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Volume 27 Number 1
FEBRUARY / MARCH 2020

Food Quality & Safety

FARM TO FORK SAFETY

NEW TECHNOLOGIES IN TRACEABILITY

Innovative digital efforts aim to improve food safety and prevent outbreaks

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Salt Safety Insights

What's In Your Ingredient Sea Salt?

If it's more than just salt, should you be concerned?

If you are a manufacturer or a processor in the food business, here is a two-part question you should ask yourself: What is in my ingredient sea salt, and how can I make sure it is of the highest quality?

One way to answer that question is by performing a simple and inexpensive test, the results of which might surprise you.

Grab a sample of your current ingredient sea salt and pour the contents onto a flat surface.

What do you see?

You might be startled to find a lot of things other than the pristine, all-natural, snowy-white salt listed on the ingredient statement.

Look closely, and things such as clay, plastic, rocks, rubber, sand, seaweed, shells, sticks, bugs, and even hair may be revealed. What's more, the color of your sea salt — stained, bruised, rheumy, and sepia-toned — might appear odd and unappealing.

This isn't just an issue of aesthetics. Dirty sea salts are a serious concern for food manufacturers and processors facing increasing scrutiny from third-party auditors who monitor food safety, as well as consumers who expect high-quality ingredients in their food and are willing to pay premium prices for them.

With that in mind, here are three simple things you should know about your ingredient sea salt.

Anti-Caking Agents

By its very nature, salt is a thirsty compound. Its hygroscopic profile means that, if not packaged or stored properly, salt will absorb and retain moisture from the air, causing it to stubbornly clump, harden, or turn sticky.

As a workaround, most salt suppliers add "anti-caking agents" — a tame euphemism for sodium ferrocyanide, sodium silicoaluminate, tricalcium phosphate, and other compound additives that aim to keep their packaged salt dry, yet still seem to work against the clean-label pedigree and spirit that many salt suppliers try to achieve and convey.

Take a few seconds to review the contents of your ingredient sea salts. Do they include any other chemicals? If so, it might be time to switch to a more clean-label ingredient product.

Water Sourcing

Sea salts contain traces of sand, shells, rocks, and other natural insolubles that require some processing to remove. Still, where your ingredient salts are sourced makes a huge difference.

If you want to use the highest quality and safest food-grade ingredient salt possible, it makes sense to choose a sea salt that is crystallized from the world's cleanest oceans.

Proper Packaging

If a salt supplier wants to show off the clean, safe, and pure qualities of their ingredient salts, why would they pack their products in opaque polyethylene bags, coarse cardboard containers, or fibrous paper sacks?

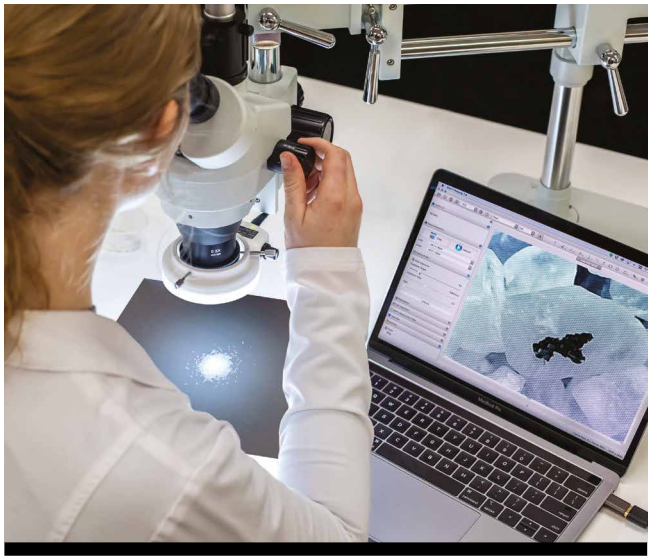
Such packaging makes visual inspection nearly impossible, and some of the materials used to create the packaging — including paper, glue, or string used to seal the packages — can turn up and contaminate the salt.

When packaged in clear containers and bags, salt has nothing to hide. It's an

invitation for you to visually inspect what you are purchasing, and a simple thing to consider when choosing who will supply your ingredient salts.

The Answer Is SaltWorks®

Meeting – and exceeding – all of these expectations, SaltWorks' all-natural, unrefined, and clean label ingredient sea salts offer delicious and balanced flavors.



A CLOSER LOOK
SaltWorks certified QA Technicians identify contaminants with careful examination.

SaltWorks selects the world's cleanest seawaters from which to source all of its salts. For example, two of the company's most popular ingredient brands are Pure Ocean® Sea Salt and Polar® Cold Water Sea Salt®, which is sustainably harvested from the pristine and frigid waters of the Antarctic Ocean — revered for its icy-cold, highly ventilated, and hypersaline qualities. Moreover, the sparkling white color and clean-tasting flavor of this ingredient salt evinces its uniquely pristine source.

All of SaltWorks' bulk products are packaged in airtight, multi-layered, vapor-proof bags with large inspection windows. The company's consumer packaging is clear as well, and features moisture barrier seals that foster a longer shelf life.

When sourcing your ingredient sea salts, it makes sense to consider all of these factors so you can offer your customers the cleanest, safest, and highest quality product available.

Learn how SaltWorks produces the best Ingredient Salt available

OFF-THE-SHELF COMPARISON

All ingredient salts are not created equal.

QUESTIONS TO ASK YOUR SALT SUPPLIER

In addition to knowing how ingredient salts are sourced, processed, and packaged, food processors and manufacturers should ask the following questions when making the most informed purchasing decisions:

Q: Is my salt supplier registered with the U.S. Food and Drug Administration (FDA) and in compliance with Food Safety Modernization Act (FSMA) regulations?

A: SaltWorks' facility in Woodinville, Wash., is registered with the FDA and in compliance with the requirements of the FSMA. In addition, the company holds certifications with the Global Food Safety Initiative (GFSI), Safe Quality Food (SQF) Institute, Good Manufacturing Practices (GMP), and Hazard Analysis Critical Control Point (HACCP).

Q: Are my raw ingredient salts from a single, trusted, and reputable salt source and supply chain – ensuring consistent quality and supply?

A: SaltWorks has relationships with trusted and reputable production partners who are required to register with the FDA. Moreover, as a member of the Supplier Ethical Data Exchange, or Sedex, SaltWorks holds its suppliers to a strict standard of ethical practices.

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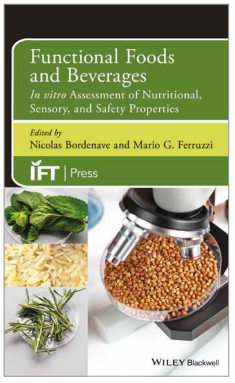

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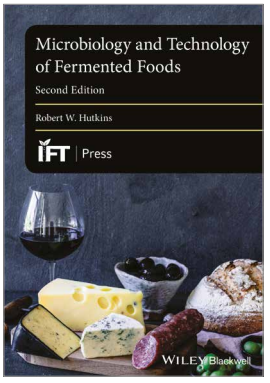

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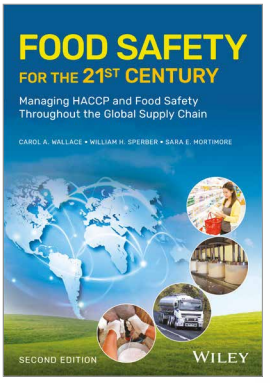

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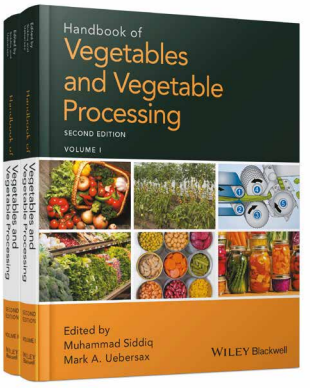

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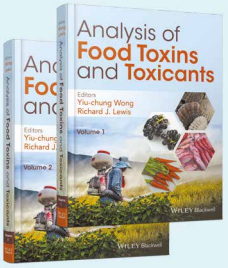

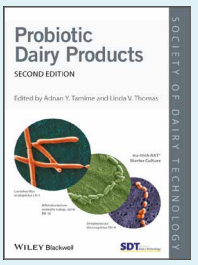

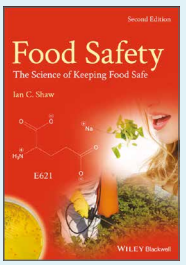

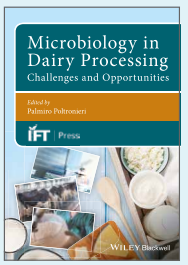

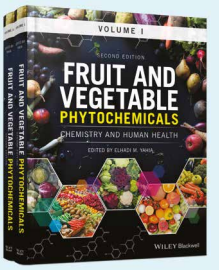

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From The Editors

I jokingly tell friends and colleagues that I am quite lazy. Their response is usually something like, "Oh, no, Rick, you work really hard," which is quite flattering. While I believe in hard work, I also believe in working smart, and that's where my reference to being lazy comes in.

Let me explain: People in all industries should work smart, and this is especially true in the food industry. When developing, documenting, and implementing a food safety, food quality, sanitation, food defense, or any one of the many other programs needed to protect your brand and your customer, the goal isn't simply to put procedures on paper, but to build programs that are both efficient and effective.

Working smart means that processors shouldn't try to put programs together based on timelines, but instead build them slowly and thoughtfully so that the plans will meet their needs and anticipate potential problems. This is one good reason to encourage your quality and safety people to conduct comprehensive risk assessments as required by the preventive controls for human food regulation found in 21 CFR Part 117.

Working smart means building those effective and efficient programs properly the first time around. This same mentality also applies to improvements to the physical plant, changes to current protocols, and any other element in a program in your plant. This is why many companies have implemented a change management program. This is a program that encourages processors to fully evaluate the potential risks and benefits of a proposed change before executing it. It's kind of like the carpenter's mantra, "Measure twice and cut once"; the goal is to maximize the chances of doing it properly.

This gets us to the comment about being lazy. I firmly believe in putting forth the time and effort up front to help minimize potential problems. If you build a good program, your effort goes toward maintaining the program and monitoring its efficiency. And, if needed, the program can be improved with small tweaks. Maintenance is much cheaper and easier than having to fight fires, hence the use of the term "lazy."

The editors of *Food Quality & Safety* sincerely hope that the information we provide will give you and your operations information to not only develop, document, and implement effective and efficient programs, but that this information helps you work smarter and be a bit lazy yourself.

Richard Stier
Co-Industry Editor

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NEWS & NOTES

LGMA Changes Irrigation Water Practices in Response to Romaine *E. coli* Outbreaks

In late 2019, the California and Arizona Leafy Green Products Handler Marketing Agreements (LGMA) changed practices involving treatment of irrigation water in response to *E. coli* outbreaks involving romaine lettuce.

April Ward, marketing communications director for the LGMA, notes that the rules regarding agricultural water have been changed in the LGMA Food Safety Practices and are standard for 2020. "Growers are required to categorize their agricultural water as either Type A water—generally free of indicators of fecal contamination, as in deep wells and municipal sources—or Type B water—surface waters, or all other types of agricultural water," she tells *Food Quality & Safety*. "Testing of all water sources is maintained but strengthened with more samples required and a new, stricter standard replacing previous standards that allowed some level of generic *E. coli*."

Additionally, the use of untreated surface water for overhead irrigation during the 21 days prior to harvest has been banned. Specific corrective actions are prescribed should water not meet the mandated microbial standards. "These changes were adopted following investigations into two outbreaks tied to romaine lettuce in 2018," Ward says. "In those investigations, the outbreak strains were found by the CDC in canal water in Arizona and an above-ground reservoir in California."

To comply, members must use water that meets acceptance criteria for generic *E.coli* when that water will touch the edible portion of the crop within 21 days of harvest. California government auditors will perform audits of growers to assure this is being done. "The LGMA programs include a compliance element," Ward says. "Handlers whose growers do not comply with the accepted food safety practices and who fail to conduct corrective actions, can be decertified. Decertification is a public action, and any action taken is made public."

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by Keith Loria

Australian Fires Cause Concern for Food Safety

The devastating bushfires raging across Australia have been responsible for the deaths of at least two dozen people and hundreds of millions of animals, and caused the destruction of thousands of homes and businesses.

Experts also note that the fires can pose serious food safety risks. Lydia Buchtmann, council communication director for the Food Safety Information Council in Australia, says that toxic fumes from burning materials is a concern as they may enter the food supply, as are the chemicals used to fight the fire. Additionally, the fire's heat can aid bacteria in multiplying in food.

The council has put out a list of recommendations for consumers to guide them to food safety, which include throwing away any food that has been near the fires, including food in jars, cans, and bottles. Refrigerated food near flames should also be discarded because fumes can still penetrate a sealed refrigerator.

All utensils and dinnerware that may have been exposed to fire-fighting chemicals should be soaked in soapy hot water and sanitized with a tablespoon of chlorine bleach and two liters of water.

Buchtmann notes that food should be wrapped in newspaper before being placed in a garbage can.

Additionally, Australia officials have cautioned that damaged transport links will likely lead to shortages of some fresh produce and any old fruits and vegetables should be scanned to ensure they were not in the fire's path prior to consuming.

by Keith Loria

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Minneapolis Posts Restaurant Inspections Online

In January 2020, Minneapolis unveiled a new website that allows individuals to check food safety and restaurant inspections online for all restaurants in the city.

"Back in 2015, the city of Minneapolis developed an open data portal and our clerk's office had identified that the restaurant inspection information was one of the top three data requests they receive, so they were very interested in having the data available on a more public format," says Cindy Weckwerth, director of environmental health for Minneapolis.

Logan Ebeling, a health inspector who helped design the site, says people can look up almost any food business in Minneapolis—restaurants, food trucks, or grocery stores—and see all routine and follow-up health inspection reports for the current year and three prior years. "Users of the site can drill down a little bit beyond just a presented score, calculated through the violations the inspector saw, and dig in and see each violation, which code of ordinances were referenced in the violation, and the inspector's comments and what might have been done to correct on site," he says.

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Twenty-two current inspectors in the city write their own comments and enter violations into the system, and there's a seven-day delay before reports hit the site to give business owners or chefs time to see the report, review it, and reach out with any questions in case of mistakes. Follow-up inspections get posted immediately.

In its first two weeks of being active, the site has had more than 41,000 hits and even crashed in its first days because of the high demand. "This is information that people want, which is confirmed by the views," Weckwerth says. "Anecdotally, we're hearing a lot of people are going and looking at their favorite restaurants, checking out others before going to a new restaurant, and finding out information they think is important."

The site can be reached at: public.tableau.com/profile/city.of.minneapolis2463#!/vizhome/shared/QTYCRZMTG

by Keith Loria

New Requirements for Produce Companies that Supply the Canadian Market

As of Jan. 15, 2020, fresh produce companies supplying the Canadian market are subject to new requirements under the Safe Food for Canadians regulations.

Tammy Switucha, senior director of the food program integration division with the Canadian Food Inspection Agency, says the new regulations impact licensed fresh fruit or vegetable businesses as well as growers and harvesters of fresh fruit or vegetables for export or interprovincial trade. "Canada was looking to modernize its food safety legislation and regulations so there was more emphasis on the prevention of food safety risks by producers," she tells *Food Quality & Safety*. "We wanted to provide Canadians with an advanced level of protection and feel more consumer confidence in the food supply."

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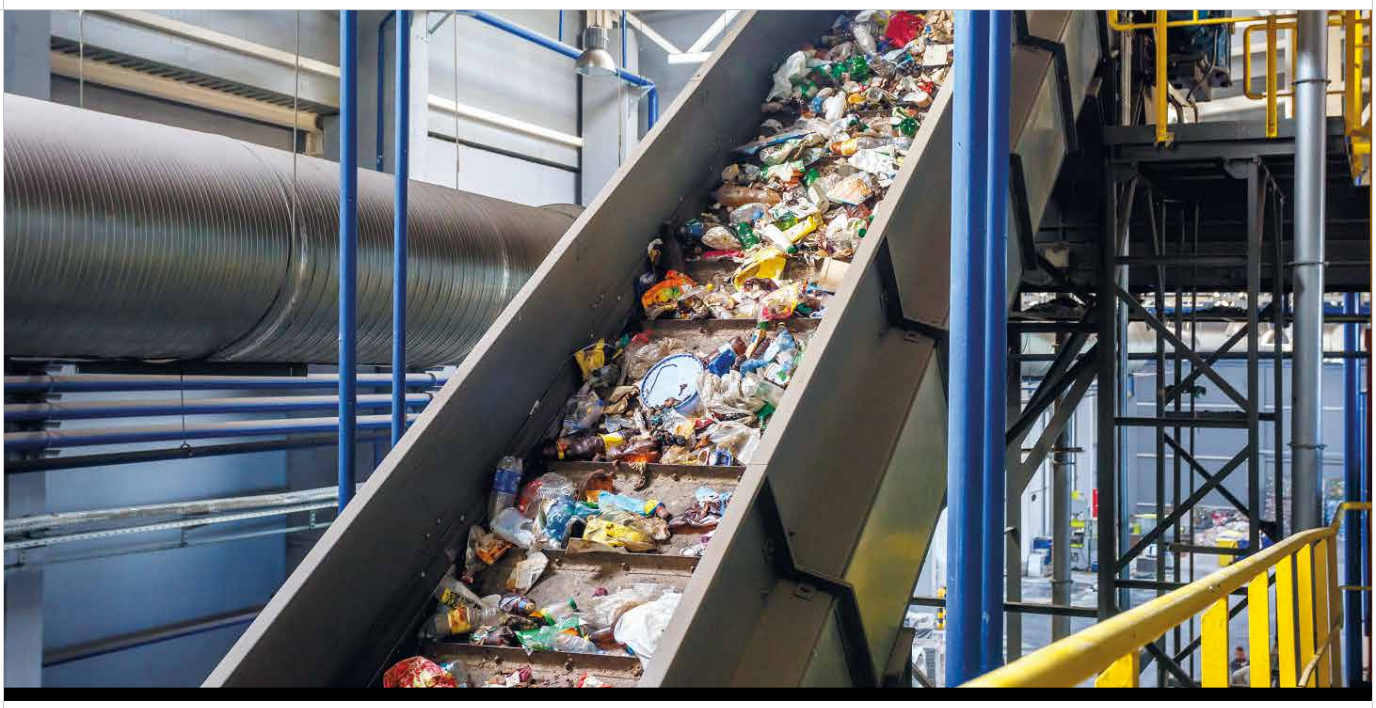
As per the new regulations, producers need to ensure that they have preventive control in their production facilities where their business is located, in addition to a plan that outlines the risks and control measures they've taken. "They must also meet the traceability requirement, which has a record-keeping component to it, and documents that trace their food one step forward and one step back," Switucha says.

Producers whose gross annual food sales are higher than $100,000 and growers or harvesters whose gross annual sales from interprovincial transactions are more than $100,000 will also be required to have a written preventive control plan.

Switucha says that the new requirements establish the expected food safety outcomes to prevent food safety hazards and help prevent contaminated and non-compliant food from entering the Canadian market. "Businesses are encouraged to familiarize themselves and implement preventive control requirements ... to comply with the new requirements," she says. "We understand these rules are new and we will balance the need for protection with the opportunity to bring everyone into compliance."

by Keith Loria

Washington Report



The Plastic Problem

New legislation may require the food industry to share recycling responsibility

BY **AMANDA MCCORQUODALE**

While growing concern over plastic pollution and climate change is prompting new legislation at the city and state levels, single-use plastic bans and extended producer responsibility (EPR) regulations may soon be passed at the federal level as well. Senator Tom Udall (D-NM) and Congressman Alan Lowenthal (D-CA) recently circulated a discussion draft of a bill that amends the Solid Waste Disposal Act, originally passed in 1965. Specifically, the proposed law would ban certain single-use plastics, institute a 10-cent nationwide container deposit, place a moratorium on new plastics facilities, and require producers and users of plastics to take responsibility for collecting and recycling materials.

As written, the bill requires companies that produce certain products to pay for and coordinate the recycling collection, sorting, and cleanup of any plastic waste associated with their products. While that would be a major shift for the U.S. market, we are the only industrial country that does not require industry to share the responsibility of recycling programs, according to Claire Koelsch Sand, a board member of the Institute of Food Technologists and owner of Packaging Technology and Research, a consulting group based in Stillwater, Minn. "The proposed legislation is in line with what global companies, packaging suppliers, and consumers have employed effectively to fund collection and sorting since the early 1990s," she says. "The technology and logistical roadmaps are there for rapid adoption in the U.S."

Others in the field note that the topic of recycling programs shouldn't be about pointing fingers in terms of who pays. "This is a shared responsibility between municipalities, consumers, and industry," says Nina Goodrich, director of the Sustainable Packaging Coalition and executive director of GreenBlue, a nonprofit organization focused on sustainability based in Charlottesville, Va. "We need to build awareness in the community and to recognize that all pieces of the value chain have some level of responsibility."

Industry Response

Without federal regulations, industry has approached the problem of plastic waste in a number of ways. In the 1990s, designers streamlined packaging to use as little plastic as possible. Next, the industry experimented with alternative materials such as metal, glass, and paper, which also proved problematic in terms of their carbon footprint. "Material switches are like moving deck chairs while the Titanic

is sinking," says Sand, pointing out that transporting heavy yet recyclable glass bottles, for example, results in unwanted carbon emissions.

Industry has also experimented with using biodegradable materials—think six-pack rings made of barley and wheat remnants that are a byproduct of the brewing process—although those might introduce more problems than they solve. "First, it's never a good idea to intentionally create packaging that is litter friendly," says Goodrich. "Second, 'biodegradable' is a very vague term that doesn't have time or temperature boundaries that can be proven," she adds.

Compostable containers may be a good solution in closed systems such as stadiums where a large quantity can be composted in a controlled environment. However, composting also creates greenhouse gases, creating other unintended environmental consequences, notes Sand.

A New Focus

The latest approach focuses on the hurdle of collection and sorting. To that end, industry has recently made great strides in its understanding of what interferes with the ability of a material to be sorted or reprocessed. "You may start out with a 100-percent recyclable PET bottle but then add a metal closure on a cap or use ink, coatings, adhesives, or labels that aren't recyclable, and that product goes straight into residual trash," says Goodrich, adding that the Association of Plastic Recyclers offers resources that pinpoint which label manufacturers have passed the organization's critical guidance tests.

There's also an emphasis to make clearer and more prominent how-to-recycle labels on packages. "Switzerland's recycling rates for PET are somewhere approaching 90 percent," says Sand, "so it could be just as simple as [creating] better labels that help consumers pre-sort better so that facilities have less sorting to do."

The Sustainable Packaging Coalition launched a How2Recycle program in 2012 that works with brands to complete an evaluation of a product's recyclability and create a standardized labeling system that clearly communicates recycling instructions to the public. "We have given more than 80,000 recommendations to date," says Goodrich. "The industry is getting much wiser in terms of what types of labels and adhesive to use to make sure their package stays recyclable and communicate that to consumers."

In fact, major brands such as Anheuser-Busch, Danone, Kellogg, McCormick, and Nestlé have made public commitments to make their packaging 100-percent recyclable, reusable, or compostable by 2025 via multifaceted initiatives and aggressive timetables. "This has really been gathering steam in the last six months," says Goodrich.

For example, Fuji pledged to make all of its plastic bottles from 100-percent recycled plastic (rPET); Coca-Cola pledged to make all of its packaging recyclable by 2025, and to use 50 percent recycled content by 2030; and PepsiCo has stated that its goal is to make 100 percent of its packaging recyclable, compostable, or biodegradable by 2025 and reduce its use of virgin plastics by 35 percent.

The more plastic that's recycled, the more recycled plastic will be available to manufacturers to use in new packages, creating an efficient circular system and feedback loop.

