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LESSONS FROM THE PANDEMIC

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food industry prepared for another surge?

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- USDA Targets More *Salmonella* Reductions in Poultry Processing



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Congratulations to This Year's Winners!



Case Farms & King Arthur Baking Company

Food Quality & Safety is celebrating two companies that have been recognized for employing high product standards and expectations. For the complete stories behind each company's success, check out pages 22 and 25 of this issue.



From The Editor

Happy Holidays!

I hope everyone, everywhere gets to spend this holiday season with loved ones. Because so many of us have had the luxury of spending time with family and friends, it's easy to forget there are parts of the world where this still isn't possible.

The end of the year can be a time of reflection as we look back at where it began. The year kicked off with a lot of uncertainty: Would the pandemic ever end? Would we ever get back to normal? As 2022 ticked along, it shifted into a time of hope: Could the vaccines and therapies make it possible to finally end the COVID-19 nightmare? Only time will tell.

At the time of this writing, the U.S. has just celebrated the Thanksgiving holiday, a time to express our gratitude for the blessings we have and share what we can with those less fortunate. This year, more than ever, I'm grateful that so much has returned to normal for so many. Sports are back, travel is picking up, schools are back to in-person classes, and many have returned to a normal workload. The year is reaching its end on a much higher note than it began.

But it's impossible to write the last column of 2022 without also acknowledging the tremendous losses suffered by so many in this pandemic. I'm sure experts will be studying it for years to come, and I hope it's the only one that exacts such a devastating price in human life.

The end of the year can also be a time to look forward, which certainly applies this year—a time to set new goals for the upcoming year and to begin planning ways to achieve them. A routine personal goal for me is to get more organized in the new year, something I'm sure is familiar to many. I should note that I've spent years of working toward this goal, but I never seem to “get there.” Actually, I'm not known to be a super organized individual, so I shudder to think how chaotic my life would be without the annual attempts to improve in this area. Since I never seem to quite achieve my lofty aspirations, I will stubbornly keep trying to achieve it (again) in 2023.

Whatever 2023 holds for us all, I hope it brings you all that you hope for.

Patricia A. Wester
Executive Industry Editor



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NEWS & NOTES



COURTESY OF UPSIDE FOODS

Upside Foods Receives First FDA Go-Ahead for Cultivated Meat

For the first time in the United States, FDA has given the green light to cultivated meat. Berkeley, Calif.-based Upside Foods has received the agency's go-ahead for its lab-grown chicken.

FDA evaluated the information submitted by the firm as part of a pre-market consultation for their food made from cultured chicken cells and has no further questions at this time about the firm's safety conclusion, according to a November 16, 2022 statement from the agency.

While this is a major milestone for cultivated meat, before this food can enter the market, the facility in which it is made also needs to meet applicable USDA and FDA requirements. In addition to FDA's requirements, which include facility registration for the cell culture portion, the manufacturing establishment needs a grant of inspection from USDA's Food Safety and Inspection Service (FSIS) for the harvest and post-harvest portions, and the product itself requires a USDA mark of inspection.

Oversight and regulation of animal cell culture technology is conducted collaboratively between FDA and USDA. In a March 2019 agreement, both agencies agreed to a joint regulatory framework wherein FDA oversees cell collection, cell banks, and cell growth and differentiation. A transition from FDA to USDA-FSIS oversight will take place during the cell harvest stage. USDA-FSIS will oversee the post-harvest processing and labeling of human food products derived from the cells of livestock and poultry. This closely coordinated regulatory approach will ensure

that cell-cultured products derived from the cell lines of livestock and poultry meet federal regulations and are accurately labeled.