How Tech Can Help

Sorting materials, particularly in single-stream recycling systems popular in the U.S., is a time-consuming task that technological advances may help streamline. Whereas a worker may be able to sort 30 to 40 items per minute, a robot could double that rate and an optical sorter may get through upward of hundreds or even thousands of picks per minute via machine-learning software and sensors that recognize visual patterns associated with specific items.

Meanwhile, flex wrap plastic packaging is uniquely difficult to collect and sort. For one, it's often a multi-layered material, all of which may not be recyclable and is difficult to separate to sort. Bread bags, which are made from the same material as milk jugs, should be recyclable but they are a handling nightmare for the facilities because they get sucked into the machines.

Advanced flex wrap packing that's cost effective to produce and won't add to pollution is currently being researched and developed. One company is experimenting with extracting the protein from natural silk to create a protective layer to wrap produce in place of single-use plastic, for example. Meanwhile, the industry may want to consider novel solutions, says Sand. "With the difficultly with recycling flex wrap, maybe this is a case where a compostable option should be considered," she says. "Or can we treat them like corrugated cardboard and compress them into a more easily handled form?"

Despite novel solutions and tech, some argue the biggest hope for addressing plastic pollution involves putting an economic, environmentally based price tag on packaging. "The reason that aluminum is recycled at high rates in the U.S. is because it's economically valuable," says Sand. "If recycled PET's value went up, then, boy, we would figure out how to recycle it." ■

> The proposed law would ban certain single-use plastics, institute a 10-cent nationwide container deposit, place a moratorium on new plastics facilities, and require producers and users of plastics to take responsibility for collecting and recycling materials

McCorquodale is a freelance writer who covers food service equipment, food service management, tech solutions in the food industry, and consumer trend reports. Reach her at amandamccorq@gmail.com.

Market Initiatives

Queuing Up for Crustaceans

From marine habitats to popular meals, quality and safety are scrutinized throughout the crustacean supply chain

BY **LINDA L. LEAKE, MS**

Consider the crustaceans, arthropods that feature a hard exoskeleton composed of the carbohydrate chitin and calcium carbonate but have no internal skeleton. While there are nearly 68,000 known species of crustaceans, as per ecologists and co-authors Alan Covich, PhD, James Thorp, PhD, and D. Christopher Rogers, PhD, the ones most popular as human consumables are decapods—specifically lobsters, crabs, shrimps, prawns, and crayfish.

In 2017, the highest landed value U.S. commercial seafood categories were salmon ($688 million), crabs ($610 million), lobsters ($594 million), and shrimp ($531 million), according to National Oceanic and Atmospheric Administration (NOAA), per its most recently available data.

Blue crab is the largest crab fishery by volume in the United States and is mainly harvested in coastal bays and estuaries along much of the Atlantic coast and the Gulf of Mexico. In 2017, 147,725,136 pounds of blue crab were landed in the U.S., valued at $197,359,499; the landed value for Dungeness crab exceeded that of blue crab ($213,509,758 for 61,571,073 pounds), according to NOAA. Commercial value notwithstanding, shrimp has consistently been the No. 1 seafood consumed in the United States at 4.4 pounds per person in 2017, NOAA Fisheries reports.

There are three commercial lobster fisheries in the United States: American lobster, *Homarus americanus*, a clawed lobster; and two spiny species: the Caribbean lobster, *Panulirus argus*, and the California lobster, *Panulirus interruptus*, according to Richard Wahle, PhD, a professor in the School of Marine Sciences at the University of Maine (UMaine), Orono, and director of UMaine's Lobster Institute.

As a center of scholarship and outreach in UMaine's College of Natural Sciences, Forestry, and Agriculture, the Lobster Institute strives to foster collaboration and communication in support of a sustainable and profitable lobster industry in the Northeast U.S. and Canada, Dr. Wahle says. "Institute staff engage with lobster scientists, fishery managers, health regulators, and legislators to address industry priorities through collaborative research, educational workshops, and conferences," he adds.

Most-Valuable Species

"The American lobster comprises the most valuable single-species fishery in the United States," Dr. Wahle emphasizes. "Of all the various species of edible fish and aquatic invertebrates sold commercially in the U.S., the American lobster boasts the greatest total annual landed value."

H. americanus is native to the northwest Atlantic coast from offshore North Carolina to the Canadian province of Labrador. "The species is especially abundant in the Gulf of Maine, the Scotian Shelf, and the southern Gulf of St. Lawrence, encompassing from south to north the states of Massachusetts, New Hampshire, and Maine, and the provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Quebec," Dr Wahle says.

The Gulf of Maine produces 90 percent of the U.S. lobster harvest, with 80 percent coming from Maine alone, he notes. "Massachusetts ranks a distant second place in U.S. lobster harvest," Dr. Wahle adds. "Additional states contributing minor amounts commercially include Rhode Island, Connecticut, New York, and New Jersey. Very small amounts are harvested in North Carolina offshore deep water."

In 2016, 120 million pounds of live American lobsters were harvested in the U.S., with a landed value of $530 million,

Dr. Wahle reports, adding that the Maine lobster harvest peaked in 2016. "In October 2019, the Maine Department of Marine Resources reported that the 2019 Maine harvest was down by some 20 percent to 40 percent from the previous year, but harvesters have reported a strong fall run," Dr. Wahle says. The total 2019 Maine lobster harvest is forthcoming.

New Research Underway

In 2019, the U.S. Congress appropriated $2 million in federal funds for lobster research administered by the NOAA Sea Grant Program. "The initiative supports seven new research projects in the Northeast and an expansion of the exiting Sea Grant extension program to include a lobster specialist," Dr. Wahle says. "The research will address critical gaps in knowledge about American lobster responses to environmental change and how to provide opportunities to increase economic resilience and adaptation in the lobster fishery. The goal of this initiative is to shed light on how to preserve the *H. americanus* fishery. This is especially important because lobster quality depends in large part on species sustainability."

Using his two-year $399,293 Sea Grant funding, Dr. Wahle will examine the disconnect between historic highs in lobster egg production in the Gulf of Maine and low numbers of young-of-year recruits showing up in coastal nurseries. "This project will help us test our hypothesis that, before larvae even settle to the seabed, their survival is limited by the supply of planktonic food in the pelagic food web," he elaborates. "To that end, we're conducting field studies to examine the association between lobster larvae and zooplankton prey. And, in the lab, we'll put new DNA sequencing tools to work in what amounts to a forensic investigation to identify prey that field-collected larvae have consumed. Studying lobster larval feeding ecology should help us better understand the links between changes in the Gulf of Maine's ocean environment and change in its iconic lobster fishery, a key economic driver in our coastal communities."

Another of the seven Sea Grant projects is led by Damian Brady, PhD, an ecosystem modeler in UMaine's School of Marine Sciences. Dovetailing Dr. Wahle's project, Dr. Brady is using his two-year $399,994 grant to further explore the potential effects of climate warming on the early life history of *H. americanus*. "His team is developing a modeling system to examine effects of three key moving targets: location and timing of spawning, larval transport, and the distribution of a thermally suitable nursery habitat," Dr. Wahle relates.

Three issues will likely impact the availability of quality crustaceans in the years ahead, namely, water quality, reduced harvest pressure, and disease control.

Lobster Education

Established in 2010, the Lobster Academy is an annual four-day program dedicated to increasing the value of *H. americanus* worldwide for all related stakeholders, including fishermen, buyers, and consumers, according to Robert Bayer, PhD, UMaine professor emeritus of animal and the veterinary sciences, as well as the Lobster Academy's founder. Dr. Bayer is also Dr. Wahle's predecessor as director of the Lobster Institute.

The Lobster Academy is held at the Huntsman Marine Science Centre in St. Andrews-by-the Sea, New Brunswick. Academy tours and demonstrations are also conducted on nearby Deer Island, which is home to the world's largest natural live lobster pound. (A pound is a commercial enclosure filled with circulating water in which lobsters are kept alive pending sale. Deer Island's pound is considered natural because it is outdoors and fed by sea water tides.) The pound's owner, Paturel International Company, a subsidiary of East Coast Seafood Group, packs and ships millions of pounds of live lobsters around the world annually, the firm reports.

"We focus on providing quality education and discovery for international and domestic lobster buyers, importers, culinary professionals, and other industry leaders," Dr. Bayer says. "We provide hands-on training aboard a lobster boat and in a lobster processing plant." To date, some 300 professionals associated with lobster have attended the academy, he notes. "The curriculum reflects industry issues including traceability, sustainability certification, demand, pricing, processing, regulatory issues, and marketing opportunities," Dr. Bayer elaborates, emphasizing that the major issue affecting lobster quality is handling live lobsters in a way that minimizes mortality and shrinkage.

While lobsters are harvested in Maine year-round, fishing diminishes there during the winter, Dr. Bayer says. "But, in Canada, the most important hard-shell season runs from November to spring," he relates. "Lobsters are more rugged and ship well during that time."

Growth of Processed Lobster Products

The number of larger lobster processing facilities in Maine—those processing more than 100 crates of live lobsters, or approximately 10,000 pounds, per day—has increased over the past 10 years from two or three facilities to eight, according to Jason Bolton, PhD, UMaine Cooperative Extension food safety specialist. Dr. Bolton works with food companies, including lobster processors, on facility design, good manufacturing practices, sanitation standard operating procedures, hazard analysis and critical control points implantation, thermal process validation, regulation interpretation, and new product development. He's also an instructor at the Lobster Academy.

"While most lobsters caught in Maine are sold live, especially for the export

(Continued on p. 49)

Legal Update

In Search of the Meaning of "Meat"

Divergent judicial decisions may portend a lengthy legal battle

BY **JOEL S. CHAPPELLE, ESQ.** AND **SHAWN K. STEVENS, ESQ.**

The English language—being an inchoate amalgamation of geographically and culturally distinct languages—is replete with quirks and oddities. There are words that are pronounced the same but are spelled differently (tare, tear), words that are spelled the same but are pronounced differently (tear, wind), and words that share pronunciation and spelling, but have widely divergent meanings (pen, bat).

For food companies doing business the United States, the linguistic idiosyncrasies of the English language are nothing to sneeze at. So is the legal case regarding the word "meat"—in fact, often the different courts will interpret the same things differently. This article explores recent legislative attempts to constrain the use of the term "meat," and the legal battles being waged in response to that legislation.

The online Merriam Webster dictionary offers five different definitions of "meat." The most expansive definition is, simply, "food." A somewhat narrower definition describes meat as the edible portion of food "as distinguished from its covering (such as a husk or shell)." Nevertheless, this definition still encompasses an enormous array of foods, from coconuts, to bananas, to pistachios, to turtles, to shrimp. Narrower still, the term can pertain specifically to the tissue of a mammal, as opposed to fowl or fish. This definition would of course exclude coconuts, but also many items commonly understood to be meat, such as chicken, turkey, or rattlesnake. Strangely, meat may also refer to the spongy tissue in the stems of most vascular plants. The archaic definition is "a meal, especially dinner." Finally, unrelated to food, meat can mean a "favorite pursuit or interest," as well as the core or heart of a matter. Meat, then, can mean many different things. As a result, the enactment of laws that significantly constrain the use of frequently applied and accurate terms is apt to result in lawsuits.

In recent years, numerous states, including Arkansas, Louisiana, Missouri, Mississippi, Montana, South Dakota, and Wyoming, have enacted so-called "truth in labeling" laws that prohibit the use of certain terms to describe products. For instance, Missouri's truth in labeling law prohibits companies from "misrepresenting a product as meat that is not derived from harvested production livestock or poultry." Does this mean that wild game isn't meat? Similarly, the Mississippi law prohibits the use of "meat terms" to describe plant-based foods. And in Arkansas, the word "meat" may only be used to describe "a portion of a livestock, poultry, or cervid [deer, elk] carcass that is edible by humans." Thus, even though poultry is included, bear, ostrich, alligator, rattlesnake, and squirrel are generally excluded. In addition, it's no longer permissible to sell "veggie burgers," in Arkansas because the law prohibits using a term that is the same as or similar to a term that has been used or defined historically in reference to a specific agricultural product.

By most indications, these "truth in labeling" laws are being enacted in response to the explosive growth of products marketed as meat substitutes, (i.e., plant-based and cell-cultured protein alternatives). The increasing popularity of these products is attributable to a confluence of cultural and technological factors: culturally, concerns about animal welfare, the environmental impact of animal agriculture, and perceptions about the nutritional value of plant-based products; technologically, companies are only now overcoming the challenges that have long made producing these foods cost prohibitive.

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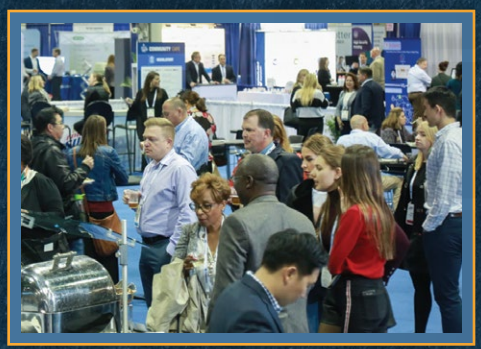

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- Download the mobile app to have a virtual Summit in the palm of your hands!
- Participate in the Community Discussion Groups and troubleshoot solutions with your peers.
- Attend the networking receptions to make lasting connections.
- Join the conversation at the Learning Lounge on the show floor for small group discussions on the most pressing issues.

SCHEDULE *at a* GLANCE

as of 12.2.19

MONDAY, MAY 4

TIME	CERTIFICATE/CERTIFICATION COURSES
9:00am – 5:00pm	• Professional Food Safety Auditor Training • Certified in Comprehensive Food Safety (CCFS) • Intentional Adulteration: Conducting Vulnerability Assessment • Converting HACCP in Preventive Controls/HARPC • Introduction to FDA-iRISK®

TUESDAY, MAY 5

TIME	WORKSHOPS
8:00am – 12:00pm	• Play to Win — The Food Safety 5K Competition
9:00am – 5:00pm	• Environmental Sampling for Retail Food Establishment Outbreaks
1:00 – 5:00pm	• What Am I Getting Into? Suppliers & Co-Packers Linked to Food Safety • Managing Allergens & Sanitation in Food Processing Facilities • Practice Improves Performance — Internal Audits for Food Processors • Food Fraud Best Practices and Implementation
5:00 – 7:00pm	**WELCOME RECEPTION ON THE SHOW FLOOR**

WEDNESDAY, MAY 6

TIME	COMMUNITY DISCUSSION GROUPS
8:00 – 9:00am	• Foodservice/Retail • Manufacturing/Processing/Distribution • Regulatory • Fresh to the Industry
9:15 – 10:30am	**KEYNOTE ADDRESS** **Back to Basics: Consumer-Focused Food Safety**
10:30am – 2:30pm	**EXHIBIT HALL OPEN** • Solutions Stage and Tech Tent Presentations • Community Round Tables and Learning Lounge

Details on Page 14

WEDNESDAY, MAY 6 *cont.*

2:45 – 4:00pm	• Food Safety Challenges of a Changing World • Difficult to Detect Organisms: Management in the Face of Uncertainty • How to Control Allergens — Bring Your Concerns and Leave with Solutions • Hepatitis A and Food Establishments
4:15 – 5:30pm	• Novel Processing Technologies — Validation, Application, Regulation • Process HACCP — Active Managerial Control and the Food Code • Supply Chain Traceability: Collaboration, Momentum and Food Protection • Foodborne Outbreaks in the News in 2019
5:00 – 7:00pm	**NETWORKING RECEPTION**

THURSDAY, MAY 7

TIME	EDUCATION SESSIONS
8:00 – 9:00am	• Don't Be Labeled for Having Bad Labels • Indoor Farming – Review of the Safety of Hydroponic Products • Risk Communications with Consumers During Outbreaks: A Research-Based Approach • Up in Smoke (CBD) and Experiencial Foods Trends
9:15 – 10:30am	**TOWN HALL** **75 Minutes of Q&A with the Top Regulators and Advisory Groups**
10:30am – 2:30pm	**EXHIBIT HALL OPEN** • Solutions Stage and Tech Tent Presentations • Community Round Tables and Learning Lounge
2:45 – 4:00pm	• Partners with a Common Purpose • Implementation of Preventive Controls for Human Food and Other FSMA Rules — Where Are We today? • Meet the Editors — Discuss Hot Topics • Foodborne Illness Outbreak Mock Criminal Trial — A View from the Jury Box
4:15 – 5:30pm	• **CLOSING SESSION:** An Interactive Discussion with Food Safety Professionals on How to Successfully Develop and Implement a Food Safety Program

Details on Page 14

Visit www.FoodSafetySummit.com for detailed descriptions of each session!

CERTIFICATE / CERTIFICATION *courses*

All courses include breakfast, lunch and breaks, books/training material and certificate. Multi-day courses also include full conference access to education sessions, Keynote and Town Hall, receptions and exhibit hall floor during non-course hours. **See page 13 for pricing.**

Professional Food Safety Auditor Training[2]

Monday, May 4 & Tuesday, May 5 | 9:00am – 5:00pm

This 2-day training is designed to strengthen and enhance the skills, knowledge and critical thinking behaviors attributed to a qualified food safety auditor in the post FSMA environment. It provides the participant with a comprehensive review of good auditing practices, written and verbal communication skills and preventive controls based technical knowledge using exercises, case studies and other interactive learning techniques. A hypothetical third party certification audit provides the framework for this course. Participants will receive a certificate of completion after successful completion of the course.

LEAD INSTRUCTOR **Donna Schaffner**
Rutgers Food Innovation Center

Certified in Comprehensive Food Safety (CCFS)[1 2]

Monday, May 4 & Tuesday, May 5 | 9:00am – 5:00pm

The CCFS study course and credential provide a strong core knowledge base for food safety professionals who perform the primary function of overseeing production, processing, and manufacturing environments of the U.S. and imported food supply. It has been designed to meet the increasing need for highly qualified food safety professionals from both industry and the regulatory community that provide oversight in preventing food safety breaches at U.S. production and manufacturing facilities and abroad. The participant learns not only the Preventive Controls and Foreign Supplier Verification programs, but how to create food safety plans that meet the requirements.

The course will give participants the in-depth knowledge necessary to be a qualified individual (QI) in developing, deploying, managing, and inspecting food safety plans for food products and facilities in the U.S. and abroad.

The credential, for those who apply for and pass the assessment, demonstrates to all that the holder has mastered the knowledge needed to create, manage, or audit a facility's food safety system.

LEAD INSTRUCTORS **Tara Paster**
Paster Training, Inc

Melissa Vaccaro, BSEd., MS, CP-FS, CPFM
Paster Training, Inc

Intentional Adulteration: Conducting Vulnerability Assessment

Monday, May 4 | 9:00am – 5:00pm

The FDA's Food Safety Modernization Act rule: Mitigation Strategies to Protect Food Against Intentional Adulteration (21 CFR Part 121) (IA Rule) requires that covered facilities develop and implement a food defense plan that protects the facility's most vulnerable points from acts of intentional adulteration intended to cause wide scale public health harm. The points in a facilities operation that have these significant vulnerabilities are called "actionable process steps". According the IA rule, individuals assigned to work at actionable process steps and their supervisors, are required to receive training in food defense awareness (21 CFR 121.4(b)(2)). This "Food Defense Awareness for the Intentional Adulteration Rule" is designed specifically for those individuals and will meet the food defense awareness training requirement within the IA rule.

LEAD INSTRUCTORS **Charlie Kalish,** Food Safety Guides
Nancy Mussack, Smithfield

Converting HACCP in Preventive Controls/HARPC

Monday, May 4 & Tuesday, May 5 | 9:00am – 5:00pm

This workshop is designed for participants wanting assistance with developing and implementing the specific required elements of the FSMA Food Safety or HARPC Plan to completion. The flow and content of this course is an alternative way to re-learn or refresh the PCQI's knowledge and understanding of how to develop a robust FSMA Food Safety Plan. PCQI's will get additional education, real examples, and advanced knowledge on what elements are required to be in a Preventive Controls Food Safety Plan. They will walk away with a clear understanding on when to apply Preventive Controls effectively and what documents and records must be included.

Designed to help PCQIs that need to convert their existing HACCP Plans into a FSMA Food Safety Plan (aka HARPC): this new course focuses on properly identifying food safety hazards, identifying which control measures are needed, and developing a comprehensive Hazard Analysis and robust Preventive Controls. By using real food processing examples, the participant can better relate to the material and bring newfound knowledge into their job function.

LEAD INSTRUCTOR **Nancy Scharlach**
FSMA International, LLC

1 Includes the CCFS Study Manual, a $209.00 value. The CCFS Manual will be shipped prior to the class. Students should go through the book and be familiar with the materials before arrival.

2 Individuals interested in taking the CCFS or CFSSA exam at the Summit must apply directly to NEHA and submit their application, fees, and required documents by April 1, 2020. Please email credentialing@neha.org or call 303-756-9090, ext. 339, if you have any questions.

Introduction to FDA-iRISK®

Monday, May 4 & Tuesday, May 5 | 9:00am – 5:00pm

Participants will be introduced to FDA-iRISK®, a Web-based, comparative risk assessment tool. This peer-reviewed tool has many built-in functions and automated features that allow users to conduct fully probabilistic risk assessments relatively rapidly and efficiently. It enables users to build, view and share scenarios that reflect their real-world or theoretical food safety issues, without requiring extensive risk assessment modeling experience. As part of the course we will provide attendees a guided, hands-on opportunity to explore the tool and develop food-safety risk scenarios. The course requires a laptop (or tablet) and the ability to log onto the Internet which will be provided.

LEAD INSTRUCTOR **Emma Hartnett**
Risk Sciences International, Inc.

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The Food Safety Summit's educational content is selected, developed and presented in large part by the 2020 Educational Advisory Board (EAB). This highly motivated, volunteer group is made up of industry leaders representing all key areas that are important to food safety professionals including Manufacturing, Foodservice, Regulatory, Academia, Retail and Distribution.

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OPENING SESSION *TUESDAY, MAY 5*

8:00am – 12:00pm *Session 1*

Play to Win — The Food Safety 5K Competition

SESSION HIGHLIGHTS:

Join an interactive journey through cross contamination scenarios and hands on simulations of food safety opportunities. The journey will include incidents, accidents, oversights, hits and misses. Allergens, Foreign Material contamination, pathogens and spoilage will be the focal point. Most important are the takeaways which employ appropriate tools and methods appropriate for Preventive Controls including cleaning, training, documentation and a food safe culture for the audience to take home.

Teams will engage on an interactive journey of hands-on preventive controls and thought-provoking challenges to out compete other teams. The competition will be a learning session to help you understand the seemingly simple controls but complex requirements for compliance. Winning teams will be rewarded for their knowledge and teamwork.

Team from Commercial Food Sanitation:

Joe Stout, President
Darin Zehr, General Manager
Richard Brouillette, Food Safety Director
Dan Schmitz, Director of Operations

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EDUCATION TUESDAY, MAY 5

9:00 am – 5:00 pm — *Session 2*

Environmental Sampling for Retail Food Establishment Outbreaks*

SESSION HIGHLIGHTS:

- Explain how environmental sampling supports activities such as environmental assessment and foodborne outbreak investigations.
- Recognize environmental pathogen niches within retail food establishments via hygienic zoning concepts.
- Demonstrate proper aseptic gloving and sampling techniques through hands-on activities with sampling tools on real life retail food establishment equipment.
- Learn, practice and demonstrate environmental sampling concepts that illustrate the pathway of disease transmission from the environment to those who became ill, and ultimately advance prevention.

**All day session — Registration required, includes lunch*

PRESENTERS

Adam Kramer, Centers for Disease Control and Prevention

Steve Mandernach, Executive Director, AFDO

1:00 pm – 5:00 pm — *Session 3*

What Am I Getting Into? Suppliers & Co-Packers Linked to Food Safety

SESSION HIGHLIGHTS:

- Delve into potential controls and solutions to some of the common challenges around supply chain short-falls and problematic co-packers.
- Elucidate potential controls for common operational challenges due to food safety issues coming from your supply chain.
- Discover best-practice solutions for creating effective partnerships with your supply chain & co-packers.

PRESENTERS

Deb Kane, J&J Snack Foods Corp.

Eva Szewczyk, Rutgers University Food Innovation Center

1:00 pm – 5:00 pm — *Session 4*

Managing Allergens & Sanitation in Food Processing Facilities

SESSION HIGHLIGHTS:

- Learn better ways to build robust Sanitation and Allergen Control Programs in food processing facilities.
- Hone operational skills for food plant sanitarians and their managers, including development of more effective documentation.
- Develop a reliable methodology for revising existing Sanitation Programs and enhancing compliance with Allergen Preventive Controls.

PRESENTERS

William Lachowsky, Safe Food Canada

P.C. Vasavada, Ph.D., PCV & Assoc. Food Safety Consulting

Jason Bolton, University of Maine Extension

Sponsored by intertek alchemy

1:00 pm – 5:00 pm — *Session 5*

Practice Improves Performance — Internal Audits for Food Processors

SESSION HIGHLIGHTS:

- Learn essential details to develop, perform, review and correct an internal auditor program for food processors.
- Hone auditor performance skills and improve audit reporting.
- Develop a reliable methodology for revising existing Internal Audit Programs and Corrective Actions.

PRESENTERS

Kara Baldus, Hydrite Chemical Company

Joseph Meyer, Kerry Inc.

WELCOME RECEPTION *on* THE EXHIBIT HALL FLOOR

Tuesday, May 5 | 5:00 pm – 7:00 pm

Kick off your first evening with a Welcome Reception in the Exhibit Hall. This networking reception has become a Summit favorite as it provides the opportunity to connect with peers, chat with representatives and get a sneak peek at the variety of displays, while enjoying delicious food and drinks throughout the Exhibit Hall.

Open to all registered attendees.

1:00 pm – 5:00 pm — *Session 6*

Food Fraud Prevention - Introduction, Implementation, and Management

SESSION HIGHLIGHTS:

- Hear an industry focused "Food Fraud Annual Update."
- Gain insights from the standards/ audits, how to both meet compliance and also protect your company.
- Learn "How to Start and how Much is Enough."

PRESENTERS **John Spink, Ph.D.,** Michigan State University
Roy Fenoff, The Military College of South Carolina

EDUCATION WEDNESDAY, MAY 6

8:00 am – 9:00 am • Conference Center Meeting rooms

COMMUNITY DISCUSSION GROUPS

Foodservice/Retailer Community Group — *Session 7*

Learn from the pros in the food service and retail segment. Attendees will hear from industry experts from Wendy's, Topco, HEB Grocery Stores and participate in a discussion about pressing topics in this segment of the industry.

SUBJECT MATTER EXPERTS:

Craig Wilson, Costco
Jorge Hernandez, Wendy's
Glenn Stolowski, H-E-B
Mahipal Kunduru, Ph.D., Topco
Chirag Bhatt, CHB Food Safety Consulting

Processors Community Group — *Session 8*

Come to this session with your biggest challenge to your food safety program. Talk with peers, industry experts and many who may have already solved your issue to find the best way forward. Learn from experience on how to solve those most difficult challenges. Audits, FSMA, customer requirements and sustainability are all driving today's challenges. Help to develop key messaging which will be brought forward by the group to the town hall and regulatory leadership.

SUBJECT MATTER EXPERTS:

Will Daniels,
IEH Laboratories and Consulting Group
Oscar Garrison,
United Egg Producers Association
Mary Lynn Walsh, Sysco

Regulatory Challenges with Non-Traditional Food Operations — *Session 9*

Food safety regulatory challenges exist along each step of the supply chain. Non-traditional food operations, such as mobile food vehicles, temporary food establishments, shared kitchens, and online food sales offer challenges to regulatory authorities charged with the licensing and inspection of these operations. This panel will lead a discussion on the regulatory challenges for non-traditional food operations and how these operations are regulated.

SUBJECT MATTER EXPERTS:

Steve Mandernach, AFDO
Joe Corby, AFDO
Angela Montalbano,
NYS Agriculture & Markets;
Division of Food Safety & Inspection

Fresh to the Industry Professionals — *Session 10*

- Meet experts from the FDA, restaurant/retail, and manufacturing segments of the food industry to learn what career options exist across the food system.
- Network and dialogue with multiple experts across these segments.
- Learn about pitfalls and land minds to be on the lookout for in one's career.

SUBJECT MATTER EXPERTS:

Joan Menke-Schaenzer,
Van Drunen Farms/FutureCeuticals
Sharon Beals, CTI Foods
Glenda Lewis, FDA

KEYNOTE PRESENTATION

Wednesday, May 6
9:15 am – 10:30 am

Sponsored by Purell

Will Daniels
President,
Produce Division
IEH Laboratories and
Consulting Group

Back *to* Basics: Consumer-Focused Food Safety

Over time, food production has moved away from focusing on feeding a family unit to feeding millions of servings per week. This shift has forced the industry to analyze risk matrices, audit compliance and the bottom line. As a result, are we falling short of what the potential is to make safe food? Learn firsthand what is impacting food safety policy and how influences like market pressure, consumer knowledge and food safety incidents are shaping companies' ability to meet the demands and change how we do food safety for the future.

NSF FOOD SAFETY LEADERSHIP AWARDS

NSF 2020 Food Safety Leadership Awards

The NSF International Food Safety Leadership Awards recognize individuals and organizations that have made a real and lasting impact on food safety. The 2020 recipient will be awarded preceding the Keynote Presentation.

The Exhibit Hall is OPEN from 10:30 am – 2:30 pm!
Refer to pages 14–15 for information on the Solutions Stages, Tech Tent, Community Round Tables, and Learning Lounge!

EDUCATION WEDNESDAY, MAY 6

2:45 pm – 4:00 pm — *Session 11*

Food Safety Challenges of a Changing World

SESSION HIGHLIGHTS:

- Identify seven food system challenges affecting food safety and explore their interconnection.
- Understand why we need to adapt our food systems to feed the future sustainably while experiencing shifting environmental pressures, labor challenges, and legislative changes.
- Learn about the challenges impacting food safety and how food safety leaders can adopt a systems-thinking mindset to produce safe food for almost 10 billion people by 2050.

PRESENTER **Jennifer van de Ligt, Ph.D.,** Integrated Food Systems Leadership Program, University of Minnesota

2:45 pm – 4:00 pm — *Session 12*

Difficult to Detect Organisms: Management in the Face of Uncertainty

SESSION HIGHLIGHTS:

- Evaluate unanswered questions associated with non-culturable organisms such as norovirus, hepatitis A virus, Cyclospora cayetanensis, and more.
- Learn how to develop and implement control strategies when the efficacy of detection methods can't be verified.
- Conceptualize proactive prevention of future recalls and outbreaks associated with these pathogens, including developing better test methods, inactivation options, research projects, and comprehensive risk management strategies.

PRESENTER **Lee-Ann Jaykus, Ph.D.,** William Neal Reynolds Distinguished Professor, Food Science, NC State.

DEVOTED *to* COMMUNITY

The Food Safety Summit is devoted to working together as a community to achieve the common goal of keeping our worldwide food supply safe, and ensuring that the highest level of safety standards and solutions are implemented.

EDUCATION WEDNESDAY, MAY 6

2:45 pm – 4:00 pm — *Session 13*

How to Control Allergens – Bring Your Concerns and Leave with Solutions

SESSION HIGHLIGHTS:

- Evaluate manufacturing controls needed to reduce risk for undeclared allergens in foods.
- Learn suppliers' specifications and use of technology to ensure accurate allergen labeling.
- Develop analytical tools to assist with Sanitation PCs and measure sanitation effectiveness.

PRESENTERS

Deb Kane, J&J Snack Foods Corp.
Tracie Sheehan, Mérieux NutriSciences
Betsy Craig, MenuTrinfo.com

2:45 pm – 4:00 pm — *Session 14*

Hepatitis A and Food Establishments

SESSION HIGHLIGHTS:

- Learn about Hepatitis A and its prevalence in 2020.
- Identify potential ways to respond to Hepatitis A in retail food establishments and communities with elevated Hepatitis A levels.
- Discuss implementation of corrective actions in response to a potential Hepatitis A outbreak in retail food establishments.

PRESENTERS

Monique Foster, Medical Epidemiologist, Centers for Disease Control and Prevention
Roslyn Stone, COO, Zero Hour Health — A Corporate Wellness Company
Hal King, Ph.D., President, CEO, Public Health Innovations

4:15 pm – 5:30 pm — *Session 15*

Novel Processing Technologies — Validation, Application, Regulation

SESSION HIGHLIGHTS:

- Learn how processing technologies are validated.
- Evaluate key factors in pre-commercial scale up and implementation.
- Learn about regulatory approval for novel food processing technologies.
- Discuss case studies for various technologies on the development spectrum, such as high pressure UV treatment, chlorine dioxide, high intensity light, and cold plasma.

PRESENTERS

Brendan Niemira, Ph.D., U.S. Dept. Agriculture, Agricultural Research Service
Alvin Lee Ph.D., MASM, Illinois Institute of Technology, School of Applied Technology

4:15 pm – 5:30 pm — *Session 16*

Process HACCP — Active Managerial Control and the Food Code

SESSION HIGHLIGHTS:

- Learn why food safety management systems are necessary in retail foodservice.
- Learn about the components of a food safety management system.
- Learn how to implement a food safety management system in retail foodservice that will prevent foodborne illnesses.

PRESENTERS

Hal King, Ph.D., Public Health Innovations LLC
Steven Lyon, Ph.D., Chick-fil-A
Kerry Bridges, Chipotle Mexican Grill
Bill Flynn, Deloitte & Touche LLP
Glenda Lewis, FDA/CFSAN/Office of Food Safety

Sponsored by Purell

NETWORKING *reception*

Wednesday, May 6 | 5:30 pm – 7:00 pm

Join your colleagues and peers for an evening of networking and fun in a relaxed environment with good food and beverages. A perfect way to further make connections and build relationships.

Sponsored by InstantRecall

EDUCATION WEDNESDAY, MAY 6 CONTINUED

4:15 pm – 5:30 pm — *Session 17*

Supply Chain Traceability: Collaboration, Momentum and Food Protection

SESSION HIGHLIGHTS:

- Gain an understanding of the FDA regulatory position to ensure proper food product traceability.
- Recognize the role and impact of blockchain technology in food product traceability.
- Learn how to more effectively implement food product traceability measures for your company.

PRESENTERS

Andrew Kennedy, Food and Drug Administration

Sean Leighton, Cargill, Inc.

Prakash Santhana, Deloitte Transactions and Business Analytics LLP

4:15 pm – 5:30 pm — *Session 18*

Foodborne Outbreaks in the News

SESSION HIGHLIGHTS:

- Evaluate outbreak case studies including the 2018 Cyclospora linked to fresh vegetable trays and 2019 linked to basil to reinforce the need for food safety controls all along the farm-to-table continuum, and how they were detected and investigated.
- Discover what types of data lead to the identification of contaminated foods linked to illness.
- Learn how public and private sectors communicate and collaborate on outbreak investigations.
- Understand why detecting and investigating foodborne outbreaks is important to reducing the estimated 9.4 million annual instances of illness due to known pathogens and preventing recurrences.

PRESENTERS

Stephanie Gretsch,
Minnesota Department of Health

Jordan Mason,
Wisconsin Department of Health Services

Polakshee Gogoi, MPH
Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP)

Laura Whitlock, MPH
Centers for Disease Control and Prevention

EDUCATION THURSDAY, MAY 7

8:00 am – 9:00 am — *Session 19*

Don't Be Labeled for Having Bad Labels

SESSION HIGHLIGHTS:

- Learn about which labeling errors can lead to recalls or other legal exposure.
- Learn about the top ten ways to always guarantee labeling compliance.
- Learn about additional resources that are available to ensure compliance.

PRESENTER

Jessica Stevens,
Food Industry Counsel LLC

8:00 am – 9:00 am — *Session 20*

Indoor Farming – Review of the Safety of Hydroponic Products

SESSION HIGHLIGHTS:

- In the USA, hydroponic products are already making an impact in the market, and several companies are successfully growing hydroponic lettuce.
- This symposium will focus on some challenges related to seed supplies, water reuse/recycling of hydroponic systems, the organization of food safety programs in highly mechanized systems, and the preparation to third-party audit of food safety systems in year-round production indoor farming.
- Panelists will also discuss the current regulatory landscape for hydroponic systems in the USA.

PRESENTER

Gina Frontino, Fresh Local Produce of Ohio

Omar A. Oyarzabal, Ph.D.,
University of Vermont Extension

75 MINUTES OF Q & A
with the TOP REGULATORS *and* ADVISORY GROUPS

Thursday, May 7
9:15 am – 10:30 am

Join us for 75 minutes of Q&A with the Top Regulators and Agency's Leaders from FDA, USDA, AFDO, CDC will share the stage in an interactive session with the audience and each other. The format will be a true town hall – be prepared with your questions.

Frank Yiannas
Deputy Commissioner For Food Policy and Response - Food And Drug Administration

Paul Kieker
Deputy Administrator for the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS)

Robert Tauxe, MD, M.P.H.
Director, Division of Foodborne, Waterborne and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases

Steven Mandernach
Executive Director, Association of Food & Drug Officials

Moderated by

Gary Ades, Ph.D.
Chair of the Food Safety Summit Educational Advisory Board and President and CEO, G&L Consulting

8:00 am – 9:00 am — *Session 21*

Risk Communications with Consumers During Outbreaks: A Research-Based Approach

SESSION HIGHLIGHTS:

- Understand how the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS) shares information about foodborne illness outbreaks with the public.
- Learn how the USDA, in partnership with state and local health departments and other public health advocates, seeks to balance transparent information-sharing with the public while avoiding misleading or counterproductive communications when information may be limited.
- Evaluate the advantages and disadvantages when determining when and how these communications are shared.

PRESENTER **Aaron Lavellee,** Deputy Assistant Administrator, FSIS' Office of Public Affairs and Consumer Education

8:00 am – 9:00 am — *Session 22*

Up in Smoke (CBD) and Experiencial Foods Trends

SESSION HIGHLIGHTS:

- Identify hot trends in experiencial foods, including CBD on the menu, plant-based foods, successful delivery, lifestyle diets, and more!
- Join a lively discussion regarding the crossroads of consumer demand and responsible implementation of food safety best practices.
- Discover the top five tips for safe delivery from restaurant to residence.
- Review the current patchwork of CBD legality.

PRESENTERS **Betsy Craig,** MenuTrinfo, LLC

Doug Davis, Marriott International

The Exhibit Hall is OPEN from 10:30 am – 2:30 pm!
Refer to pages 14–15 for information on the Solutions Stages, Tech Tent, Community Round Tables, and Learning Lounge!

FOCUSED *on* SOLUTIONS

Explore our exhibit hall featuring innovative food safety solutions from hundreds of leading companies. Then, stop by the Tech Tent for presentations featuring the most cutting-edge technology on the market! Attend the educational sessions to hear expert advice on how to implement these solutions for maximum effectiveness. You'll walk away from the Summit with everything you need to improve your safety regime!

EDUCATION THURSDAY, MAY 7

2:45 pm – 4:00 pm — *Session 23*

Partners with a Common Purpose

SESSION HIGHLIGHTS:

Based on a thematic analysis of food safety challenges captured during previous "Partners" sessions, a continuum of actionable items has been identified. This "Partners" session will include an overview of how we arrived at this continuum followed by a deep dive into two of its elements - Communication and Culture.

PRESENTERS

Joe Corby, Senior Advisor, AFDO

Dionne Crawford, McDonald's Corporation

Laurie Farmer, U.S. Food and Drug Administration

Steven Mandernach, AFDO

2:45 pm – 4:00 pm — *Session 24*

Implementation of Preventive Controls for Human Food and Other FSMA Rules — Where Are We Today?

SESSION HIGHLIGHTS:

- How does your company compare to others in the industry, re readiness for FDA inspection of your Preventive Controls Food Safety Plan?
- What has actually been done (re violations found) by FDA Inspectors out in the field?
- What changes can you expect to see re FDA inspections in the upcoming months?

PRESENTERS

Donna Schaffner, Rutgers University Food Innovation Center

Deb Kane, J&J Snacks

Steven Mandernach, Association of Food and Drug Officials

MODERATOR

William Lachowsky, Safe Food Canada

2:45 pm – 4:00 pm — *Session 25*

Meet the Editors — Discuss Hot Topics

SESSION HIGHLIGHTS:

Join the three editorial leaders of food safety publications to hear about hot topics, how media handles outbreaks and recalls and the most pressing issues facing the industry. Come with questions for this interactive session.

PRESENTERS

Barbara VanRenterghem, Ph.D., *Food Safety Magazine*

Coral Beach, *Food Safety News* (invited)

Douglas Peckenpaugh, *Food Safety Strategies*

2:45 pm – 4:00 pm — *Session 26*

Foodborne Illness Outbreak Mock Criminal Trial — A View from the Jury Box

SESSION HIGHLIGHTS:

- Listen to federal prosecutors as they argue why Lynn White, V.P. of Food Safety for a company that caused a Listeria outbreak, should be criminally convicted.
- Learn about the scope of potential criminal exposure you may face if your products are associated with an outbreak.
- Learn about the different types of evidence and arguments federal prosecutors will use to convict food company executives.
- Identify strategies that you can implement in your organization today to protect yourself and your company from criminal exposure.
- Deliberate the evidence as jurors in the trial and vote whether to convict or acquit Ms. White.

PRESENTERS

Shawn Stevens, Food Industry Counsel LLC

Joel Chappelle, Food Industry Counsel LLC

CLOSING SESSION 4:15 pm – 5:30 pm — *Session 27*

An Interactive Discussion with Food Safety Professionals on How to Successfully Develop and Implement a Food Safety Program

SESSION HIGHLIGHTS:

This is your chance to meet, hear and discuss what food safety professionals that represent all segments of the food industry and have decades of experience have done to successfully develop and implement food safety programs. You will hear what works and what doesn't work. This will be an interactive discussion.

You will leave the session understanding that you are "not alone" in facing the challenges of a food safety professional and what you can do to be successful within your own organization.

PANELISTS:

Jorge Hernandez (Wendy's)

Joan Menke- Schaenzer (Van Drunen Farms/ FutureCeuticals)

Sharon K.K. Beals (CTI)

Mahipal Kunduru, Ph.D. (Topco)

MODERATORS:

Craig Henry, Ph.D. and **Gary Ades, Ph.D.**

REGISTRATION PACKAGES

EARLY BIRD EXPIRES MARCH 31!

CERTIFICATE/CERTIFICATION COURSES	By March 31	April 1
IA Conducting Vulnerability Assessments Course** *Monday, May 4 / 9:00am – 5:00pm*	$435	$485
Food Safety Auditor Training* *Monday, May 4 & Tuesday, May 5 / 9:00am – 5:00pm*	$1225	$1325
Certified in Comprehensive Food Safety (CCFS)* *Monday, May 4 & Tuesday, May 5 / 9:00am – 5:00pm*	$1225	$1325
FDA-iRISK - JIFSAN: Risk Analysis Training* *Monday, May 4 & Tuesday, May 5 / 9:00am – 5:00pm*	$1225	$1325
Converting HACCP in Preventive Controls/HARPC* *Monday, May 4 & Tuesday, May 5 / 9:00am – 5:00pm*	$1225	$1325

FULL CONFERENCE PACKAGES Complete Conference access	Non-Profit Organizations (Gov/Milt/Acad/Assoc.)		For-Profit Companies	
	By March 31	April 1	By March 31	April 1
3-Day Package	$850	$950	$975	$1,075
2-Day Package *(Tues/Wed or Wed/Thurs)*	$650	$750	$875	$975
1-Day Package *(Tues/Wed/Thur)*	$450	$550	$675	$775

EXHIBIT HALL ONLY Excludes lunch and sessions	By March 31	April 1
Retailers, Academia, Government/ Military, Non-Profit Associations and Foodservice Personnel	Free	$195
All other Suppliers or Vendors to the trade	$295	$325

*Multi-day courses include free access to the full Summit **Single-day courses include 15% off of any full conference package

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The Summit has secured discounted room rates at several hotels conveniently located around the Convention Center. Visit our Travel Page at **www.FoodSafetySummit.com,** for hotel information and rates and to book your room today.

Book smart and stay sharp! Avoid companies falsely posing as a partner of the Summit. For your protection, only book through our official housing partner, onPeak.

EXHIBIT HALL

The exhibit hall at the Food Safety Summit is where the community truly comes to life. You'll meet new connections in the Community Hub, see new technology in the Tech Tent, chat with subject matter experts in the Community Learning Lounge, and network with leading companies introducing the latest products and technologies in food safety!

COMMUNITY HUB

Back by popular demand, the Community Hub is designed to further create new and exciting opportunities for attendees and exhibitors alike to collaborate, engage and discuss all things food safety. Within The Hub are **4 Community Cafes** (sponsored by Purell) where subject matter experts will be available to continue the conversation and answer questions at scheduled times.

LEARNING LOUNGE

Participate in an open forum with subject matter experts in a relaxed setting near the exhibit hall entrance

WEDNESDAY, MAY 6

Cannabis — Food Safety Concerns
Douglas Peckenpaugh, *Cannabis Products*

Ingredients — Clean Label
Douglas Peckenpaugh, *Cannabis Products*

Cleaning and Sanitation Strategies
Casey Laughman, *Food Engineering*

Impact of New Packaging Technology on Food Safety
Kristen Joker, BNP Media Packaging Group

THURSDAY, MAY 7

Developing Easy to Implement Food Safety Disaster Plans
Mary Lynn Walsh, MS, RD, Sysco Corporation

Home Delivery Food Safety Concern
TBA

ICE Raids Impact on Food Safety and Training Within the Plant
Craig Henry

Developing Future Food Safety Industry Leaders
TBA

To see all the Exhibit Hall has to offer, view the 2020 Exhibitor list & Floor Plan — including special community focused features at www.FoodSafetySummit.com

To reserve a booth, contact Kim Hansen | hansenk@bnpmedia.com | 847.915.9656

HALL HOURS

TUESDAY, MAY 5
5:00 pm – 7:00 pm
Welcome Reception

WEDNESDAY, MAY 6
10:30 am – 2:30 pm
Lunch served on floor

THURSDAY, MAY 7
10:30 am – 2:30 pm
Lunch served on floor

TECH TENT presentations

Get your hands on the latest technologies and newest tools

WEDNESDAY, MAY 6		THURSDAY, MAY 7	
10:45 am – 11:15 am	INECTA	10:45 am – 11:15 am	DNV·GL
11:45 am – 12:15 pm	Spartan We make clean simple	11:45 am – 12:15 pm	*Time slot available for your Company's solutions*
12:45 pm – 1:15 pm	FoodLogiQ	12:45 pm – 1:15 pm	*Time slot available for your Company's solutions*
1:45 pm – 2:15 pm	REDZONE	1:45 pm – 2:15 pm	*Time slot available for your Company's solutions*

SOLUTIONS STAGE presentations

Subject Matter Experts offer solutions you can use today

WEDNESDAY, MAY 6		THURSDAY, MAY 7	
11:00 am – 11:30 am	BIOMÉRIEUX	11:00 am – 11:30 am	*Time slot available for your Company's solutions*
11:30 am – 12:00 pm	LITEPLATE	11:30 am – 12:00 pm	NSF International
12:00 pm – 12:30 pm	FoodLogiQ	12:00 pm – 12:30 pm	*Time slot available for your Company's solutions*
12:30 pm – 1:00 pm	TRAQTION	12:30 pm – 1:00 pm	MilliporeSigma
1:00 pm – 1:30 pm	SAFETYCHAIN	1:00 pm – 1:30 pm	Controlant
1:30 pm – 2:00 pm	MERITECH	1:30 pm – 2:00 pm	DNV·GL
2:00 pm – 2:30 pm	METTLER TOLEDO	2:00 pm – 2:30 pm	*Time slot available for your Company's solutions*

Exhibit Hall education and activities open to all registered attendees!