Advancements in cell culture technology are enabling food developers to use animal cells obtained from livestock, poultry, and seafood in the production of food; these products are expected to be ready for the U.S. market in the near future, FDA says, adding that the agency's goal is to support innovation in food technologies while maintaining the safety of the foods available to U.S. consumers. ■

Organic Dairy Farms Seek USDA Assistance During Western Drought

BY KEITH LORIA

The western U.S. is experiencing an unprecedented drought that has created a dramatic increase in feed costs, by as much as 50%, due to feed shortages and drought-related operating costs. In response, Straus Family Creamery, a certified organic creamery that obtains milk from 12 independent certified organic dairy farms, has organized the Western Organic Dairy Farming Crisis Coalition. The coalition is asking both USDA and California officials for immediate emergency relief to help save organic dairy farms.

"Organic dairies in California are expecting an average financial loss of \$250,000 this year and are at imminent risk of going out of business," Albert Straus, founder and CEO of

Straus Family Creamery, tells *Food Quality & Safety*. "Of the 106 organic dairies in California, we have lost 10 this year and expect to lose 10 more."

Straus says that the coalition is trying to increase awareness about the drought among the public and federal and state leaders. "We need emergency relief from the USDA and at the state level, or we could see a partial collapse of the regional organic dairy sector in the coming months. This will greatly impact rural economies' stability and our local supply of organic milk and organic dairy products," he adds.

The coalition hopes to see federal and state leaders provide disaster funding for organic dairy farms as soon as possible. "One short-term solution is to find a source of state or federal funding to offset the feed price premiums for hay and grain," Straus says. "One of the goals is to have emergency funding in the December omnibus bill."

The coalition is growing and working on building support from local politicians in each of its members' communities. The group is also collaborating with other national dairy processors and brands to gain federal support and relief.

The coalition has drafted a letter to Thomas J. Vilsack, USDA Agriculture Secretary, and Karen Ross, California's Agriculture Secretary, about the challenges facing these farms. ■

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FDA Announces Strategy to Increase Infant Formula Supply, Safety

BY KEITH LORIA

FDA is no longer accepting requests for enforcement discretion for certain requirements that apply to infant formula, the agency announced in November 2022, based on its temporary guidance released in May 2022 and in effect through earlier this week. Now, FDA has said it will provide a pathway for formula manufacturers to continue marketing these products while they work toward fully meeting FDA requirements. “Under the new guidance, the period of enforcement discretion for these products is being extended until January 6, 2023, with further extensions possible for firms that express interest in and take steps toward remaining on the U.S. market,” FDA said in a statement.

For background, in May 2022, FDA issued new guidance to manufacturers of infant formula as a way to temporarily exercise enforcement discretion on certain requirements that applied to infant formula, an action the agency hoped would help increase the supply of infant formula in the United States. The need for increased supply of formula became even more pressing after two major occurrences—a February 2022 voluntary recall by Abbott Nutrition due to formula contaminated with *Cronobacter sakazakii* at the company’s Sturgis, Mich., facility, and increased strains on supply chains experienced during the COVID-19 pandemic.

Additionally, on November 15, FDA announced plans to create a dedicated team

of investigators for infant formula production as part of its ongoing strategy to prevent contamination of any product. Part of the agency’s plan would be to realign staff across the Center for Food Safety and Applied Nutrition and the Office of Regulatory Affairs in hopes of better supporting the regulatory oversight of infant formula.

FDA has also released a proposed rule that *Cronobacter* infections be added to CDC’s list of national notifiable diseases, an action that would require physicians to report cases of infection to public health officials.

Other actions FDA is considering include reevaluating testing requirements to enhance safety of finished infant formula products; developing and improving consumer education on how to safely prepare and store infant formula; and providing added training for staff who inspect infant formula production facilities. ■

DOJ Probes Processor Payments to Chicken Farmers

The U.S. Justice Department has launched an investigation into how poultry processors pay chicken farmers; the agency is examining current chicken-grower contracts and payment practices during the probe.

The news came to light after an SEC filing by Greeley, Col.-based Pilgrim’s Pride Corp., one of the largest poultry producers in the U.S., alerted the company’s shareholders of the investigation. “The U.S. government’s recent focus and attention on market dynamics in the meat processing industry could

expose [Pilgrim’s Pride] to additional costs and risks,” the company said in the filing.