Solutions *for* TODAY, Planning *for* TOMORROW

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For years, cell-cultured products—derisively termed "lab meat"—have languished nearer to the realm of science fiction than reality. The products bore only a passing resemblance to their animal-derived counterparts, despite the extraordinary cost. For example, a 2013 taste test involving a $325,000 "hamburger" grown in a laboratory petri dish received poor reviews and was described as dry, flavorless, and akin to "an animal-protein cake."

Much has changed since 2013. The technology has vastly improved, costs have plummeted, and consumer attitudes are shifting dramatically. According to projections by global wealth manager UBS, sales of plant-based meat products will increase from $4.6 billion in 2018 to $85 billion in 2030. Such projections likely alarm stakeholders in the animal-derived meat industry, who have already seen their bottom line falling. Meat industry advocacy organizations, in turn, have successfully lobbied for laws that reign in the ability of companies to apply meat-like descriptors to plant-based or cell-cultured products. In response, numerous lawsuits have been filed to challenge the laws.

Among the most interesting things about these lawsuits is that both sides claim to be acting in the best interests of consumers. Proponents of the law argue that plant-based products sold, for instance, as "sausages" or "hot dogs" are likely to mislead consumers, who won't be able to distinguish between traditional and plant-based versions of these products. On the contrary, opponents of the law contend that consumers won't be misled because the principle selling point of plant-based meat alternatives is that they are not animal-based. Opponents contend that these laws are merely an attempt to stifle competition under the guise of consumer protection.

In a recent *New York Times* article, Jaime Athos, the chief executive of Turtle Island Foods (d/b/a Tofurky), decried the new laws, asserting that his products are specifically marketed not to be confused with conventional meat products. "That's the selling point," Athos said. His argument has some merit. Even though companies producing plant-based meats certainly wish to closely mimic the taste and texture of products like hot dogs, sausages, and hamburgers, their appeal is almost singularly attributable to the fact that they are not derived from animals. In that regard, the failure to prominently disclose the plant-based origins of such products would likely prove more harmful than helpful, even in the absence of truth-in-labeling laws.

> Rules are in notoriously short supply in the English language but attempting to rectify that by legislating new rules is almost certainly destined to fail.

Missouri Challenge

In 2018, Tofurky, The Good Food Institute, the Animal Legal Defense Fund, and the American Civil Liberties Union of Missouri (Plaintiffs) sued to preliminarily and permanently enjoin enforcement of the Missouri truth-in-labeling law.

The Plaintiffs argue that the Missouri law violates the First Amendment, the Dormant Commerce Clause, and the Due Process Clause of the U.S. Constitution by prohibiting companies like Tofurkey from truthfully labeling plant-based meat substitutes in a manner that effectively conveys they are substitutes for conventional meat. The state of Missouri countered that the statute prohibits only labels that suggest that the plant-based or lab-grown meat is derived from animals, and thus, does not require Tofurkey to do anything different.

Early in the case, it appeared the parties were going to reach a settlement, but negotiations ultimately broke down and the lawsuit continued.

In September 2019, the court denied the Plaintiffs' request for a preliminary injunction that would have barred enforcement of the law pending the outcome of the lawsuit in its entirety. The court ruled, among other things, that Plaintiffs failed to establish a likelihood of injury because "[t]he statute only prohibits companies from misleading consumers into believing that a product is meat from livestock when it is, in fact, plant-based or lab-grown." In short, the court ruled that Tofurkey was unlikely to prevail because, according to the state of Missouri's own lawyers, nothing Tofurkey had done to that point would constitute a violation of the law—thus, there was no harm. Under the law, there's generally no standing to sue in the absence of an identifiable harm, referred to as a "case or controversy." If there is no case or controversy, then courts don't have subject matter jurisdiction and must dismiss the lawsuit.

The state of Missouri's argument is interesting because, even though it won the day, it also significantly narrowed the potential scope of the law by asserting that Tofurkey's products did not violate the law. Plaintiffs sought to appeal the decision on the preliminary injunction, but the Court of Appeals denied the request.

Arkansas Challenge

In Arkansas, producers of plant-based or cell-cultured meat products may be fined for employing terms that describe meat when describing products that aren't derived from animals. The law also constrains the use of phrases like "almond milk" and "cauliflower rice" to describe other plant-based alternatives to conventional foods. The statute does not offer an exception for plant-based meat producers that clearly identify their products as being vegetarian, vegan, or made from plants.

Soon after the Arkansas law was enacted, the American Civil Liberties Union, Good Food Institute, Animal Legal Defense Fund, and ACLU of Arkansas, on behalf of Tofurkey (Plaintiffs), filed a lawsuit challenging the law on similar grounds to that of the Missouri case. In the Complaint, Plaintiffs allege the Arkansas law places "a restriction on commercial speech that prevents companies from sharing truthful and non-misleading information about their products. It does nothing to protect the public from potentially misleading information. Instead, it creates consumer confusion where none existed before in order to impede competition." Arkansas has stated that it doesn't intend to begin enforcement of the challenged law until case is resolved.

In many ways, the Missouri and Arkansas laws are similar. So are the lawsuits. Yet, whereas the judge in Missouri denied the request for the preliminary

(Continued on p. 50)

Allergen Control

Will Novel Foods Cause Allergies?

The use of scientific risk assessment to identify the most allergenic new foods, and the use of clear labeling to communicate risk for the rest, is key with novel food products

BY **PHILIP JOHNSON, PHD, LEE PALMER, MS,** AND **RICHARD GOODMAN, PHD**

Recent years have seen an explosion in novel food products in international and, especially, in U.S. markets. Many novel food products seek to address consumer concerns regarding environmental impact and nutritional quality of mass-produced foods. Others look to a growing population of consumers seeking alternatives to meat products. Although no single definition of 'novel food' exists, we usually consider a food to be novel if does not have a significant history of human consumption. Examples include not previously consumed plant species, algae, insects, lab-grown (cultured) foods, and fungi. We may also consider a food to be novel to a region or country, meaning that a history of consumption elsewhere may exist. An existing food that undergoes radically different processing may also be thought of as novel.

The introduction of new species to the food supply raises the possibility of new food allergens. A common misapprehension is that only certain foods cause allergic reactions. Allergy to some foods are thought to be more prevalent, more severe, or more difficult to avoid and these are often required to be labeled by law (e.g., wheat, milk, egg, soy, fish, crustacean shellfish, tree nuts, and peanut in the U.S.). However, almost any food can be allergenic, and predicting allergenicity of a new food has proven to be a problematic safety and regulatory issue for the novel food industry. The prevalence of food allergy in the U.S. is approximately 3 to 4 percent, though estimates vary.

The Molecules that Cause Food Allergy

Almost all food allergens are proteins. All living things contain protein, meaning all foods (unless extensively processed to remove protein) also contain protein. Many novel foods on, or entering, the marketplace are designed to replace existing protein-rich foods (particularly meat) and are, therefore, rich in protein themselves. Proteins are extremely varied in structure and function, a property that enables them to perform many different roles. This variability also affects allergenicity, with only some proteins having significant potential to be allergens.

The Food Allergy Research and Resource Program (FARRP) AllergenOnline database (available at allergenonline.org) currently contains 2,129 proteins that are known or suspected allergens, including those from food, airway allergen sources (pollen and fungi), contact (latex), and venoms. Newly identified allergens are added every year. However, despite a relatively large number of known allergens, we still don't know precisely which properties of a protein cause them to be allergens. We do, however, have some clues that help us identify types of food that may be particularly problematic allergens.

Sensitization, Elicitation, and Cross-Reactive Allergens

Most food allergens are thought to be capable of both sensitizing ("priming" the immune system to respond later) and eliciting (causing a reaction in a "primed" or allergic individual). There are many examples of individuals who are sensitized to one allergen who then react to similar proteins in different foods. This phenomenon is known as cross-reactivity. Banana/latex allergy and birch-pollen/fruit allergy are relatively well-known examples of this. That cross-reactive allergic reactions may occur due to the consumption of a novel food by an individual who is already allergic to a known allergen is very much a possibility. In fact, the likely susceptibility of shellfish-allergic consumers to reactions resulting from the consumption of insect-based foods is already known. However, we know that different allergic individuals react to allergens in different ways, and allergens that cross-react in one may not in another.

Allergic reactions to food occur when a specific type of antibody, IgE (immunoglobulin-E) binds to food allergens. The IgE molecules that allergic individuals possess vary greatly, even among those who react to the same protein in the same food. These different IgE antibodies recognize allergens differently. Cross-reactivity can, therefore, be very different even among individuals with similar food allergy diagnoses. Because of the occurrence of cross-reactive allergy, and because the

sensitization stage of food allergy is currently very poorly understood, we mostly consider elicitation when examining the possibility of food allergy from novel foods.

Predicting Allergenicity of a Novel Food

There is no diagnostic test to determine whether a food is an allergen. When researchers refer to allergenic foods, we rely on the experience of having foods in the marketplace over years or decades and observing patterns of allergy in a population. For novel foods this is often not possible, as by definition there is no well-recorded history of consumption. Additionally, animal models of food allergy are poor and do not provide accurate predictions of responses in humans. For these reasons we look for patterns in foods that are known to be allergenic and whether or not these patterns are present in a newly introduced food. Because it is proteins within foods that are responsible for food allergy, we are particularly interested in the proteins that are present in novel foods. Both Canada and the European Union have distinct novel food regulations that require manufacturers to examine the potential allergenicity of novel foods under intended use. Currently, the U.S. does not have a separate set of regulations for novel foods, but the questions raised are broadly similar.

How Is the Novel Food Related to Known Allergenic Foods and Commonly Consumed Non-Allergenic Foods?

Organisms that are closely related to each other generally contain similar amounts of similar (by amino acid sequence) proteins. It follows that a protein type that is an allergen in one food may also be an allergen in another food. There are numerous examples of types of proteins that are allergens in more than one type of food. Such proteins are often referred to as "pan-allergens" and include lipid transfer proteins in fruits and cereal crops, and tropomyosins in fish and shellfish. If a novel food contains a protein that is similar to known allergenic food this suggests the novel food may be allergenic. We can readily examine the similarity of proteins if their amino acid sequences are known. For this reason, databases of known allergenic proteins (such as allergenonline.org) are important when assessing allergenic risk from a new food. Proteins of similar sequence to known allergens may be further tested in the laboratory to examine the risk of cross-reactivity.

How Much Protein from the Novel Food Is Likely to be Consumed?

The higher the dose of protein consumed, the more likely it is that individuals may become sensitized or undergo an allergic reaction. The dose of protein delivered to consumers depends on how much protein is in the novel food, and how much of the novel food is likely to be consumed. For this reason, some novel protein isolates of foods that are already commonly

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Cannabis Corner

The Trouble with Edible Testing

While the cannabis industry is surging, it remains unclear how it will be regulated, and what entity will oversee it

BY **KEITH LORIA**

FDA recently issued an advisory regarding the safety of cannabidiol (CBD), one of the compounds found in cannabis plants, alerting consumers that some companies are marketing products containing the compound in ways that the agency says violates the Federal Food, Drug and Cosmetic Act, but the market for CBD products—and especially edible CBD—is growing rapidly.

Adam Floyd, commercial operations manager for Think20 Labs, an analytical testing company for hemp and cannabis products based in Columbia, Md., notes that the testing market for cannabis edibles isn't as evolved as CBD oil and flower testing, and he says more needs to be done to rectify this. "One of the major issues with edible testing is massive variance in sample types, e.g., gummy bears, candies, brownies, etc.," he says. "This makes the actual testing of the products more difficult, as specific methods need to be developed for each type of edible."

Additionally, Floyd says that concentrations of tetrahydrocannabinol (THC), another compound in cannabis plants, can vary wildly from the stated concentration on packages. "A major public health danger of this issue is people receiving inconsistent doses of THC/CBD. Edibles take longer to take effect so the danger of overconsumption can be more pronounced."

Sara Rose Kennedy, co-founder of PuraPhy, a Las Vegas-based online publication focused on the hemp and cannabis industry, says methods of testing levels of THC in edibles is constantly evolving through the advances in technology, research, and standardization practices that have come about since the inception of state cannabis legalization, with California being the first state to legalize it in 1996.

The cannabis industry is in an unusual situation, she says. While FDA typically regulates drugs and food in the U.S. that aid in disease or impact the human body, this is not the case for THC and CBD edibles, she says. "Although there have been many advances in lab testing in the cannabis and hemp industry, there are still inconsistencies [in methods among] the different states, and even [among] labs around the country."

Kennedy says that federal law does not consider any cannabis-infused food product legal at this point in time. However, FDA can intervene when an edible label makes a "health claim," because it does not approve of any marijuana product. "Otherwise, [FDA has] no rules for quality assurance/control for cannabis edibles, which means they are not able to offer 'official' regulations for ingredients, preparation (SOP), or packaging guidelines," Kennedy adds.

Who Is Regulating?

Currently, the laws concerning edibles are regulated on a state-by-state basis. For example, in Nevada, the state's board of taxation monitors the production and sales of THC edibles such as gummies, while the Maryland Medical Cannabis Commission recently passed its rules for the sale of cannabis edibles in that state. Colorado, Ore-

gon, and Washington require a universal symbol to be affixed to edibles identifying them as cannabis products, but only Colorado and Oregon require that the packaging for edibles bear a Nutrition Facts panel on the label.

Each state sets up its own guidelines and, while there is some uniformity, the gray area comes from cannabis and hemp as ingredients, as regulatory bodies are just starting to understand all the ways products can be infused with cannabis compounds.

Typically, cannabinoid methodologies will remain consistent, but the regulations for allowed concentrations of pesticides, residual solvents, and heavy metals can vary immensely. "Many edibles and cannabis products are sold in dispensaries without proper testing from laboratories and there is limited state enforcement to ensure that proper regulations are adhered to," Floyd says. "There aren't a lot of us, so it's not too hard to find a lab."

For instance, in California, there are approximately 30 licensed and operational cannabis laboratories that typically offer a turnaround time of between three and seven days from sample arrival. Yet, in Maryland, there are only five labs, which is more the norm, as most states outside of California have fewer than 10. "Investigation and thorough vetting of a laboratory testing partner is critical in ensuring success," Floyd says. "Thorough and accurate testing of all raw and finished products will ensure that safe and properly labeled cannabis products are being produced and sold. A successful partnership with a licensed testing laboratory will guarantee safe products."

Merril Gilbert, co-founder and CEO of San Francisco-based TraceTrust, a hemp and cannabis consulting organization, says numerous labs entered into legal cannabis testing from the food and beverage, nutraceutical, or pharmaceutical industries, without any true standard testing base, which is only adding to the confusion. "When you add in the variances in regulations by state, and no universal standard for testing ingestibles, that often produces conflicting results," she says. "The gap in part is that most regulatory requirements focus on the plant extractions—concentrations of THC and CBD, pesticides, molds, solvents—and not on all the ingredients for the entire life cycle of a product."

> [FDA has] no rules for quality assurance/control for cannabis edibles, which means they aren't able to offer "official" regulations for ingredients, preparation (SOP), or packaging guidelines.
>
> —**SARA ROSE KENNEDY,** *co-founder of PuraPhy*

There is a massive demand for testing and not enough licensed laboratories to fulfill market needs. Floyd notes that much of the method development for cannabis testing was established from academics and does not always translate to commercial testing. "Proper and consistent sample preparation are among the largest issues in the industry currently," he says. "This can lead to huge variations in results from lab to lab. Currently, it's up to the lab to develop methods for testing cannabis. These methods are vetted by the state prior to licensing."

Testing Issues

The cannabis market is still relatively new and the laws dictate that edibles be tested prior to packaging. Unfortunately, there's little enforcement beyond this. The California Department of Public Health stipulated that single-serving edibles products cannot exceed 10 mg of THC, and packages of edibles cannot exceed 100 mg of THC. Other states have different requirements.

While products purchased through a legal licensed retailer have gone through rigorous testing for THC and CBD, Gilbert notes that what is not clear to the consumer is how the product will affect them. "Generally, when someone has an alcoholic drink, they have a point of reference for how they will feel," she says. "New and returning consumers to cannabis and CBD hemp don't have that and will share stories of unpleasant experiences. As an industry, we must unite on common terminology and know that, for many of us, this is a goal for 2020 to provide more consumer and retailer education. There isn't enough consumer information—including on the label—that can explain when the onset and offset of the experience may happen."

Gilbert advises clients not to choose a lab strictly by price and not to jump around among different ones. "The success and longevity of the product should be based on building a relationship with the lab," she says. "[The lab] develops a product profile and provides points of reference over time and can often spot variances, allowing time for corrective actions."

A Look Ahead

No one seems to have a quick, tight answer to how long it will be before cannabis testing regulations are more strictly defined. "Research is just beginning," Gilbert says. "As an industry, we're innovating and developing very quickly. It's amazing." ■

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New Technologies in Traceability

FDA's increased focus on traceability in 2020 aims to move away from merely tracking an outbreak to preempting a crisis through the use of new technology

BY **LORI VALIGRA**

Keeping food safe by improving traceability is high on the agenda of government and industry groups for 2020. The reasons why likely come as no surprise: It took health officials six weeks to trace the source of an E. coli outbreak in romaine lettuce in 2018. Some outbreaks, like the 2019 one involving blackberries, are difficult to trace because a distribution center may not keep records of where its various fruit shipments originate. Additionally, some outbreaks simply can't be traced.

Two initiatives by FDA this year aim to improve traceability. One, the "New Era of Smarter Food Safety Blueprint," is expected to be rolled out in the first quarter and includes recommendations for using digital technology to improve traceability and food safety. The other initiative would create a list of high-risk foods, along with additional recordkeeping for those foods, by September, with a final rule due by November 2022. Both initiatives fall under the Food Safety Modernization Act (FSMA).

Industry experts see the increased focus on traceability as a way of moving from merely tracking an outbreak to potentially preempting a crisis by bringing technology to bear in both recording data and then analyzing it efficiently and effectively. "This is going to be the biggest year for traceability in a very long time. It will be one of those landmark years," says Dr. Jennifer McEntire, PhD, vice president of food safety and technology at the United Fresh Produce Association, an industry group in Washington, D.C. "If you can't get to the source of the problem, it will continue to happen."

Tejas Bhatt, senior director of food safety innovations at Walmart in Bentonville, Ark., agrees. "Traditional traceability is viewed as a reactive tool used after the problem has occurred," he says. "It can [also] be a preventive tool, to prevent an outbreak. Technology is one thing that's missing."

And the complexity of tracing foods today is something FDA recognizes. In a statement last April on the Smarter Food Safety initiative, acting FDA Commissioner Ned Sharpless, MD, and Deputy Commissioner Frank Yiannas, said, "Today's technology-focused world has morphed the way our society operates, creating a highly complex and globally interconnected landscape that is fundamentally changing the way foods move from farm to table. We've evolved from a system that sources foods from 'around the corner' to 'around the world' and are now redefining the 'last mile' with the emergence of various direct-to-home food delivery models."

In addition to genetics tools already in use, FDA is expected to leverage emerging technologies, including distributed ledgers, sensors, the Internet of Things, and artificial intelligence to improve food safety.

The main areas FDA is focusing on include:

1. Technology-enabled traceability and foodborne outbreak response. This initiative will examine technologies, data streams, and processes to reduce the time it takes to track and trace the origin of a contaminated food and respond to public health risks.

2. Smarter tools and prevention approaches. The goal is to enhance the use of new knowledge from traceback, data streams, and tools for rapidly analyzing data. Using new data analysis tools and predictive analytics will help FDA and stakeholders better identify and mitigate potential food safety risks and advance the preventive controls framework that FSMA established.

WALMART

During a 2017 blockchain technology pilot, Walmart store associates used blockchain technology to trace mangoes back to the farm in 2.2 seconds, compared with the seven days previously required.

3. Adapting to new business models and retail food safety modernization. This initiative will focus on advancing the safety of both new business models, such as e-commerce and home delivery of foods, and traditional business models, including retail food establishments.

4. Food safety culture. FDA wants to promote and recognize the role of food safety culture in farms and facilities. This will involve doing more to influence what employees and companies think about food safety and how they demonstrate a commitment to this work. FDA also is working to educate consumers on safe food handling practices.

"We will assess how these technologies could create a more digital, transparent, and safer food system while also addressing consumer demands for quick access to information about where their foods come from, how they're produced, and if the food is the subject of an ongoing recall," the commissioners said in their statement.

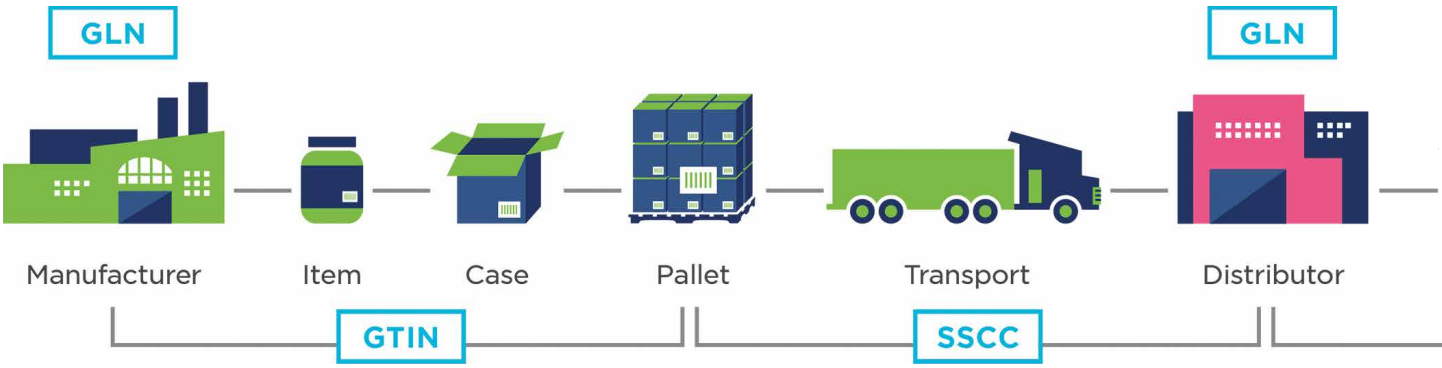
Bryan Hitchcock, senior director of Food Chain and executive director of the Institute of Food Technologists' Global Food Traceability Center in Chicago, says he's already seeing consumer preferences drive some of the new traceability goals. "We're seeing a lot more interest and awareness by consumers of how food is manufactured, its traceability, and chain of custody," he says. "There's a disruption in the distribution channels in how food is delivered and consumed. Sometimes delivery is by bicycle. This is all causing people to rethink supply chains."

Learning From the Past

Before producers, distributors, and retailers can move too far ahead with technology, issues that are holding back progress must be addressed. Those include many parts of the supply chain still using paper records and other parts simply not inputting data that would be useful during recalls.

Dr. McEntire says that the Produce Traceability Initiative has been in use for a decade, but not everyone uses it on labels. This industry-led initiative aims to implement traceability across the entire produce supply chain by using common industry standards such as the GS1 US barcode and electronic storage and retrieval of that data. The GS1 US barcode includes the brand owner, lot num-

(Continued on p. 24)



A typical scenario for traceability in the supply chain. GLN, global location number; GTIN, global trade item number; SSCC, serial shipping container code.

(Continued from p. 23)

ber, and processing date for the produce. "One of the long-standing challenges is getting owners in the supply chain to capture that information, which remains on the box—but the box gets thrown away," she says.

Yiannas, who formerly was vice president of food safety at Walmart, outlined some of the challenges of traceback in a statement last December about the various romaine lettuce recalls in 2018 and 2019. Calling traceback investigations "resource and time-intensive," he said they cannot begin until someone reports being ill. "Once the initial evidence is laid out, a traceback investigation includes investigating retail establishments, suppliers and distributors and working our way back to the farm or farms that may have grown the lettuce that ended up in consumers' meals and homes," he wrote. "It's a labor-intensive task requiring collecting and evaluating thousands of records while also trying to accurately document how the contaminated lettuce moved through the food supply chain to grocery stores, restaurants, and other locations where it was sold or served." But because of the expansive nature of the romaine lettuce *E. coli* outbreaks, "our investigation remains a complicated work in progress, and it is too soon to draw definitive conclusions," he added.