Additionally, the Justice Department notified other major poultry companies about the investigation, according to a report published on October 27, 2022, in the *Wall Street Journal*. No other company names were disclosed in the article.

Currently, poultry processing companies use a tournament system whereby two dozen farmers in a select region are compared with one another to determine payment rates. This method has long been criticized by some chicken farmers, who claim that the variables involved in chicken rearing often make it impossible to fairly determine income. However, poultry processing companies argue that a performance-based structure such as this one incentivizes chicken farmers to maximize efficiency, better protects chicken health, and keeps prices low for consumers.

Under tournament systems, vertically integrated poultry companies, known as “integrators,” contract with chicken farmers who serve as growers. Integrators provide growers with birds and feed, and growers provide facilities and labor to raise birds to slaughter weight. Grower compensation is based on a grouping, ranking, or comparison of poultry growers whose poultry was harvested during a specified period—usually one week. Tournament group averages are established for formulaic flock performance metrics, and growers are ranked against the averages.

A particular grower’s pay is impacted by the performance of others in the tournament. Growers have no control over the other tournament members’ efforts and performance, nor over the growers with which they are grouped. An individual grower’s effort and performance can be static, and yet that grower’s payments could fluctuate based on the grower’s relative position in the settlement group. Further, changes in payment may not be commensurate with the changes in a grower’s effort and performance. These characteristics of the tournament system can add to the variability of pay and affect the ability of growers to plan and measure their own effort and performance.

Integrators also determine which growers are in each settlement group. While growers in a group must have similar flock finishing times, a live poultry dealer could move a grower into a different grouping by





altering layout times to change the week that a grower's broilers are processed. An individual grower may perform consistently in an average performing pool, but if the integrator places that grower in a pool with more outstanding growers, those outstanding growers raise the group average and reduce the fees paid to the individual. At its discretion or per the poultry growing arrangement, an integrator may remove certain growers it considers to be outliers from a settlement pool. This would likely affect the average performance standard for the settlement and affect the remaining growers' pay.

Last spring, in response to numerous complaints from chicken farmers, USDA proposed new rules around the tournament system, which the agency hoped would increase transparency around the practice.

Many in the poultry processing industry were not happy with the proposed rules. "This is just the first salvo in the [Biden] administration's attempts to resurrect failed policies that would dismantle a successful industry structure that has benefited growers, chicken companies, and—ultimately—consumers all around the world," says Mike Brown, president of the National Chicken Council. "The last thing USDA should be doing is pushing increased regulations, red tape, and costs onto businesses at a time of record inflation and input costs, threatening food security and potentially raising grocery bills even further for Americans."

USDA is also proposing a series of new transparency measures designed to address many grower concerns relating to deception and lack of access to critical information

in connection with poultry contracting and tournament systems. Furthermore, USDA is taking a range of steps to enhance fair and competitive markets in the meat and poultry sectors. ■

FDA Releases Food Traceability Final Rule

In November, FDA announced finalization of its food traceability rule, which the agency says is designed to more effectively trace contaminated food through the food supply, whether sourced in the U.S. or abroad.

The final rule establishes additional food traceability record-keeping requirements for those that manufacture, process, pack, or hold certain foods, including fresh leafy greens, nut butters, fresh-cut fruits and vegetables, and ready-to-eat deli salads. In collaboration with industry, FDA says it will be able to more rapidly and effectively identify the origin and route of travel of certain contaminated foods to prevent or mitigate foodborne illness outbreaks, address credible threats of serious adverse health consequences or death, and minimize overly broad advisories or recalls that implicate unaffected food products.

"This rule lays the foundation for even greater end-to-end food traceability across the food system that we're working on as part of the New Era of Smarter Food Safety initiative," said Frank Yiannas, FDA's deputy commissioner for food policy and response, in a November 15, 2022 statement. "This standardized, data-driven approach to traceability record-keeping helps create a harmonized, universal language of food traceability that will help pave the way for industry to adopt and leverage more digital, interoperable and tech-enabled traceability systems both in the near term and the future."