What has helped FDA make progress in its investigations to detect and even link cases of foodborne illness are whole genome sequencing DNA-fingerprinting technology, coordination among federal and state agencies, and the voluntary adoption by many companies of best-practice labels.

The labeling is one change that was made in the past few months, spearheaded by a group of major grocery companies, Dr. McEntire says. The Leafy Greens Safety Group comprises Walmart, Kroger, Costco, Wegmans, and Yum! Brands.

Last October the group endorsed the recommendations of the Romaine Task Force, which itself was formed by United Fresh and the Produce Marketing Association at FDA's request following the November 2018 *E. coli* outbreak in romaine lettuce that sickened 62 people and sent 25 to the hospital. That outbreak followed one of the largest and most deadly romaine *E. coli* outbreaks in the spring of 2018 that resulted in 210 cases of sickness across 36 states, five deaths, and 96 hospitalizations, according to CDC. There also was an outbreak around Thanksgiving of 2019.

This group of five companies came together to support the Romaine Task Force recommendations on traceability, boost their own company's traceability, and work with the supply chain to improve the capture of data for traceback, Dr. McEntire says. One result from the task force is that the group initiated labels that carry the origin location of romaine lettuce—for example, Yuma or Salinas, two areas of California that produce romaine. And while Dr. McEntire says more granular information such as the barcode that can track products to the individual grower and field is needed for traceability, the regions on labels can help consumers, including herself. "During the Thanksgiving 2018 *E. coli* outbreak in romaine lettuce, FDA said don't eat any romaine lettuce. But [in the 2019 outbreak, FDA] knew it was OK to eat romaine from Yuma, but not from Salinas," she says. "I had romaine hearts in my refrigerator that had a sticker saying they were from Salinas and thus were subject to the alert."

Dr. McEntire says a lot of data is available that companies don't use, but the collaboration of the five major produce retailers could change that. "The five companies are influential and have peer pressure. And FDA is increasingly vocal about the challenges they face when investigating outbreaks," she adds.

Yiannas wrote that the labeling practices and technology-enabled traceability now in use by some companies "help to target consumer advice to a defined growing region, compared to [2018's] advisory, which was to avoid romaine lettuce nationwide regardless of where it was grown."

Even if there is an advisory and not a recall, the product can't be sold and needs to be discarded. "There are economic consequences for everyone in the supply chain," says Dr. McEntire.

New Technologies

Bhatt of Walmart is eager to push ahead with new technologies that improve transparency and traceability throughout the retailer's extensive supply chain. "I refuse to accept these continuous outbreaks with romaine lettuce in the last few years as the new norm," he says. "The industry and agencies don't want that to become the new normal. So, what can we do to push industry to do better to protect customers? I believe they're going to embrace technology."

He said Walmart wants to protect customers from outbreaks and retain their trust by being more proactive and less reactive. One of its strategies is using blockchain technology, which uses blocks of information stored in a shared database. Blockchain technology for traceability is available from companies including IBM,

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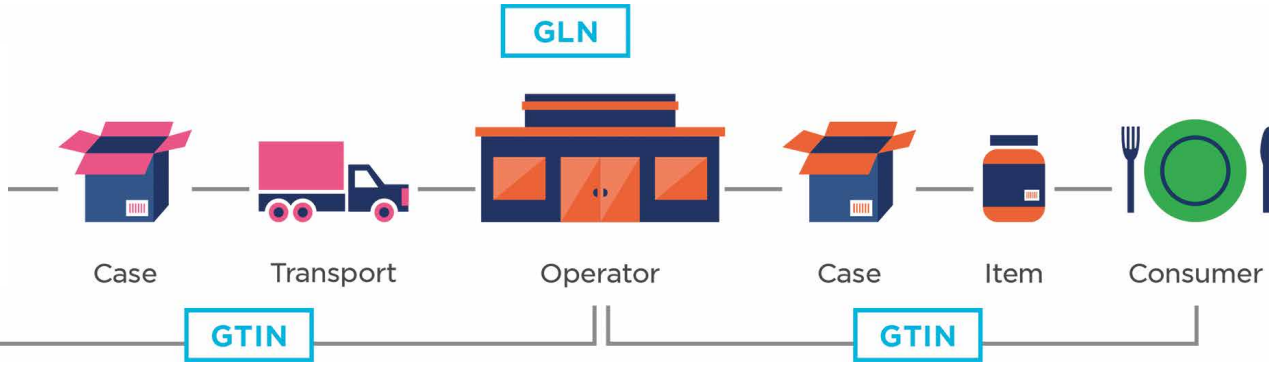

Hyperledger Fabric, and FoodLogiQ Connect. "We looked at several technologies, including traditional traceback," Bhatt says. "Blockchain was relatively new and we weren't sure there was something behind the hype. That's why we decided to do two pilot studies, one in mango in North America and one in pork in China."

The two proof-of-concept pilots convinced him that there is value to blockchain technology that goes beyond the traditional approach to traceability. Among other things, Walmart discovered it could trace the origin of the mangoes it was selling within 2.2 seconds, much faster than the prior timeline of seven days.

Walmart subsequently launched a one-year pilot and invited its large buyers and some competitors to participate. It spent a full year testing, learning, and scaling blockchain technology with the partners across two dozen SKUs before it officially launched a Walmart initiative with leafy green suppliers in September 2018 using blockchain technology. "The Yuma romaine lettuce outbreak from March 2018 was fresh in our minds," Bhatt says. "That was before we knew there would be another large advisory in November 2018 as well as November 2019."

Walmart gave its three dozen leafy green suppliers one year to onboard to the blockchain platform. "What that means is that before they ship leafy green products from their facilities to our distribution centers, we need to know which farms they came from and when they were harvested," Bhatt says. "With the success of that launch, we expanded the initiative to our green bell pepper suppliers in July 2019." There are approximately 40 suppliers of bell peppers that have until July 2020 to adopt blockchain technology from the farms to the retail store.

Hitchcock of IFT said big retailers have a major voice in the requirements for traceability in the supply chain. Some of the advantages of blockchain technology are its speed and the fact that the documentation of transactions can't be changed after they are posted.

"One of the key strengths is the fact that blockchain is an immutable ledger where the data can't be changed. That improves the quality of the data," says Bhatt. "And blockchain is a consensus mechanism. If there's a shipment event there needs to be a receiving event. The quantity must be aligned. Reducing disputes creates efficiencies in the supply chain. You don't want to be identifying inconsistencies during a crisis."

He adds that he considers blockchain to be "democratic" in that it is not controlled by one company, so it's faster to get to the root cause of a problem. "There are efficiency gains that reduce the overall cost of technology and traceability," he says.

This is important because the number of recalls is increasing, according to Hitchcock. "That's less tied to the ability to track them and more to the increased ability to detect issues," he says. "We're getting more data in sharable form with new handheld data collection devices and blockchain or cloud software."

There has been an uptick in the use of blockchain technology, says Kevin Otto, MBA, senior director of community engagement GS1 US, a nonprofit offering voluntary standards for barcodes based in Ewing, N.J. "We're seeing more blockchain software players," he says. "IPC-Subway uses our standard so it can send push notifications to only the impacted restaurants." That allows food service companies to track batch lots and throw away only the affected food rather than all food. "It's faster and safer," he adds. "Blockchain also can enhance other business practices."

Coming Regulations

Dr. McEntire of United Fresh says industry participants are eagerly awaiting FDA's announcement of the high-risk foods and what additional recordkeeping for traceability will be needed. "I expect they will be aligned with the Produce Traceability Initiative," she says.

Hitchcock says that, while it still isn't clear which foods will be included, any food without a final microbial kill step could be considered high risk. That includes raw foods such as fish, vegetables, fresh foods, and items in quick restaurant buffets.

Some are concerned FDA's smarter food safety initiative may become a de facto requirement, says Dr. McEntire. "But, from my perspective, many companies are already adopting technology," she adds. "For blockchain, you need good quality data and data that are relatable to each other between supply chain partners."

Bhatt says that with its blueprint, FDA is intent on elevating the baseline for food safety across the industry. "There will always be leaders like Walmart, but FDA will send a strong message to the rest of the industry that they need to do better," he says.

One of the key questions is what to do with all of the data that will be collected. "The industry needs education and training as it brings new digital technologies to the workforce," Hitchcock says. "We need knowledge to handle large data sets and make business decisions based on the information." ■

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Life Lessons from Pest Management Professionals

Real-world examples of infestations caused by everyday food plant activities

BY **SHANE MCCOY, BCE**

The one phrase you'll never hear an experienced pest management professional utter is, "Now, I've seen it all." Nothing can be further from the truth when it comes to eliminating pests from food processing, storage, and distribution facilities.

Why is that phrase so far-fetched? It's simple: pests. Rodents, cockroaches, flies, and stored product pests are animals and their behavior can be unpredictable. When you add the human element to the mix, you need to be prepared for anything when it comes to pests.

An experienced pest management technician will see evidence of pests in areas of a food processing facility that no one ever thought possible, or uncover structural, cultural, or sanitary conditions that no one would think could contribute to a pest infestation.

The bottom line is that, when it comes to designing, implementing, and measuring the effectiveness of a pest management program, nothing is off the table. Anything is possible, so expect the unexpected.

Be Awake to All Possibilities

It may sound like a daunting task to prepare your facility for every possible pest, and the reality is, that it isn't possible. No QA manager, plant sanitarian, or facility manager can think of everything when it comes to pests.

That's why developing strong partnerships with your pest management service provider and outside vendors (e.g., cleaning crews, transportation companies, etc.) is essential to safeguarding your facility, products, employees, and customers from pests and the harmful bacteria they can transfer to food products.

A collaborative and proactive approach to establishing consistent cleaning, sanitation, inventory management, product and ingredient inspection, and maintenance protocols is the first step toward effective pest management. Learning from experiences, both good and bad, when it comes to pest prevention and management is a critical part of the process. With these protocols in place, the chances of coming across an unwelcomed pest surprise are mitigated, but never eliminated.

Here is a collection of real-world tales that illustrate the point that effective pest management involves expecting the unexpected, being proactive and innovative, and leveraging all your intellectual and technical assets to arrive at a solution.

Tale No. 1: Digging Deep to Solve a Phorid Fly Infestation

A technician was having a problem getting an intense phorid fly infestation under control at a new food plant. The problem had been going on for a few months and the client was getting impatient.

The technician and technical staff met with the plant's management team to explain the biology of the species and point out that the flies are usually associated with compromised drains, but manage-

ment did not want to listen. They wanted a bioremediation treatment performed, pesticide injections in the drains, and weekly fogging treatments to eliminate the flies.

Even though it was explained that these approaches would only provide short-term relief, the technician did what was asked. The plant's maintenance staff even filled the facility's hollow block walls with foam and called another pest control company to drill into the slab floor and perform a termite treatment, both of which did not solve the problem.

The client finally followed the original recommendation and had the drains scoped by a plumber. It was discovered that the drainpipes were not connected, and water was accumulating underneath the building slab, providing ideal conditions for a fly infestation.

The Takeaway: When it comes to pests and drains, have a plumber scope the drains to see what's really going on down there. Yes, drain repairs can be costly, but what's the price of a product recall or a failed audit? If the client had followed the initial recommendation, the problem would have been solved much faster and at a lower cost.

When it comes to designing, implementing, and measuring the effectiveness of a pest management program, nothing is off the table. Anything is possible.

Tale No. 2: That Sucks—Fungus Gnats in a Food Plant

A production factory was experiencing an intense fungus gnat infestation in its employee break room. The infestation was so severe that it started to migrate to the plant's production area where it potentially could contaminate product.

A technician conducted a thorough inspection of the facility. Since he understood the behavior and biology of the fungus gnat, he took the time to look at the air intake on the plant's roof. Sure enough, the filter was so full it was collapsing, allowing small flies to be sucked into the building.

Adding to the misery, it was the dead of summer and there was extensive security lighting on the exterior of the building. These lights, which were located above the entrance and loading dock doors, shined brightly and attracted small flies to the building.

The Takeaway: Staying on top of basic maintenance practices is a critical element in any pest management program. If your maintenance crew has too much on their plate, consider outsourcing certain tasks; it's worth the investment. Additionally, when conducting an inspection, make sure it covers all areas, from the roof to the basement. When it comes to building lighting, switch to low sodium vapor bulbs and determine which lights must be on for safety

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and security. Consider putting lights on poles in the parking lot and shining them on the building to draw pests away from the building while still meeting security needs.

Tale No. 3: A Fly in the Soup—Cheese Soup

A cheese manufacturer was experiencing a drain fly problem, something it had never faced before. After several weeks, the problem intensified and, during a follow-up inspection, the primary culprit was identified: a missing p-trap on a drain.

The drain was in an area on the production floor that was very difficult to access. There was large machinery in the way and the area was very warm and wet from the constant use of water in production. The missing p-trap was lying on the gravel under the slab and water was falling freely to the ground.

Repairing the drain was a challenge, as the floor in the older plant needed to be jacked up to safely allow workers to get underneath to perform the work. In the interim, a bioremediation treatment was performed to knock down the fly infestation. It took several weeks from initial identification until the pipe was fixed.

An interesting aside to this situation is that a few days following the inspection, the city's wastewater department called and said gravel was showing up in their facility about a mile away from the plant. So much water was being put down the broken drain that it was washing gravel all the way to the wastewater building!

The Takeaway: Drains must be cleaned on a consistent basis and on a specific schedule. If that had been done in this case, the broken drain would have been noticed sooner and a solution would have been reached more quickly. The type of food you are producing should dictate the frequency for drain cleaning. For example, dairy and beverage facilities are at the highest risk as they use a lot of water in production. For that type of product, monthly drain cleanings are recommended.

Tale No. 4: Don't Get Snake Bitten

An employee at a food processing plant kept pet snakes in his office (a non-production area). One day he put too many feeder mice into the snake's aquarium enclosure and needed to remove some.

To safely remove the mice, one of the plant's multi-catch rodent devices was placed into the enclosure. The trap caught several of the mice, but instead of keeping them for a future feeding he put the trap—with the mice in it—back where he found it inside the plant.

You can probably imagine the technician's surprise when he opened the trap while performing the next scheduled service and found four dead white mice in the trap. The employee shared his mistake and the technician explained the importance of not keeping any pet animals in a food plant.

The Takeaway: Just when you think you've "seen it all," a story like this comes along. While not a typical example of pests in a food plant, it illustrates the need to be prepared for any possibility. What if an auditor had discovered the mice first? It wouldn't have mattered that they were feeder mice instead of a sign of an infestation. It would have led to a failed audit and a real headache for the plant. ■

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A Pest's Worst Nightmare: A Clean Facility

Sanitation is pest management, plain and simple. If your facility has strong cleaning and sanitation protocols in place, you have taken a significant step toward mitigating the chances of a pest infestation.

Why do pests want to gain access to food processing, storage, and distribution facilities? It's not because they're interested in applying for a job—it's because there's food, water, and shelter inside.

Good cleaning and sanitation protocols take care of spills and food waste in drains, on floors, on food preparation countertops, and under and inside processing equipment. And, when food waste and spills are eliminated, so is the attraction for pests.

Investing in cleaning and sanitation practices pays for itself. When an auditor makes a visit to your facility, they'll note conducive conditions related to sanitation practices and if they aren't up to speed, you'll know.

Well-designed cleaning and sanitation programs not only lessen a rodent's or cockroach's interest in your facility, they also instill confidence in your workforce. It tells them they work for a company that cares about producing a world-class product that is safe for consumers.

What does a good cleaning and sanitation program entail and where should it be applied? The following is a list of areas inside and outside your facility that should be regularly monitored and included on any master cleaning schedule:

- ***Exterior areas***—garbage disposal areas, drainage, weed control, and pest breeding and harborage areas.
- ***Building exteriors***—pest-proofing/exclusion and lighting.
- ***Building interior***—walls, floors, ceilings, floor drains, plumbing, ventilation, and lighting.
- ***Food storage:***
  - Packaged and dry food storage—proper storage practices and good sanitation.
  - Damaged goods storage—segregation, repackaging, and good sanitation.
  - Returned goods.
  - Refrigerated areas—condensation and cleaning.
- ***Food preparation areas***—access to enclosed areas, under equipment, and surface areas.
- ***Dishwashing areas.***
- ***Garbage and recycling areas***—proper containers and containers covered.
- ***Toilet and locker rooms***—lockers regularly cleaned and emptied.
- ***Lunch/break room***—cleaned and trash taken out regularly.
- ***Vending machines***—accessible for cleaning.
- ***Utility areas***—accessible for cleaning and no pest-conducive conditions.
- ***Office areas***—trash removed regularly and no food stored in desks.

Source: Portions of this information are adapted from *Truman's Scientific Guide to Pest Management Operations*

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Integrated Pest Management Plans

Steps you and your employees can take to help stave off pests

BY **CHELLE HARTZER, BCE**

Food processing facilities provide various environments in which pests can enter, hide, and thrive. Pest survival and their ability to populate an environment is largely based on the availability of three things: food, water, and shelter. They're resilient in their search, which is why a well-maintained line of defense is crucial to keep pests from threatening the quality and safety of the food products you provide.

No two food manufacturing facilities are alike. Size, layout, and surrounding environmental factors will all affect your specific pest management needs. However, every facility will face pest pressures in some way or another. A pest management professional can help you implement an integrated pest management (IPM) plan to expose the opportunities for pest intruders and put a stop to them.

An IPM program will assess the risk areas within your facility and establish tactics to proactively control the environment and limit pest attractants. Top pest attractants include spills, moisture, and raw ingredients. Pests are particularly fond of dried food products—from cereal to preserved meats—and they're capable of causing them major damage.

As part of an overall plan, pest management tactics may include a combination of exclusion, facility maintenance, and sanitation practices. From there, ongoing monitoring and inspections will help evaluate the strength of your IPM program and allow you to make changes swiftly if needed.

While a pest management professional is likely helping you with many aspects of your program, there are certain tasks at your site that you and your employees can do to stave off pests.

Outdoor Areas

First, let's focus on your outdoor maintenance and sanitation efforts. What happens right outside your facility on the surrounding property is critical to creating an effective IPM plan. Keeping outdoor areas maintained makes them less attractive to pests, making it less likely that they'll show up on your doorstep.

- The roof is a common entry point for birds, roof rats, and even insects. Have a professional inspect the roof to ensure no repairs are needed. As an added layer of precaution, it's best to

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trim back tree branches from touching or hanging over the roof. Don't forget to have roof HVAC units checked to ensure filters are properly installed and that they aren't pulling in insects.

- Close dock doors between shipments and install vinyl strip doors as added barriers when doors must be open.
- If possible, move outside lighting away from the building. Having a light directly over a personnel door can attract night-flying insects and provide them access every time the doors are opened. Moving lights off the building (while still providing a safe amount of indirect light) will minimize the amount of insects that are directly around the building.
- Dumpsters, trash cans, and other waste disposal areas quickly can become havens for pests if not maintained properly. These areas should be part of a stringent sanitation routine ensuring that dumpsters are emptied regularly (never overflowing or left open). They should also be placed as far away from buildings as possible to help prevent ants, flies, and cockroaches from accumulating and looking for an even better meal inside the facility. Don't forget to manage any trash bins outside of employee areas as well.
- Keep in mind that fruit-bearing trees, sweet-smelling flowers, nuts, and seeds are all enticing for pests such as birds and rodents. These trees and plants provide food and potential nesting sites. Create a perimeter of reinforcement: Trim back branches and plants at least 3 feet from around your facility. You'll also want to clean up and remove fallen branches or dead trees, as these are a prime target for termites.
- Eliminating trash and standing water that can accumulate in parking lots or low spots is critical.
- Install air curtains at entrances and establish positive air pressure to push pests toward an exit instead of pulling them in.

Indoor Areas

There are also some facility maintenance tactics you can use inside your structure.

- Equip floor drains with a removable secondary strainer to help prevent pest entry through drainpipes.
- Moisture within your facility can become an issue and lead to small fly infestation, mold and mold-feeding insects, and even structural damage. Look for warning signs such as slow-moving drains, mildew, and peeling paint, and quickly remedy the moisture source.

Without a thorough, well-documented sanitation plan in place, your facility will be at increased risk for pests, spoiled products, and even foodborne illnesses.

Sanitation

After a thorough inspection of both your outside and inside areas, a focus on facility maintenance is key in establishing an IPM program. Next, and just as important, is sanitation, a crucial factor that will set you up for long-term success.

Unfortunately, it's inevitable that a pest introduction will occur at your facility at some point. Proper sanitation will make it harder for pests to make your facility their home. Indeed, proper sanitation is vital to maintaining the safety and integrity of your food products. Without a thorough, well-documented sanitation plan in place, your facility will be at increased risk for pests, spoiled products, and even foodborne illnesses.

- Storage areas, or any areas that aren't regularly inspected, can become places for pests to hide and thrive. Remember FIFO (first in, first out): The longer a food product, whether a raw ingredient or a finished product, sits on the shelf, the greater the potential for pest issues.
- Clean drains with a foaming cleaner to break down organic matter that might be collecting. In dry environments, if food debris accumulates, insects can take harborage in drains. In wet environments, microbial concerns abound.
- Keep products off the floor and on pallets and ensure there is at least a 12-inch inspection zone between shelves or equipment and the perimeter walls.
- Containers with ingredients, or even dry goods, should remain closed with airtight lids whenever possible.
- Dispose of cardboard boxes immediately as they are emptied. Many stored product insects find harborage and food in the corrugation of boxes and other cardboard items.
- Overall, you want a clean, well-lit facility, free of unnecessary stock piles. Clutter serves as the cover pests need to hide out while they search for food sources.
- Equipment is extremely vulnerable to pests because of potential food and moisture buildup. All areas beneath and behind equipment need to be accessible in order to be properly cleaned regularly. As often as possible, deep cleaning inside of processing equipment should also be performed.
- Break rooms and locker rooms are another important area to pay close attention to. Encourage employees to exercise good sanitation practices such as immediately cleaning up spills, storing food in airtight containers in the refrigerator, and emptying trash cans at least daily.
- Wash, sweep, and/or vacuum processing areas regularly and immediately address spills. While it's impossible to clean up every particle of food, try to limit the amount and access pests have to a food source. The less there is, the harder pests have to work for it. This will keep them stressed out and populations more manageable.

The earlier you spot a pest problem, the quicker it can be resolved, which will protect you, your facility, staff, food products, and your audit scores from being negatively affected. Protect your products and profit with an IPM plan, a program that requires a strong partnership between you, your employees, and your pest management professional to implement and continue to improve over time. Remember, if you make it harder for pests to find one of their three needs—food, water, or shelter—they can't thrive. It's as simple as that. ■

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Keeping Watch

Inspection and documentation matter in tracking pests at every turn

BY **PAMELA PECKMAN**

While a supply chain may be global and involve many partners, food processing and manufacturing facilities are increasingly being held responsible for contaminated products. New standards and regulations mean managers have to be more stringent than ever when it comes to food safety. A proactive food safety strategy is more than just a smart move—it is a complete necessity. There are very few fallbacks or excuses when it comes to sending tarnished food out the door.

All kinds of pests—including rodents, insects, or birds—can spread harmful pathogens and compromise the safety of your products. And all it takes is one point of contact (or a single dropping) from these pests to upset an entire batch of your otherwise pristine shipments. Everywhere across the globe, pests are an ever-present threat to health and safety. No region or country is exempt, and an infestation could happen to any business at any time.

That's why three things are more important now than ever: monitoring, inspection, and documentation. These are the measures that, when implemented properly, can help save your facility from pests—and ultimately, foodborne illness, as well as loss in profit due to ruined products. Monitoring will assist in helping spot pest issues early, which means you stay audit-ready and get more protection for your budget and your bottom line. Inspection and documentation are equally as crucial. A supply chain with exceptional documentation will help you pinpoint exactly where in the chain pest issues originated, allowing you to solve the root issue and quickly resolve challenges that arise.

Let's take a closer look at some of these measures and how you can make them functional parts of your overall pest management plan.

Employees as Monitors

There's no better way to spot pests than to have multiple sets of eyes trained to look for them at all times. It's a good idea to have regularly scheduled training sessions for employees and actively promote participation from everyone.

Getting the word out doesn't have to be an elaborate process—it can be something as simple as a poster that features photos of the most common pests and the indicators they typically leave in their wake. When it comes to employee education, there isn't exactly a one-size-fits-all solution. Pest threats will differ for every company, and your educational materials should reflect your facility's unique challenges.

Another key aspect of employee education and training is assigning personal responsibility. Make it abundantly clear that each individual employee plays a large role in keeping the facility pest free, and ensure that they feel empowered to speak up when they see a potential threat. There also needs to be a company-wide pest log where every associate can record a sighting. Make sure everyone is aware of how to access this log and is familiar with the approved methods for documenting sightings. Identifying high-risk sectors of the building and ensuring that all sanitation practices are being sufficiently performed is crucial for record-keeping purposes.

And there's nothing wrong with outsourcing this kind of employee training, either. Many pest management companies

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will perform this service absolutely free as part of an ongoing relationship with your business, so be sure to utilize their expertise to increase engagement with pest prevention tactics across the board.

Using Monitoring Devices

While employee training is essential, it's not the only monitoring that should take place. There are several devices you can use to help with this process and most operate 24/7 as well. Making use of these monitoring devices is a great way to help supplement your "eyes on the ground" already operating throughout the facility.

Here are a few of the best options:

- ***Rodent traps:*** Rodents can chew right through wrapping or packaging to get to your products, so it's best to cut them off before they ever have the chance. Using traps around your facility can help stop these pesky pests in their tracks. Traps can be single-catch (one rodent) or multi-catch (several rodents), depending on your building's needs.
- ***Bait stations:*** These are typically placed outside a facility as first line of defense and help ensure that rodents never make it inside. Monitoring bait station activity is useful for determining how prevalent an outside rodent

problem is. This allows you or your pest management professional to implement additional measures as needed.
- ***Insect Light Traps (ILTs):*** Flies are disgusting pests, and you don't want them anywhere near your products. Every time they land on a surface, flies can spread an extraordinary amount of bacteria. ILTs utilize a light source to draw in these winged pests to a sticky glue board or electrocution grid. This traps serve two purposes: helping to reduce the flying nuisances in your building and providing you with insights as to where, specifically, they are most prevalent. Knowing where flies are likely to pop up can help you preemptively ground them.
- ***Pheromone traps:*** These traps are a great way to monitor for stored-product pests—like beetles and moths—which are primary insect concerns for food processing and manufacturing facilities. Pheromone traps help indicate the presence of these pests early, which can sometimes be the difference between a small issue and a large scale infestation.

While the tools above are useful for reducing pest populations and remaining aware of pest pressures, it's important to remember that sanitation procedures should also be in place at all times. This helps reduce buildup of organic materials and water, which are attractive to pests. And because it's impossible to remove all attractants from your building through

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Quality

The Science and Safety of Food Additives

These ingredients help assure the continued availability of safe, nutritious, affordable, and accessible foods

BY **ROGER CLEMENS, DRPH, PETER PRESSMAN, MD,** AND **A. WALLACE HAYES, PHD**

The application of food additives has a rich history. Before the development of refrigeration and thermal processing, meat and fish were often salted to be preserved. The addition of sugar and vinegar was often used to retain the safety, flavor, and texture of fruits and vegetables. These and other practical food ingredients are readily used in the typical home kitchen, and include baking soda, baking powder, vanilla, yeast, and food colorings.

Regulatory agencies around the world, such as the European Food Safety Authority, Codex Alimentarius Commission, Health Canada, as well as FDA, carefully evaluate the safety of these and emerging food ingredients, commonly categorized at food additives. Within the United States, a food additive is any substance that is intended to be used, either directly or indirectly, to affect the character and function in a food. The safety assessment of colors and flavors are regulated similarly, with the ultimate goal being assurances that under intended usage, these food components will be safe.

A brief overview of the many common food ingredients includes approximately 30 different categories that encompass hundreds of substances. Some of these categories include preservatives, flavors and spices, nutrients, emulsifiers, leavening agents, enzyme preparations, drying agents, humectants, and nonnutritive sweeteners. Many of these ingredients were widely used prior to 1958 and, in the absence of adverse events, were accepted without additional evaluation. Since that time, new food ingredients have been extensively evaluated for safety. That safety process includes several key assessments, including chemical characterization, animal toxicology, metabolic fate, human trials, historical exposure, and evaluation of food processing on ingredient stability. All of these attributes are central to safety

pertinent to intended use, affected population segments (e.g., infants, pregnant/lactating women, seniors), and frequency of use.

Within the United States, the Delaney clause of the Food Additives Amendment of 1958 was invoked approximately 60 years ago, fundamentally barring FDA approval of any carcinogenic food additive, regardless of amount or potential exposure, to be ingested by humans or animals. Interestingly, this clause does not apply to the array of naturally occurring potential carcinogens or even possible innate toxins in the food supply. The clause does permit scientific discretion by the agency, such that not all data from animal species or in vitro data are applicable to humans.

Food additives provide several important functions: They promote food safety, enhance food choices, permit greater food conveniences, promote shelf life, and increase nutritional value. For example, sulfites reduce lipid oxidation and nitrates/nitrites inhibit *Clostridium botulinum* growth. It is noteworthy that many vegetables, such as celery and beets, naturally contain nitrates at levels greater than permitted in the food supply as a food additive. Then there is benzoic acid, innate in strawberries and tomatoes, that inhibits the growth of some bacteria and molds.

Food Preservatives

Many consumer surveys indicate contemporary consumers avoid products that contain preservatives. The reluctance appears to be related to unfamiliar terms declared on package labels. Despite the extensive risk and safety assessments conducted by FDA and the Joint FAO/WHO Expert Committee on Food Additives, even ingredients such as ascorbic acid, sorbic acid, and tocopherols are shunned by consumers because they do not understand that even the most common "chemical" that may be innate to foods must be produced through good agricultural practices.

While there are ongoing efforts to reduce food waste and food spoilage, substances such as spices, which can reduce the risk of food loss due to bacteria, molds, fungi, and yeast, and help maintain texture, color, and freshness, represent part of the total effort to assure the continued availability of safe, nutritious, affordable, and accessible foods for a growing population.

Direct Food Additives

Many direct food additives added during product formulation and during processing provide nutrients, help keep products fresh and make foods more appealing. Nearly a century ago, iodine was added to table salt in order to reduce the risk of goiter. This action eliminated the goiter belt in the 1920s, a geographic region in the U.S. where as many as 70 percent of children presented clinical signs of iodine deficiency. Even in the 21st century, according to the World Health Organization, iodine inadequacy and frank deficiency remains one of the main factors of impaired cognitive development in children. Interestingly, in many regions of the world that are markedly affected by iodine insufficiency, many of the food plants that dominate the local diets contain goitrogens. Those foods include primarily cruciferous vegetables, such as broccoli, cabbage, cauliflower, and bok choy. Other foods that also contain goitrogens include some fruits (peaches, pears, strawberries), soy-based foods, and even some cereal grains. It was more than 20 years ago that the U.S. added folic acid to flour as a public health policy in an effort to reduce the risk of neural tube defects (NTD) in newborns. Since that time, the prevalence of NTD has decreased by nearly 30 percent. Many scientists also suggest that, in addition to adding folates to the food supply, increased consumption of choline and vitamin B12 may be important in reducing NTD risk.

Food additives provide several important functions: They promote food safety, enhance food choices, permit greater food conveniences, promote shelf life, and increase nutritional value.

Indirect Food Additives

Indirect food additives may be found in foods as a result of processing, packaging migration, or even during handling. Examples include preservatives that are components of packaging materials, which may migrate into the food via contact and during storage. Importantly, the safety of food contact surfaces must be rigorously assessed before they are permitted for usage.

The 1997 Food and Drug Modernization Act established a food contact notification process. Sponsors of this notification must provide extensive and relevant safety information, such as: a) migration or extraction data, as determined by specific guidances; b) an array of published and unpublished safety data; and c) evaluation of safety based on consumption of residues or extractables from the material.

Some of the packaging materials that may include indirect food additives include metal-polymer coatings applied in retort pouches, paper-polymer coatings used in many polymeric materials, and an array of polyolefins used in rigid, semi-rigid, and plasticized packages, polystyrene (nylon), and ethylene vinyl acetate (a type of plastic) applied to acrylic and phenolic packaging materials.

Color Additives

Food colorants are subject to extensive safety assessments as noted in the 1960 Color Additives Amendments to the 1958 Food, Drug, and Cosmetic Act. These substances are classified as either certified or exempt colors. From a consumer perspective, certified colors are synthetic, whereas exempt colors, which are exempt of certification, are considered natural. Certified colors, which may be dyes (water soluble) or lakes (fat soluble), are typically resistant to degradation by light, pH, and temperature. On the other hand, exempt colors, such as those derived from insects (e.g., cochineal), plants (e.g., beets, grape skins), fungi (e.g., Aspergillus, mushrooms), microalgae (e.g., an array of pigments) and mineral sources (e.g., titanium dioxide), have less coloring power in that they are more subject to degradation when exposed to light, pH (acid or alkaline), and elevated temperatures.

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More than 40 years ago, several reports from a single research center suggested that the yellow color tartrazine contributed to the development of hyperkinesis among children. Despite several follow-up clinical studies that rejected this relationship, FDA promulgated a regulation that the use of this lemon-yellow azo dye (aka FD&C Yellow 5) must be declared on food labels and even on pharmaceutical agents.

About 10 years ago, several studies out of the United Kingdom suggested the consumption of artificial colors led to attention deficit hyperactivity disorder among children. While FDA commented that there wasn't sufficient evidence proving that foods with artificial colors supported hyperactivity in the general population, the food industry gradually reduced the use of such colors, while increasing efforts to identify "natural" replacement pigments.

It's important to note that, ironically, many natural sources of potential food pigments are associated with toxins. For example, a selected number of ascomycetous fungi species produce specific polyketide pigments along with toxic metabolites, such as ochratoxin A and penicillic acid. On the other hand, the terms azaphilones, anthraquinones, oxopolyenes, and naphthoquinoes, which also have some pharmacological properties, may not appeal to consumers.

Flavoring Agents

Within the United States, FDA has a memorandum of understanding with the Flavor Extract and Manufacturers Association (the "other FEMA"). This body of experts publishes its safety findings every two years. Its most recent GRAS (Generally Recognized as Safe) document, released in December 2019, is the 29th report that reflects extensive safety review of flavoring agents. Since 1970, FEMA experts have reviewed the safety of approximately 3,000 flavoring substances. Flavoring agents are typically small molecules that are used in very small doses, usually less than 1 percent of the product formulation. These reviews leveraged an array of external resources that contribute to exposure assessment and process control.

It should be noted that a given flavor profile often includes hundreds of compounds. For example, a strawberry, a seasonal row crop, contains a broad diversity of more than 30 substances such as esters, terpenes, and furans that contribute to the classic, complex, and variable flavor profile of a ripe fruit. Some of the integral aroma or volatile compounds innate to strawberries include butanoic acid, hexanoic acid, methyl ester, ethyl ester, linalool, butanoic acid, and many more substances that occur naturally in a fresh strawberry.

Carrageenan Confusion

Carrageenan, an extract from a red seaweed, has been used as a food texturing ingredient for decades and is considered safe by many regulatory agencies, including FDA, EFSA, and WHO. The three forms of carrageenan vary slightly in their degree of sulphation, which affects their functional properties.

Several years ago, some investigators suggested that carrageenan was unsafe based on some injection studies, and that it degraded to poligeenan during a product's thermal processing. However, preponderance of the evidence indicates dietary carrageenan is not absorbed, hydrolyzed, or converted to poligeenan following ingestion by rodents, dogs, and nonhuman primates, or by intestinal microflora. There is limited evidence that suggests carrageenan may exhibit toxicological properties when administered at greater than 10 percent of the diet. This level far exceeds the typical use of this ingredient, which is less than 0.1 percent of the product formulation. Despite the spectrum of safety evidence collected through its use in the food supply for many decades, consumers avoid products that contain carrageenan, and the food industry continues to seek substitutes to cover its broad applications in food products, including infant formula. Ironically, these substitutes may not be as efficacious as the demonized carrageenan.

Toxicologic Assessment

The principles for safety evaluation are presented in the FDA's Redbook. These basic principles reflect those typically applied to pharmaceutical agents as noted in the S section on safety guidelines by the International Council for Harmonization. These principles require basic toxicological information, assessment of exposure relative to potential levels of concern, estimation of exposure among population segments, and anticipation of adverse events, including possible allergenicity. These kinds of data permit the calculation of an acceptable daily intake (ADI), which is compared to the estimated daily intake (EDI). At this point, if the EDI is less than the ADI, the additive is deemed safe under the proposed conditions of use.

The recommended toxicological tests for food additives vary based on level of concern (LOC) as spelled out in the Redbook. For the highest LOC, the following studies are required: genetic toxicity, short-term toxicity with rodents, subchronic toxicity with rodents and nonrodents, one-year toxicity with nonrodents, chronic toxicity and carcinogenicity toxicity with rodents, reproductive and developmental toxicity, metabolism and pharmacokinetics (classic absorption, distribution, metabolism, excretion), and human.

The current and emerging food supply is safe and abundant. An assurance that the food supply remains safe is everyone's responsibility. Perhaps the real challenge is international reliance on safety assessment of food additives that are used in the global food supply. There seems to be a general agreement that the safety of food additives can be reasonably assured across population groups and genetic diversity.

To these points, it remains imperative that the safety of food additives is assured when consumed by vulnerable populations, and that this safety is determined by those trained in and experienced with the complexities of food ingredients at the interface of human health. The future safety assessment of food ingredients will reflect emerging technologies, including in silico modeling and an increased understanding of human metabolism and genetic diversity—all of which should be tempered with foundational knowledge, the best scientific and medical evidence, and common sense. Public health is an overarching priority; there is little place for politics or emotion. ■

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Prepare an FSMA-Compliant Food Safety Plan

Avoid these common mistakes and pitfalls

BY **ANDREA TOLU**

Since the Food Safety and Modernization Act (FSMA) went into effect in 2011, U.S. companies have had to take their food safety practices to a new level. The law introduced substantial changes, such as a stronger focus on prevention, new hazards to consider (radiological, allergen control, and economically motivated adulteration), more transparency and accountability, and a closer inspection of the supply chain.

Adapting to these provisions means new challenges for food businesses, especially when it comes to preparing the food safety plan, the written document or set of documents in which companies must explain how they prevent food safety incidents from happening and how they'll manage an emergency if one does happen.

Prevention's Biggest Enemy: Complacency

The authors of the FSMA greatly reduced the application of Hazard Analysis and Critical Control Points (HACCP) in favor of a framework called Hazard Analysis Risk-Based Preventive Controls (HARPC). Compared to HACCP, HARPC is more proactive, less reactive, and has a stronger focus on risk-based prevention. For food companies, one of the practical consequences of this shift is that steps and procedures that were part of HACCP's Prerequisite Programs are mandatory in HARPC.

Although this is a significant change, according to Nancy Scharlach, president and chief technical director at FSMA International, many operators tend to think that preventive controls are just HACCP with a different name. "A lot of companies are too complacent, still in the mindset that they only have to make a few tweaks to their HACCP plan in order to be FSMA compliant," she says. "In fact, we've grown beyond HACCP. The FDA felt that it didn't cover all of the critical recall subject matters like allergens, environmental pathogens on ready-to-eat food, and food fraud from within the supply chain."

> "You may think you're doing a mock recall, but all you're really doing is a traceability exercise."
>
> —**MATHEW SURI,** *president of Essential Food Safety Consulting*

The other risk of a complacent attitude is to have a false sense of security. "When companies use their HACCP plan as a reference to build their FSMA food safety plan, sometimes they don't carry risks over," says Mathew Suri, president of Essential Food Safety Consulting. "If they identified a hazard in their HACCP plan but never experienced a problem with that hazard, they just might not include it in their risk assessment, when in fact they still need to keep track of it as a potential hazard."

Another common mistake is not being specific enough. "Many food safety plans that we review worldwide are too generic," says Scharlach. "You'll see a hazard analysis that simply says: 'biological hazard,' 'pathogens,' or 'allergens.' But you need

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to know which allergens or pathogens are unique to your production line."

For Brian Perry, senior vice president of food safety and quality at TreeHouse Foods, a manufacturer and distributor of private-label packaged foods and beverages, conducting a correct hazard analysis was one of the main challenges to making his company's food safety plan FSMA compliant. "One of the things that we worked to improve upon across the board was making sure that we're looking at all the inputs from the supply chain and at our risk assessment in a broad sense. We tend to focus very much on microbiological hazards because of the public health elements, but we can't ignore radiological, chemical, and physical hazards."

Finding the Right Resources

What complicates things further for food companies is that they don't always know where to find resources and guidance to put together a food safety plan, making the mistake of falling back into what they already know.

According to Perry, companies shouldn't be insular in their risk assessment. They should actively seek expert opinions and use all the materials provided by FDA and other food safety institutions.

Kevin Byrne, senior consultant at Essential Food Safety Consulting, says most companies don't do enough research. "Especially if you're a smaller company with little time to look at what's out there, you may not be aware that other hazards exist, so you can't complete a thorough assessment of your ingredients, process steps or finished products. For example, something that a lot of people don't even realize is that the FDA put out an appendix to the draft guidance on the food safety plan, which covers all of the biological and chemical hazards that you would expect to encounter with different ingredients based on their category. It's a huge reference, but not a lot of people are aware that it even exists." [The appendix is available at fda.gov/media/99581/download.]

Make Your Food Safety Plan Crisis Ready

Managing a food safety emergency requires a lot of intense decision making, including knowing when to issue a recall or not. "There are a lot of layers involved, but if there's even a chance that misbranding or adulteration occurred and you can't prove that it didn't, you still have to initiate a recall," Scharlach says.

According to Byrne, the first step is obviously to assess the impact by identifying which customers the product was sold to and then to take care of the regulatory aspects by contacting the appropriate people.

The part of the food safety plan about crisis management should be a tool that helps quality and safety teams make the right decisions quickly. Unpredictability is an objective limit here: When prevention fails, there are an infinite number of things that can go wrong, and it would be impossible to include all of them in the recall plan—in fact, this isn't what FDA expects. "What the FDA wants to see in your recall plan isn't necessarily the hundred different scenarios that could happen. What they want to see is that you have a list of key contacts, both internal and external, and a step-by-step protocol that the recall team will follow in order to decide on, initiate, and follow through with the recall process," Scharlach says.

> "[The FSMA has] been like a tide that raises all boats. The focus on prevention brought a clear improvement and probably helped to weed out some bad actors."
>
> —**BRIAN PERRY,** *senior VP of Food Safety and Quality at TreeHouse Foods*

Do Mock Recalls, but Do Them Right

A good way to bridge this gap as much as possible is by conducting mock recalls, but they need to be done the right way.

"A lot of businesses do mock recalls, but once they know which customers are being affected and they can account for everything, they stop the exercise," Byrne says. He suggests companies add more specific steps to their mock recalls, such as root cause analysis and the drafting of a press release.

"You may think you're doing a mock recall, but all you're really doing is a traceability exercise," adds Suri. "That's only one aspect of a mock recall, though. There are several other things that have to be done, sometimes concurrently," says Suri.

Mock recalls aren't just for rehearsing for an emergency, but also to find out if there are any gaps in your recall plan. "[Businesses] put a plan together that looks like it should hold up procedurally, but practically they've missed steps because they've never really mocked the process the whole way through. So when an actual recall shows up, they're lost," Suri says. "You might not be able to role play every potential situation, but we encourage our clients to pick a different scenario each time and role play it out fully twice a year. That way, you wind up gaining experience with a wide gamut of issues."

Byrne also warns food companies away from taking a superficial approach toward corrective action through a lack of monitoring. "We see a lot of companies identify the problem and what the

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Moisture Content Analysis

The pros and cons of current methods of moisture control

BY **KAREN APPOLD**

Moisture plays a critical role in many aspects of food production, from getting the right consistency to achieving proper shelf life. Too little moisture can lead to products that are crumbly, hard, or that have palatability issues, says Ian R. Olmsted, PhD, a product manager in the process control division at CEM Corporation in Matthews, N.C., while too much moisture can lead to spoilage.

A variety of moisture control methods are currently available, and each has its pros and cons. Here's a closer look.

Loss on Drying

Loss-on-drying instruments, such as ovens, thermogravimetrics (TGA)/infrared, and microwaves, are a simple and robust way to measure moisture in foodstuff. The general principle is that a sample is weighed initially, then dried in an apparatus such as an air oven, under a heat lamp or via microwave energy, Dr. Olmsted says. Once a sample is completely dry, it is re-weighed and the amount of loss on drying is calculated. Air ovens, a low-cost option, work well for many sample types but require up to eight hours to completely dry samples.

TGA is a very precise method of analysis, but to get reliable data a sample must be heated at a slow, controlled rate, Dr. Olmsted says. Therefore, TGA is not good for rapid process control.

Microwave moisture analyzers use microwave energy to dry samples; an integrated balance automatically measures sample weight during a test, Dr. Olmsted says. Microwave moisture analyzers are the fastest way to measure loss on drying, with typical testing times taking as little as two minutes.

Claas Boerger, head of the strategic product group at Mettler-Toledo GmbH in Greifensee, Switzerland, concurs, and says that microwaves are indeed fast. However, they can be used only for samples with high moisture contents approximately above 10 percent, limiting their applications. Typically, they cost more than an infrared moisture analyzer as well.

Infrared moisture balances provide a more rapid approach to drying samples. However, most instruments don't have active ventilation so high-moisture products can take as long as 20 minutes to dry, Dr. Olmsted says. Infrared moisture balances with active ventilation can reduce testing times to around five minutes.

Claas says that infrared moisture analyzers are fast and easy—providing results in minutes. "They are easy to use for untrained personnel (e.g., shift workers), and results match the official method of oven drying," he says. Their versatility enables them to be used for all samples with moisture contents ranging from 0 percent to 100 percent. On the downside, method development needs to be performed in order to get the same results as a drying oven, which is why modern instruments support the user with integrated method development functionality.

Karl Fischer Titration Method

To avoid the loss-on-drying method's main shortfall of not being specific to water, the titration method instead relies on a wet chemistry to detect the amount of water, says Brady Carter, PhD, senior application scientist at Novasina AG, based in Morgan, Utah. The concept involves creating a reaction chamber containing

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the sample plus a solvent that will help release the water from the sample, and creating the necessary conditions needed for the reaction to proceed.

Then, iodine is titrated into the reaction chamber and the amount is closely tracked. Iodine and water are both needed for the reaction to proceed. When all of the water is consumed by the reaction, the reaction stops, and iodine starts to accumulate in the reaction vessel, Dr. Carter says. This causes a change in the solution's electrical properties detected by an electrode inserted into the solution.

When the change is detected, the test is stopped, and the amount of iodine added is directly proportional to the amount of water present in the product. This amount of water is then divided by the wet weight to give a wet basis moisture content or divided by the dry weight to give a dry basis moisture content, Dr. Carter says.

The Karl Fischer titration method is specific to water, so it is a more pure determination of water content, says Dr. Carter in noting its positive attributes. It is not impacted by ambient conditions, making it more reproducible. However, this method does require using hazardous solvents that must be handled, stored, and properly disposed of. It's a complicated process, which requires training and understanding, Dr. Carter says. Furthermore, the equipment is typically more expensive than that for loss on drying. Because no independent standard is possible for moisture content, the measurement is completely empirical—making it impossible to determine accuracy or its true value.

Near Infrared (NIR) Moisture Meter

NIR moisture meters use calibrations to convert an optical signal into the percent of moisture. They can be quite accurate if regularly calibrated, but users must be aware that as the optics of an instrument age, they change in a way that affects the signal. "NIR instruments are commonly used as inline detectors, but they need to be calibrated to a primary method to maintain accuracy," Dr. Olmsted says.

On the positive side, Claas says that these meters provide very fast measurements in 30 to 60 seconds, and multi-parameter options (e.g., fat, moisture, proteins). On the negative side, the meter requires calibration; precision and accuracy depend on the quality of calibration. In addition, the meters are expensive.

> Some producers have eliminated moisture content testing completely and only measure water activity. By tracking water activity throughout the production process, these producers are able to catch changes in production that may lead to problems before they are widespread.
>
> **—BRADY CARTER,**
> *PhD, senior application scientist at Novasina AG*

Preferred Methods

Since moisture content is subject to many sources of error and doesn't have an independent standard, it is impossible to know the true value, Dr. Carter says. Given this, he prefers the loss-on-drying method because it is the cheapest and easiest to perform. That said, he would not use moisture content to monitor moisture control, but instead would use water activity testing.

Dr. Olmsted prefers a method that is direct, easy, and rapid. For these requirements, a microwave moisture analyzer with secondary infrared heating is his instrument of choice.

Claas says his choice depends on the application and workplace. For food production in regular operation (e.g., goods-in, in-process control, final quality control) infrared moisture analysis is his choice because it's versatile and can be used for many different samples (e.g., liquids, creams, powders, granulates), it's easy to use, results are provided quickly, and it offers great precision and accuracy.

Innovations in Moisture Control

CEM Corp. combines numerous technologies to provide a loss-on-drying analyzer that is faster than any other primary method on the market—the SMART 6. "Not only does it combine microwave and infrared energy for faster heating, but it also uses active ventilation to both speed the process and to give SMART 6 the capability of operating safely outside a fume hood with no odors being released into the test area," Dr. Olmsted says. For customers using inline NIR sensors, the SMART 6 offers the ability to calibrate the NIR sensors in only a few minutes, instead of hours with an air oven.

Dr. Carter works with Novasina, a provider of water activity meters, and Neutec Group, Novasina's distributor for the U.S. market. "Although water activity meters are not new, many food manufacturers are now switching to releasing product solely on water activity values and relegating moisture content to only a measure of purity and standard of identity," he says. "Some producers have eliminated moisture content testing completely and only measure water activity. By tracking water activity throughout the production process, these producers are able to catch changes in production that may lead to problems before they are widespread."

In addition, by releasing on water activity, they are able to maximize moisture levels but assure product safety and stability using the water activity. "Since most products are sold on a weight basis, releasing based on water activity makes it possible to maximize profits, eliminate waste, save on energy costs, and release a safe product with optimal shelf life," Dr. Carter says.

Educating Members

It's important for food industry organizations to keep their members educated on moisture control methods, and what innovations are happening.

The American Dairy Products Institute showcases equipment at its annual meeting and technical symposiums where instrument suppliers can present new or updated products. They can also network

with users to get answers to specific questions and training issues. Instrument manufacturers may have workshops for specific instruments as well as preventive maintenance training.

Software training for calibration adjustment or development is done via webinars or online training. "Most instruments have modem and interface capabilities, which allows the manufacturer or service technician access to an instrument in the event of a needed repair or updates," says Dean Tjornehoj, a dairy industry quality and food safety consultant and Center of Excellence resource professional at the American Dairy Products Institute in Chicago. Control system manufacturers may exhibit control packages with integrated infrared or NIR instruments for moisture control. Webinars are used for company training sessions, with a manufacturer's technical service joining in online to answer questions.

The majority of educational material that the American Association of Meat Processors (AAMP) provides and sponsors are in the form on hands-on demonstrations or presentations for processor members on the preparation and techniques used to create safe and wholesome meat products, says Nelson J. Gaydos, outreach specialist for the AAMP, which is based in Elizabethtown, Pa. The organization presents several state and regional conventions throughout the year nationwide.

Tjornehoj says the American Dairy Products Institute may share particular issues with a type of instrument or test method with its members. "Generally, because accuracy and precision have a significant influence on production efficiencies and profitability, further detail is usually proprietary," he says. "NIR in general works well for powder and condensed products with appropriate procedures. A discussion about methods is usually limited to those points, as well as the general reliability or ease of adjusting product calibrations."

Service is critical for NIR or infrared systems, especially those instruments integrated into a control system that may not be as flexible as a benchtop offline unit, Tjornehoj says. Less common are questions about networking instruments or networking software, which is important for companies that are large enough to purchase and take advantage of such software.

AAMP shares information in two major food areas: food safety and how preparation/cooking affects the final product. "Food safety, specifically prevention of pathogen growth and destruction, is of the utmost importance when it comes to any food product," Gaydos says. "Cooking with humidity has been shown to be an extremely important factor when it comes to killing pathogens such as *Salmonella* and *E. coli*. Secondly, it's also important to understand how processes like cooking and humidity (or lack of it) affects the final flavor, texture, and appearance of products so processors can make products consistently the same and to their desired preferences." ■

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Prepare an FSMA-Compliant ... *(Continued from p. 38)*

corrective action is or should be, and document that it's being done. But then they don't monitor it to make sure that the corrective action is continuing to prevent the problem from reoccurring. I think the main challenge is in making sure that corrective actions go far enough and that you're not looking at them just as a Band Aid."

Company Culture Is Key

For Perry, the effort that FSMA has required from food manufacturers has definitely improved food safety standards. "It's been like a tide that raises ... all boats. The focus on prevention brought a clear improvement and probably helped to weed out some bad actors," he says.

This higher level of effort puts different challenges in front of both small and large enterprises, requiring them to allocate more time, knowledge and people to their food safety program. "Small companies may have a hard time getting people trained properly, creating bigger budgets around food safety, and understanding how to comply with each element of the law," Scharlach says.

Larger companies face different issues. "The challenge for us has been to manage a very complex portfolio and still make our food safety plan as simple as possible," says Perry. "The main difference has been the level of validation, verification, and transparency that we have with our agency partners. As the FDA comes in and reviews our food safety plans, we know that our record keeping must prove that we did what we said we would do."

Despite all difficulties and misconceptions, there's no escaping this adaptation to FSMA requirements, no matter how large or small the business. "It's a matter of sitting down, doing it correctly, rewriting everything properly, and retraining everybody," Scharlach says. "That takes time, effort, energy, and culture change."

The key to this culture change is a top-down approach to food safety culture, where companies' executives are directly involved in the implementation of the food safety plan. One example is TreeHouse's steering committee, where, Perry explains, the C-suite and the presidents of the divisions meet monthly to review food safety objectives and challenges, and make sure they have visibility and alignment.

By contrast, when all responsibilities are left entirely to employees, the level of food safety culture is often poor. "If the project is dumped on the already overburdened food safety lead or QI-practitioner, then the workforce will resist change resulting in an ineffective plan," says Jocelyn Lee, consultant at Superior Food Safety. "When food safety culture is embedded from the top down, the preparation of a food safety plan is likely to be smooth, comprehensive, effective, and implementable." ■

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Hygienic Plant Design for Allergen Management

Hygienic plant design creates the ideal environment for effective allergen cross-contact prevention

BY **ANDREA TOLU**

During the first three quarters of 2019, allergens were the cause of 40 percent and 30 percent of FDA's and USDA's recalls, respectively, making 2019 a record year for undeclared allergens, according to Stericycle's Product Recalls Index.

"According to FDA data, mislabeling is the leading cause for allergen recalls, but even if we're seeing fewer Class I recalls for cross-contamination, it doesn't mean that sanitation and allergy control is generally good or that the risk is low," says Charlie Kalish, a food safety consultant and trainer who works with businesses on compliance and audit readiness. "There are all kinds of cross traffic and risk for cross-contact in many facilities, and that's a sort of ticking time bomb."

Effective allergen cross-contact prevention is based on different procedures, such as supply chain control, cleaning and sanitation, personnel hygiene practices, and the use of color-coded tools. Hygienic design, however, is what creates the ideal environment for those procedures to be more effective.

Ideal Facility Design

Hygienic design is often mentioned in relation to equipment and tools. A less talked about aspect is its application to plant layouts. The ideal facility design for allergen management is conceived with the purpose of separating traffic patterns of allergens and non-allergens at every processing step: storing, handling, processing, and packaging. "If you can minimize the footprint in a plant where you have allergens, then you can do a better job at controlling them. If they're all over your facility, then it's much more difficult," says Mark Morgan, PhD, head of the food science department at the University of Tennessee in Knoxville, and U.S. liaison for the European Hygienic Engineering & Design Group (EHEDG).

In the Food Safety Modernization Act (FSMA) the principle of separation is included in the cGMPs in Title 21 Sec. 117.20, and states that allergen cross-contact may be reduced by (among the other things) separating "location, time, partition, air flow systems, dust control systems, enclosed systems, or other effective means." It's up to food businesses to determine what these effective means are.

To what extent allergens should be segregated from non-allergens will depend first on the type of product and its ingredients. "If your product contains powdery allergens that can become airborne and travel around, like, for example, wheat flour, then you want to design a facility with an enclosed area for that," says Vicky Waskiewicz, CEO of Safe Food Resources, a food safety training and consulting organization based in Milwaukee, Wisc.

Another factor is how these ingredients enter the facility. "If I'm just bringing products that are enclosed in a metal drum into my warehouse, they're going to need fewer controls than products that come in a paper bag, which may drop and break, spreading flour all over the facility, or be pierced by a fork truck," says Elise Forward, president of food safety consultant firm Forward Food Solutions, based in River Falls, Wisc.

Once you know the risk of cross-contamination associated with your products, you can then decide on the ideal traffic patterns inside the facility. In practical terms, that might mean assigning separate delivery areas, warehouses, and processing lines to allergen-free products and to those containing allergens.

For plants that are still in the design phase, businesses can work directly with their building contractors to incorporate these principles. The project manager within the company "should be some-

body with a keen understanding of how their food is being made, because hygienic design is going to revolve a lot around efficiency," says Kalish.

Hygienic Design for Existing Facilities

For existing facilities, the process is more complex. Many plants offer little or no segregation or unidirectional traffic flow, or have separated production lines that share the same area, or even allergen and non-allergen products being processed using the same equipment.

While lack of proper hygienic plant design increases the risk of cross-contamination, refurbishing the facility or building a new one is rarely a realistic solution, as that would be financially unsustainable. The only way to offset the risk is by adding checks, sanitation practices, inspections, and procedures on top of the existing procedures.

A common scenario would be two products with incompatible allergen profiles running on separate but adjacent production lines. "Depending on the particular allergen, I have seen plastic strip curtains going from ceiling to floor, or actual temporary walls being used," says Waskiewicz. "When conveyors of two different product lines are crossing paths, these are sometimes reconfigured to eliminate opportunities for cross-contact."

Other solutions would be to upgrade the ventilation system (to deal with airborne particles) or to invest in hygienically designed equipment and tools.

Before adopting any solution, however, it's still important to know which paths allergens take inside your building. "Knowledge is power, so it would be really helpful for companies to just map out where allergens are going," says Forward, adding that you could have them come only to certain door ducts, or funnel them. "Even if you're dealing with an old facility, you still can find other options," she adds.

A non-negotiable countermeasure, however, will be to increase cleaning and sanitation: "When you don't have a very good design, that's the biggest [area] affected. That means you have to sanitize much more frequently," says Waskiewicz.

Trying to compensate for a non-optimal plant layout isn't guaranteed to work every time. One issue is cost: "There are all kinds of quick fixes that you can do but in the long run, they're going to cost you more," says Kalish. Additional checks require more time and resources: Increasing cleaning and sanitation needs more manpower, and production output may suffer if lines have to stop more often; temporary walls may have to be replaced eventually, even if they are cleaned often, especially with airborne dry allergens; and while hygienically designed equipment and utilities may cost less than a new facility, they're likely to be more expensive than average.

The other issue is that you may decrease the risk of cross-contamination only up to a point. "You can improve the equipment design and utilities in critical areas, such as pipe work, electrical conduits, and duct work. But other than that, there's not a lot you can do, because the traffic pattern is always the problem," says Morgan.

Risk Versus Profit

If the chances of cross-contamination are still high despite all countermeasures, then the question is whether the risk of a recall is worth the profit coming from that product: "Sometimes there are tough decisions that have to be made where you can't run products," says Forward. Temporary fixes may then just leave the two main issues at stake—risks and costs—unsolved. Lowering the risk of cross-contamination costs money. Not lowering it enough is also a cost. Quite often, the problem is that in the latter case, that cost isn't visible.

"Most people in the food industry are doing their best to protect people, but it comes back to our quality leaders to be able to communicate to upper management the choices that we need to make in dollars and cents, to help them make the right decisions," says Forward. "What is the cost of a recall? What is the cost of capital improvement, and what are the costs of Band-Aid fixes? Even some kind of ballpark will help them, because the cost of a life is never going to be less than that."

Forward also notes that pathogen management is very well developed, while allergen management is more in its "teenage years." She thinks allergen management is often overlooked because there's little awareness by top management as to how important this is, or the time needed to fully evaluate it. "Often, it's simply about watching how the warehouse guys move the product from one point to another. Most companies don't do that because people aren't paid to stand around and watch, but that's what's needed in order to make improvements," she says.

Kalish notes that most people don't get into the food business because they want to control allergens, but because they want to make great products and sell them. "They don't think of factoring allergen management as a cost into their business plan," he adds.

"There's a lot of great design and technology out there in trade publications and at conferences, but how many people know about it and how much it costs?" adds Kalish. "I think there's a big blind spot in the industry. Hygienic design is trending up, but making it affordable and persuading the business community within the food industry that this is something to invest in, is going to be a worldwide priority and one of the biggest challenges." ■

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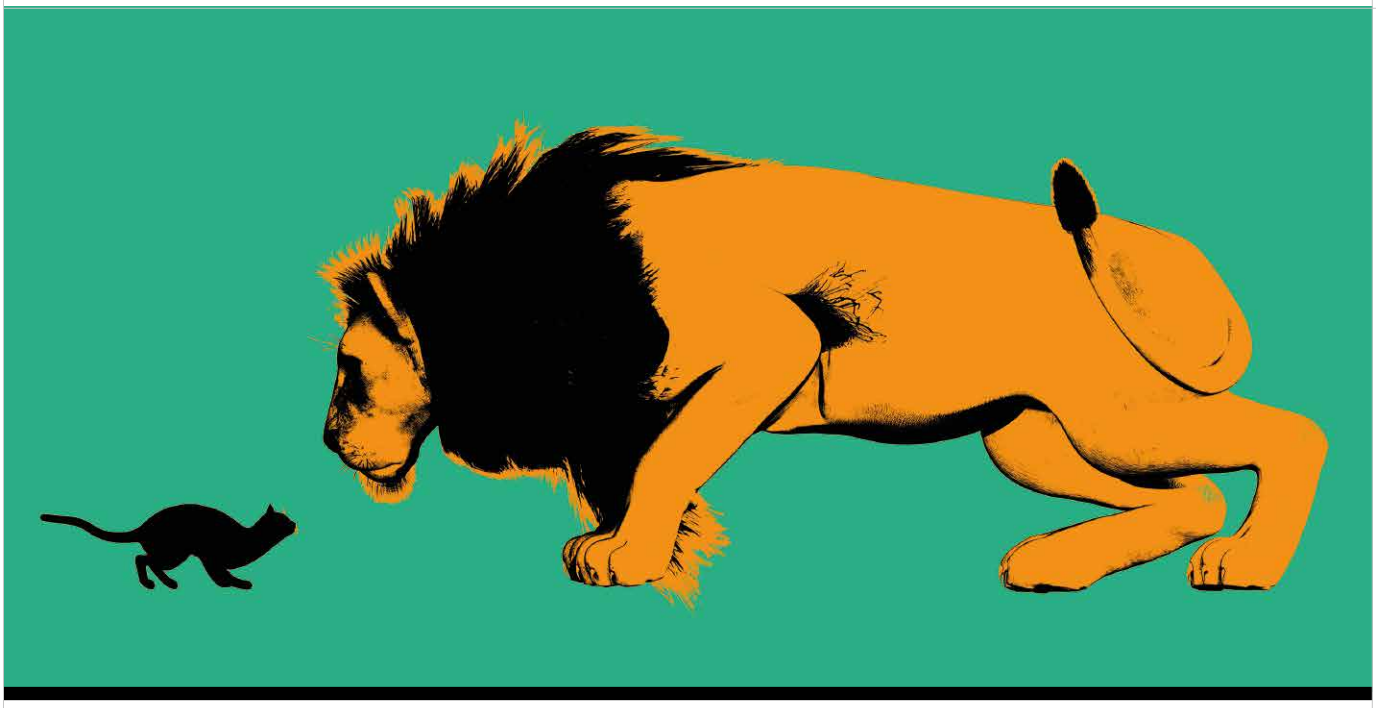

Nine Years of FMSA Impact

How the legislation accelerated M&A activity for small food manufacturers

BY **FRANCES BRUNELLE**

It was nine years ago that the Food Safety Modernization Act (FSMA) went into effect. It took several years for the weight, substance, and impact of the new law to be known or quantified. Its enforcement, definition of terms, and implementation delayed the real consequences until 2016—now we know.

Both small and large food manufacturers must comply with FSMA. Obviously, this is not an insurmountable challenge for manufacturers with $100 million or more in sales and hundreds (if not thousands) of employees. However, more than 90 percent of U.S.-based food companies generate $2 million to $20 million in annual revenue and have fewer than 50 employees.

Meeting the requirements of Hazard Analysis and Critical Control Points (HACCP) was not nearly as challenging as meeting those of FSMA, because the requirements for HACCP were part of the need for the QA/QC documented process. Large food companies have both the financial resources and staffing to manage the complexities of FSMA. Smaller companies do not, and often find that being acquired by a larger enterprise is a more attractive option than facing the risks of non-compliance.

Impact on Small Food Manufacturers

Total food industry deals for the third quarter of 2019 were worth $10.28 billion, according to GlobalData's deals database. The value marked an increase of 139.6 percent over the previous quarter and a rise of 24.2 percent when compared with the prior year's four-quarter average of $8.28 billion. In terms of number of deals, the sector saw a rise of 5.5 percent over the previous four-quarter average, with 211 deals against the average of 200 deals.

In value terms, North America led the activity with deals worth $3.96 billion. The combined value of the top five food deals stood at $6.67 billion against the overall value of $10.28 billion recorded for the month.

The top five food industry deals of the third quarter of 2019 tracked by GlobalData were:

1. KKR's $2.2 billion private equity deal with Campbell Soup;
2. PepsiCo's $1.8 billion acquisition of Pioneer Food Group;
3. Best of Nature Bidco's $1.03 billion private equity deal with Koninklijke Wessanen;
4. The $1 billion acquisition of VMG Quest Blocker and Voyage Holdings by The Simply Good Foods; and
5. P/F Bakkafrost Holding's acquisition of The Scottish Salmon for $641.14 million.

The remaining merger and acquisition activity within the food sector are those smaller food manufacturers that are weighed down in regulatory compliance. A 20-person salsa producer most likely has only one designated person to oversee QA/QC and safety, and often even operations. They lack the time to meet FSMA rules; yet, failure to comply is not an option. Burnout among these positions is very high with a turnover averaging less than 2.3 years in companies with gross revenue of less than $20 million.

Having a risk-based hazard analysis and preventive control program in place reduces the occurrence of adverse events such as contamination in processes and

products. Corrective action to overcome the contamination, rework the product, or discard it takes time and effort and comes at significant cost. Again, the personnel must be available to execute on the elimination of adverse effects, which is often not the case for small food manufacturing companies.

Sadly, what usually prompts corrective action are not the rigors of compliance, but is often an incidence of foodborne illness. When microbial, physical, or allergen contamination threatens consumer health, a small food manufacturer faces a huge risk that could end the entire enterprise with a single lawsuit.

Large food companies have both the financial resources and staffing to manage the complexities of FSMA. Smaller companies do not, and often find that being acquired by a larger enterprise is a more attractive option than facing the risks of non-compliance.

Risk to Small Manufacturers

Prior to FSMA, FDA could ask only for voluntarily recalls of food products. Under FSMA, FDA is authorized to order an administrative detention if the agency has credible evidence or information to believe that the food presents a threat of serious adverse health consequences or death. If the risk of health hazards is high, the administration detention may lead to seizure of the food product.

Under FSMA, food product recalls have significantly increased and, because FDA has the authority to assess and collect fees for activities associated with a food recall order, small food manufacturers carry greater potential financial risks as they may not have the funds readily in reserve.

FDA issues a warning letter when it finds FSMA violations during a facility inspection. Warning letters are public records and are published on FDA's website. While this can be damaging for any food manufacturer from a public relations and consumer confidence perspective, loss of an already-small market share can be devastating for smaller businesses.

Companies are typically given 15 days to respond to the warning letter. FDA may re-inspect the plant to assure the non-compliant issues are resolved. The agency is authorized to collect fees to reimburse FDA costs related to re-inspection, resulting in an even higher financial burden for small food manufacturers.

Also under FSMA, FDA has new powers to suspend the registration of food facilities when there is a reasonable probability of causing serious adverse health consequences or death. This may lead to temporary or permanent shut down of the facility, such as with the bankruptcy in 2009 of Peanut Corporation of America, a food manufacturer with $25 million in annual revenue and 90 employees, after a massive outbreak of illnesses linked to *Salmonella* were identified across 46 states. Damage to brand reputation and loss of market share like this are simply unrecoverable for many smaller food manufacturers.

Options

There are options for small food manufacturers that are found to have FSMA compliance issues other than being acquired by a larger company. An infusion of capital by an investor can ensure that all the consequences of FSMA are adequately addressed and that the growth trajectory of the business is strong; this could build the stable underpinnings of a $5 million company to make it a $50 million company, for example. If the business is fast-growing, consumer driven, and stands out in the marketplace, investors will see the merit of mitigating FSMA risks to ensure the company's resources are capturing market share and profitability.

However, what's trending now is the acquisition of smaller food manufacturers by larger food and related companies that already have the regulatory compliance role well handled and are looking to expand their product offerings. Buying several innovative food companies grows the product offerings under their brand without the food quality and safety issues.

Most small food manufacturers, some of which produce their product in a home kitchen, just did not realize the undertaking associated with FSMA compliance and would like to find a lucrative exit strategy. ■

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Six Misconceptions about Sanitizing & Disinfecting in Food Service

Proper, proven steps to preventing foodborne illness

BY **RUTH PETRAN, PHD, CFS,** AND **CHRISTOPHER STEEP, FSR**

As a commercial food service operator, you well know the risks that foodborne illness can pose to your customers and business. And, you certainly have the best of intentions when it comes to preventing outbreaks.

But, you're only human. Today's deluge of food safety information and misinformation can lead to confusion and misconceptions. Misconceptions can lead to ineffective prevention, increased risk of a foodborne outbreak, and reputation-damaging inspection violations.

To optimize your own food safety practices, it is important to recognize misconceptions associated with cleaning and sanitizing, and to understand the proper, proven steps to preventing foodborne illness. Here are six misconceptions, and the real truth about each.

Misconception No. 1: It is *not* necessary to clean food contact surfaces before sanitizing or disinfecting because sanitizers or disinfectants can handle cleaning too.

Effective cleaning is necessary before sanitizing or disinfecting. The generally recommended steps are clean, rinse, and sanitize. Ideally, the cleaning solution you use should be effective in removing the specific type of soil on the surface. Alkaline detergents work best on fat- and protein-based soils, while acid cleaners are effective on mineral-based soils. Fortunately, many of today's cleaning solutions are formulated to remove a range of food soil types.

Why clean before sanitizing? Essentially, because you want to clear the surface of organic matter and any cleaner residues so sanitizers can do the work they're designed to do: reduce pathogens. Sanitizing a dirty surface cannot effectively reduce the number of microbes.

Misconception No. 2: Hospital-grade disinfectants are always recommended as the most effective defense against pathogens on food contact surfaces.

In food service, the use of hospital-grade disinfectants is typically overkill. However, these powerful chemicals may be recommended to manage certain events, such as during a norovirus outbreak. In the event of an outbreak, be it bacterial or viral, refer to your sanitizer's label; if the organism is not on the label, then a disinfectant with that claim set will be required. If disinfectants are used, refer to the product label for proper procedures—food contact surfaces might require a rinse step.

Misconception No. 3: Sanitizers and disinfectants are pretty much the same and can be used interchangeably.

It's true that sanitizers and disinfectants have a similar purpose: to reduce the risk of microbial contamination of foods during preparation on kitchen surfaces. Generally speaking, sanitizers reduce the number of infectious microorganisms while disinfectants, with more concentrated chemistry, destroy or inactivate them. Sanitizers are more commonly used in food service in part because, when used properly according to the label, they effectively reduce pathogens yet may not require rinsing, as disinfectants do.

Sanitizers are required by EPA not only to kill 99.999 percent of illness-causing bacteria within 60 seconds on food contact surfaces, but it is also mandatory that they kill *Staph. aureus* and *E. coli*. Most

also reduce other common foodborne pathogens, such as *Listeria monocytogenes*, *Salmonella enterica*, *Escherichia coli O157:H7*, *Campylobacter jejuni*, *Shigella flexneri*, *Shigella sonnei*, *Yersinia enterocolitica*, and *Cronobacter sakazakii*. The product label will tell you which organisms your sanitizer is effective against.

Disinfectants destroy or irreversibly inactivate infectious bacteria, viruses, and fungi (but not necessarily their spores) on hard surfaces, usually within 10 minutes. Since disinfectants typically use a higher concentration of chemistry than sanitizers, they must be rinsed from food contact surfaces with potable water. The surfaces also must be treated with an EPA-approved food contact sanitizer following the directions on the product label. Refer to the product's label for disinfecting and/or sanitizing claims.

All ingredients of both sanitizing and disinfecting products must be EPA approved and products must meet efficacy, toxicity, and stability requirements. For a no-rinse claim, ingredients must also meet EPA-determined food-contact limits at use-dilution levels.

To effectively control harmful microorganisms, the concentration of a sanitizer or disinfectant is critical. Using chemical concentration test strips appropriate for the particular chemistry is one way to verify that the concentration is at the optimal or required level.

Misconception No. 4: ATP (adenosine triphosphate) systems can be used to verify the efficacy of a sanitizer or disinfectant.

ATP testing systems verify the effectiveness of cleaning and soil removal, not the efficacy of sanitizers or disinfectants. Organisms, such as bacteria, viruses, or fungi and other cells such as those from foods or humans, contain ATP. ATP testing is based on the principle that, without biomass (including bacteria or soils) on surfaces after cleanup, microbial growth is limited. ATP systems do not verify the efficacy of sanitizers or disinfectants because their chemicals may disrupt the ATP reaction.

Misconception No. 5: When no rinsing is required after using a sanitizer, the remaining chemical residues can attract pathogens.

There is no compelling evidence that pathogens are attracted, or develop resistance, to chemical residues if cleaning is done effectively and sanitizers are used according to the instructions on the product label.

Misconception No. 6: Sanitizers must be certified by the National Science Foundation only.

Sanitizers must be EPA registered and have efficacy, toxicology, stability, and chemistry data to support the claims and directions for use on the approved label. Sanitizers are required to meet specific performance standards in order to make public health claims on their label. Specifically, all sanitizer ingredients must be approved by EPA for use on food contact surfaces. If the sanitizer has a no-rinse claim, its ingredients must also meet EPA-determined food-contact limits at use-dilution levels. Check the product label to verify EPA registration.

When effective cleaning and sanitizing protocols are developed and followed as part of a comprehensive food safety program, the safety of food service establishments and the delight of their guests are better assured. ■

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Safer Food, Lower Costs for Schools

How the IIoT can improve school lunch programs

BY **SAM CECE**

School food program managers are the unsung heroes of the food service industry. While they oversee the production of breakfasts and lunches for hundreds or thousands of students each day, they also have to meet federal nutrition requirements, stay on top of food safety and food allergy issues, support and motivate their employees, maintain kitchen equipment, and turn out meals that the children will actually eat—and do it all for about $3 per meal.

School cafeterias are widely considered some of the safest, cleanest places to eat. However, when school food safety issues or foodborne illnesses arise, the consequences can be serious: sick students, missed classroom time, and damaged public trust.

Some grocery retailers, restaurants, and food producers are using inexpensive new Industrial Internet of Things (IIoT) technology to detect and prevent food safety problems. IIoT technology can do the same for school food safety. It can also help reduce food waste, save money, and make program oversight more efficient and less stressful for managers.

What Is the Industrial Internet of Things?

In general terms, the IIoT is a secure remote wireless network of battery-powered, inexpensive smart devices that record and send a steady stream of data to a "bridge." The bridge is a computer that stores and analyzes the sensor data with powerful machine-learning tools. That data analysis helps managers plan more efficiently and respond to problems faster.

For example, an IIoT school food safety network can include remote wireless temperature and humidity sensors placed in coolers, remote wireless vibration sensors near cooler motors to detect mechanical problems, and tracking tags on incoming food that show where the food originated, who transported it, the temperature it was kept at in transit, and other important data.

All this data goes to the bridge, where managers can see it on their smartphones and computers. Here are some ways they can use that information.

Real-Time Insight into Freezer and Cooler Operation

Proper food storage temperatures are the cornerstone of food safety. Remote wireless temperature sensors and humidity sensors can alert managers right away if a freezer or cooler is too warm to be safe. That early warning can give staffers time to move food to another cooler or freezer before it risks going bad. Real-time alerts can help prevent the kind of high-profile situation that Seattle-area schools faced in early 2019 when health inspectors found walk-in coolers that were far out of the safe temperature range.

Remote IIoT sensors in school kitchens can also save staff time. With this technology, there's no need for manual

temperature recordings or manual data entry of temperature logs.

Reduce Unplanned Equipment Downtime

IIoT systems can head off unexpected problems with coolers. Remote wireless vibration sensors placed near the motors can detect subtle changes in the way the motors work. These changes can show managers that the equipment needs service.

Over time, as the IIoT system collects and analyzes more vibration data, it can help managers schedule maintenance exactly when it's needed, rather than on a set schedule. This type of predictive maintenance saves money on unnecessary maintenance calls as well as unplanned equipment outages.

Predict When Food Safety Problems May Arise

The more data a school kitchen's IIoT system records, the better it can identify patterns and trends. Over time, the system builds a database that can help managers see when certain problems are most likely to happen.

For example, is the cooler temperature consistently out of range early in the morning? Maybe staffers are leaving the door open for too long while they bring out and prep items for the day ahead. On hot days, are the coolers more likely to operate outside the safe temperature range? Knowing what's causing these problems can help managers solve them.

Equipment monitoring, maintenance management, and trend identification are doable now. There are more IIoT food safety solutions in the works that may help school food programs in the next few years.

Track Incoming Food Items and Know Their Condition on Arrival

FDA announced this year a goal to digitally trace U.S. food from farm to kitchen. Right now, most food storage and transportation records are kept on paper. Real-time digital information from tracking devices will enable faster recalls in case of foodborne illness outbreaks. Some grocers, including Walmart and Hy-Vee, already use RFID tags to monitor products in transit to their stores.

Expect to see more real-time monitoring of the food chain as FDA and entrepreneurs work toward this goal. Among more than 1,600 startups related to farming and the food supply chain, many are focused on tech tools to monitor food freshness and storage conditions in transit from farm or factory to customers.

This technology will be implemented by suppliers, not schools. But school food managers should be aware that it's in development and may want to ask their suppliers about it.

On-Site Inventory Tracking

Small, inexpensive RFID tags can also monitor the location of packages and pallets of food items on site. This kind of tracking can alert managers to theft. It can also make menu planning more efficient, because it gives managers a clear view of what's available and what's running low.

IIoT systems are worth looking into for any school food program, where reducing costs, cutting waste, and increasing safety are priorities. IIoT food safety technology is already helping some retailers, restaurants, and food manufacturers work smarter and safer. It can do the same for schools and the children they serve. ■

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Queuing Up for Crustaceans *(Continued from p. 15)*

market, domestic processors are creating value-added products for retail and food service with increasing regularity," Dr. Bolton points out. "Lobster meat for lobster rolls, macaroni and cheese, and ravioli are examples of popular products in demand. And, for the companies in our state producing these products, food quality and safety are top priorities."

Quality Issues

Three issues will likely impact the availability of quality crustaceans in the years ahead—namely, water quality, reduced harvest pressure, and disease control, according to David Green, PhD, professor emeritus of food science at North Carolina State University (NCSU). Dr. Green is the founder and former director of the NCSU Center for Marine Sciences and Technology in Morehead City, N.C.

"Selling large quantities of crustaceans consistently depends on having multiple sources of high-quality product, including sourcing from foreign countries," he contends. "In addition, complying with Food Safety Modernization Act requirements, including traceability and country-of-origin labeling, is an ongoing challenge for crustacean purveyors. In the United States, crustacean processors and distributors must record hand-to-hand traceability—that is, who they buy from and who they sell to. But if a distributor co-mingles products from multiple suppliers, traceability can become more burdensome."

High pressure processing (HPP) is becoming more widely used for crustacean processing, Dr. Green mentions. "Not only does HPP inactivate pathogens and extend shelf life while maintaining the natural flavor, aroma, and nutritional characteristics of foods, the technique is especially useful for removing a lobster's outer shell," he points out. "Applying hydrostatic pressure at 43,500 to 87,000 pounds per square inch transmitted by cold water, HPP weakens the muscles that attach the shell to the meat, making lobster stripping easy, This is a real plus, because shells typically have to be removed by hand, making lobster processing a labor-intensive task."

"HPP facilitates recovery of basically 100 percent of the edible parts of the lobster," adds Roberto Peregrina, Miami, Fla.-based USA director of Hiperbaric, a Spanish manufacturer of HPP systems. "That offers benefits for food service professionals as they develop new culinary creations." ■

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In Search of the Meaning ... *(Continued from p. 17)*

injunction, the Arkansas judge granted it. Consequently, Arkansas is barred from enforcing the law against Tofurky until the case has been decided. In its December decision, the Arkansas court ruled that Tofurkey would likely prevail on the merits of its First Amendment claim—that is to say, the court was convinced that the Arkansas law likely violated the First Amendment. The court also ruled that the threat faced by Tofurkey as a result of the law was so substantial that an injunction preventing Arkansas from enforcing the law was necessary.

Collectively, these cases represent two very capable judges reading two similar laws, and applying them to similar facts, but each reaching very different conclusions. One could argue that the differences in the respective laws made the difference in the cases, but that will provide scant comfort to those affected by similar laws in other places. For obvious reasons, it's vitally important that laws are applied fairly and uniformly both within and beyond jurisdictional boundaries. When judges issue arguably divergent rulings in similar cases, the cases are often appealed to higher courts, who will then set a uniform standard. How higher courts will ultimately reconcile the Missouri and Arkansas decisions, or even whether they will, remains to be seen. Any sort of final decision is likely years away. By then, the words we use to discuss plant-based or cell-cultured meats will have likely undergone significant additional shifts. Such is nature of English in these increasingly fast-paced times.

Rules are in notoriously short supply in the English language but attempting to rectify that by legislating new rules is almost certainly destined to fail. Perhaps technology, just as it may one day allow us to sustainably end world hunger, will also eradicate legal ambiguity. Perhaps then we'll no longer need to meet at the courthouse and ask the judge to mete out justice regarding the meaning of meat. But that of course would open a whole new can of worms. ■

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Will Novel Foods Cause Allergies? *(Continued from p. 19)*

consumed may pose allergen risks that were not previously noticed by the consumer, if they are concentrated and consumed in a large quantity. A protein-rich novel food that is intended to be consumed in large quantity is likely of greater concern than low protein, low consumptions foods.

Are the Proteins In the Novel Food Easily Digested?

It has long been known that proteins that are not easily digested in the human stomach, or possibly in the intestinal tract, are more likely to be allergens. Given that parts of a protein must survive for the immune system to recognize and react to it, this hypothesis is reasonable. It should be noted, however, that many poorly digested food proteins are not allergens. We can examine how digestible proteins from novel foods are in the laboratory using protein-digesting enzymes from mammals. Novel foods that contain proteins that do not break down with enzyme treatment, or that only partially break down, would be considered candidates for becoming an allergen, especially if they are abundant in food.

Challenges

Novel foods are very different from one another with respect to potential allergen risk. Currently, our understanding of food allergy allows us to identify novel foods that may present particularly high risk, but little more. Assessing the ability of a novel food to sensitize consumers is a particular problem. Ultimately, it is regulatory agencies that decide on the safety of novel foods. Pathways to the regulatory acceptance of novel foods should be clear, rely on the best and most relevant scientific evidence, and not introduce unnecessary burden to the food manufacturer.

Informing consumers about allergen risk is the cornerstone of food allergy safety. In the absence of a food allergy cure, labeling of problematic, already existing known food allergens is our primary method of preventing allergic reactions. For this reason, allergen labeling regulations are tightly controlled by regulators. Communicating likely risk from novel foods, especially those which cross-react to known allergens, is therefore a problem. How should one label the presence of insects that may cause reactions in shellfish allergic consumers? By law they cannot be labeled as shellfish because they are not. A mechanism by which food manufacturers may label an allergen risk from novel foods without falling afoul of regulatory agencies is clearly needed.

Summary

Yes, novel foods will cause allergy. All, or nearly all, foods—novel or not—cause allergy. Some novel foods pose more risk than others. It is important to note that, just as with existing foods, presence of an allergy risk does not preclude novel foods from having a place in our diet. Wheat, egg, and milk are all recognized allergens with a crucial place in nutrition.

We do not want to introduce extremely allergenic foods into our food supply. Equally, we must acknowledge that all foods come with an element of risk. The use of scientific risk assessment to identify the most allergenic new foods, and the use of clear labeling to communicate risk for the rest, is a sensible approach. The potential importance of novel foods in addressing nutritional challenges cannot be overstated. As the novel food market moves forward and grows, sensible regulation should minimize risk while allowing benefits to all. ■

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sanitation alone, monitoring helps provide a better idea of what's happening when you're not looking.

Inspection and Documentation

We know that it's key to monitor what's already in and around your facility, but it's also crucial to thoroughly inspect everything arriving at it. This means taking product samples off trucks and railcars and inspecting incoming shipments of packaging material. If you're stopping pests early, well before they even get inside, you'll find that it's far easier to keep them from getting a foothold. Proper inspection is one of the best proactive ways to fortify your defenses against pest invasion.

Use a site-specific checklist when performing inspections of inbound items into the facility and don't forget to inspect items your contractors bring in. If you do find pests in shipments, be sure to take note of how many you find, what kind they are and notify the supplier of the issue. Then, if necessary, ask for your pest management professional's help in identifying the next steps.

And finally, tracing issues aren't likely to exist if you document everything that happens at your facility. Recording every instance of pest activity is essential. It's best to keep a strong documentation system that includes the following:

- An overarching food safety plan for your company.
- A complete summary of your supply chain program, including suppliers and other partners, types of ingredients, and receiving records for incoming shipments.
- Detailed inspection and monitoring records, including annual assessments, regular facility inspections, device monitoring records, inbound shipment inspections, and pest-sighting logs.

Keeping these documents readily available can help efficiently address any issues. Being able to act quickly, especially in the food processing and manufacturing industry, is of primary importance when it comes to halting pest problems.

Communicating With Partners

Stopping pests takes a strong team. Communicate regularly with your supply chain partners, and ensure your businesses are on the same page when it comes to monitoring and documentation. If every party involved maintains the procedures needed to trace problems back to their origin, you can better address food safety concerns and help eliminate pest issues.

In addition, a pest management professional can help implement a comprehensive plan designed specifically for your building. Every business will have different concerns based on the types of products they make and the region of the world they're located in, but the right pest management partner will help design a strategy that takes all those factors into account. Don't hesitate to reach out to a provider, as it could very well be one of the best decisions you make on the path to a year-round, pest-free, and audit-ready operation. ■

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NEW PRODUCTS

Head and Tongue Wash

Beef harvest plants are known to use a lot of water for sanitation programs. Not only does that mean using a disappearing resource, but it also generally means high operation costs. Processors need to pay to pipe in water, heat it, and treat outgoing water. In addition, some areas of the country experiencing drought-like conditions are enforcing stricter standards on water usage.

The patented Birko head and tongue wash is proven to effectively wash heads and tongues while reducing water consumption in plants significantly. The system works by capturing each head and tongue as they enter the cabinet and spraying water with 3-dimensional, contoured arbors that oscillate, following the heads and tongues. The arbors shut off between washes and move back to the front of the cabinet to capture the next head and tongue. **Birko, birkocorp.com.**

Campylobacter Test Kit

Romer Labs, a provider of diagnostic solutions for the agricultural, food, and feed industries, is announcing that its RapidChek line of solutions for pathogen testing will now include a test kit for *Campylobacter*. RapidChek *Campylobacter* couples a sensitive immune-detection strip with a proprietary aerobic enrichment media. Poultry processors testing carcass rinses, turkey carcass swabs, and raw ground chicken get clear results within 20 minutes (after incubation), ensuring accuracy and enhancing compliance with emerging U.S. regulations.

The test kit was developed in collaboration with a large poultry processor looking for an efficient way to comply with new USDA regulations that require the industry to implement qualitative testing for the pathogen using enrichment-based procedures. The kit detects the three regulated species: *C. jejuni*, *C. coli*, and *C. lari*, in carcass rinses, raw ground chicken, and turkey carcass swabs. **Romer Labs, romerlabs.com/en/campy.**

Wash and Clean System

Grundfos, a water technology company, has debuted a new wash and clean system for the food processing industry. The Hydro HP is a high pressure clean and wash booster set that provides steady pressure from 5 gpm up to the system set point of 150, 250, 350, or 500 gpm. The Hydro HP is energy efficient, reliable, and easy to maintain, offering customers full realization of ROI after the first few maintenance cycles. **Grundfos, grundfos.us.**

UV-Vis Spectrophotometers

Shimadzu Scientific Instruments (SSI) introduces a new UV-i group of UV-Vis spectrophotometers designed to provide improved quality control productivity, data analysis and management, and operating efficiency. The new series consists of six models: UV-1900i, UV-2600i, UV-2700i, UV-3600i Plus, SolidSpec-3700i, and SolidSpec-3700i DUV.

All six of the spectrophotometers in the series include an automatic pass/fail determination for improved efficiency. The systems are equipped standard with a spectral evaluation function in the software that automatically determines whether data satisfies specified criteria. This function helps to improve the efficiency of quality control operations by eliminating the manual data analysis steps required after spectra are acquired.

The UV-i spectrophotometers also include automatic measurement for improved operating efficiency. By connecting an autosampler unit, the systems can analyze up to 360 samples automatically. Used in combination with the spectral evaluation function, the entire process, including pass/fail determination, can be fully automated.

In addition, these new spectrophotometers improve data analysis and data management. Operators can send data to an Excel spreadsheet in real time or simultaneously save information as a text file. This function reduces time spent sending data to separate software for data analysis. Shimadzu's LabSolutions software includes advanced security functionality for solutions compliant with electronic records and electronic signature (ER/ES) regulations. **Shimadzu Scientific Instruments, ssi.shimadzu.com.**

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Events

MARCH

1-5
Pittcon
Chicago
Visit pittcon.org/pittcon-2020 or email expo@pittcon.org.

3-6
Beef Industry Safety Summit
San Antonio, Texas
Visit bifsco.org.

11-12
National Food Policy Conference
Washington, D.C.
Visit consumerfed.org/cfa_events/national-food-policy-conference.

APRIL

7-9
IAFP European Symposium
Munich, Germany
Visit foodprotection.org/europeansymposium.

21-23
Regulatory + Science Forum
Washington, D.C.
Visit consumerbrandsassociation.org/events.

28-29
European Food Sure Summit
Milan, Italy
Visit foodsureeurope.com

MAY

4-7
Food Safety Summit
Rosemont, Ill.
Visit foodsafetystrategies.com/food-safety-summit.

JUNE

1-2
Food Label Conference
Washington, D.C.
Visit primelabel.com/conference.

2-3
North American Food Safety & Quality
Chicago
Visit foodsafetyna.com.

JULY

12-15
IFT Food Expo
Chicago
Visit iftevent.org.

AUGUST

2-5
IAFP Annual Meeting
Cleveland, Ohio
Visit foodprotection.org/annualmeeting.

SEPTEMBER

11-17
AOAC Annual Meeting & Expo
Orlando, Fla.
Visit aoac.org/annual-meeting-exposition or email aoac@aoac.org.

NOVEMBER

Pack Expo International
8-11
Chicago
Visit packexpointernational.com.

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ARTICLE: Effects of Hot Air and Microwave Drying on Celery Stalk Slice Quality

Celery *(Apium graveolens)* has extensive culinary usage given its characteristic aroma and flavor, which are due to the presence of butylphthalide and sedanolide. The aim of this work was to study the preparation of dried celery stalk slices through hot air or combined microwave and hot air drying at 50°, 60°, or 70°C with or without blanching pretreatment. The celery stalk slices that were dried at low temperatures retained aroma well. Although blanching reduced drying time (DT) and global color change, it also reduced the retention of the characteristic aroma of celery. Therefore, combined microwave and hot air drying without blanching was selected for celery stalk slices given that it reduced DT, minimized chromatic aberrations, and maximized the retention of the characteristic aroma of celery. ***Journal of Food Processing and Preservation,*** **Vol. 44, No. 1, January 2020, e14310.**

ARTICLE: Hempseed in the Food Industry: Nutritional Value, Health Benefits, and Industrial Applications

Hempseeds *(Cannabis sativa L.)* have been consumed in Asian communities since prehistoric times. Recently, Australia, Canada, and the United States have legalized the cultivation and consumption of hempseed at low (‹0.3%) tetrahydrocannabinol levels, and there's a growing interest in hempseed due to its nutritional value and pharmaceutical potential. This review aims to summarize the chemical composition, nutritional value, and potential health benefits of hempseed, as researched via *in vitro* and *in vivo* trials. The application of hempseed in the food industry is limited due to its poor performance on some functional properties, so the latest processing methods developed to improve these properties were compared. Additionally, manufacturing technologies incorporating hemp seeds into existing food products are also elaborated. This review would promote further in-depth research on this recently approved food resources and maximize its utilization in new food product development. ***Comprehensive Reviews in Food Science and Food Safety*****, Vol. 19, No. 1, January 2020, Pages 282-308.**

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Changes of Liposome Activity in Immature Rice During Development

For the past several decades, only a few studies were conducted on the change in immature rice liposomes during seed development. To evaluate and compare the lipid material of different degrees of developing rice grains, this paper focused on fresh rice seeds from only one most popular species of Dasan divided into five growth periods. The lipid components of fresh rice, especially γ-oryzanol and fatty acids equipped with extremely beneficial phytonutrients, were investigated. The results illustrated that the level of extracted liposomes increased gradually along with the development of rice and in the third stage of development, the level of liposomes achieved maximum levels. And then, instead of increasing, it was decreased at later stages of development. Moreover, the antioxidant activity of fresh edible rice (FER) was also evaluated by DPPH and ABTS assay. It was shown that FER has higher antioxidant activity than ripened rice seed on lipids, which will improve FER using functional foods and help provide a theoretical basis in the food processing industry. ***Journal of Food Science*****, Vol. 85, No. 1, January 2020, Pages 86-95.**

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