Foods subject to the final rule requirements appear on the Food Traceability List (FTL). To determine which foods should be included on the FTL, FDA developed a risk-ranking model for food tracing based on the factors that Congress identified in Section 204 of FDA's Food Safety Modernization Act (FSMA). These foods include fresh leafy greens, melons, peppers, sprouts, herbs, tomatoes, cucumbers, and tropical tree fruits, as well as shell eggs, nut butters, fresh-cut fruits and vegetables, ready-to-eat deli salads, cheeses (other than hard cheese), fin-fish, and crustaceans.

Key features of the final rule include:

- **Critical tracking events:** At specific points in the supply chain—such as at harvesting, cooling, initial packing, receiving, transforming, and shipping FTL foods—records containing key data elements are required.
- **Traceability plan:** This information is essential to help regulators understand an entity's traceability program and includes a description of the procedures used to maintain required records, descriptions of procedures used to identify foods on the FTL, descriptions of how traceability lot codes are assigned, a point of contact for questions regarding the traceability plan, and a farm map for those that grow or raise a food on the FTL.
- **Additional requirements:** Maintaining records as original paper or electronic records, or true copies; providing requested records to FDA within 24 hours of a request (or within a reasonable time to which the agency has agreed); and providing records in an electronic sortable spreadsheet when necessary to assist FDA during an outbreak, recall, or other threat to public health.

FDA says that these enhanced record-keeping requirements for FTL foods outlined in the final food traceability rule will allow for faster identification and rapid removal of potentially contaminated food from the market, ultimately resulting in fewer foodborne illnesses and deaths.

The compliance date for the recordkeeping requirements is January 20, 2026. ■



Washington Report



Effects of the Law

Prop 12 became effective on January 1, 2022. However, in 2022, a Sacramento County superior court judge ruled that some of the proposition's pork provisions wouldn't become effective until 180 days after the California Department of Food and Agriculture finalized Prop 12 regulations, which occurred on September 7, 2022, says Kate Brindle, senior specialist of public policy in the Farm Animal Protection Department at The Humane Society of the United States in Gaithersburg, Md.

Prop 12 has introduced significant uncertainty into the pork industry, says Michael Formica, chief legal strategist at the National Pork Producers Council in Des Moines, Iowa, who believes that the ruling is unconstitutional. "One state can't make laws regulating commerce between states," he says. "This creates regulatory and financial chaos."

Under Prop 12, farmers raising pigs that provide pork products to the California market must register and pay California agents to inspect their farms. "This will create serious biosecurity threats nationwide," Formica says. Having out-of-state inspectors visit multiple farms increases the risk of disease spreading from farm to farm, he adds. Furthermore, he says that there aren't enough inspectors to conduct all the inspections and maintain proper biosecurity protocols.

According to David Stender, a swine field specialist at Iowa State University in Cherokee, some larger companies that were already planning to remodel have already remodeled their facilities to Prop 12 standards. But most smaller operations haven't made changes for various reasons, including the fact that many smaller operators have seen sows attack each other in pens during mixing and feeding events.

Simultaneously, the harvest plant slowdown from the COVID-19 pandemic severely burdened most small operations financially, especially those that lacked a packer marketing contract, Stender says.

California's Prop 12 Heads to Supreme Court

SCOTUS likely will decide the fate of the Farm Animal Confinement Initiative in 2023

BY KAREN APPOLD

In 2023, the Supreme Court is scheduled to rule on California's Proposition 12, the Farm Animal Confinement Initiative, which sets minimum requirements for animals in confined housing. The proposition, which has been quite controversial, has strong support from both sides.

Originally passed by California voters on November 6, 2018, the legislation requires farm owners and operators to house covered animals in non-cruel ways,

and sets minimum standards for freedom of movement, cage-free design, and floor space. Applicable animals include breeding pigs, veal calves, and egg-laying hens. Specifically, the law prohibits selling shell eggs, liquid eggs, whole pork meat, or whole veal meat from animals housed in inhumane spaces to California. Any sale of an illegal (i.e., non-compliant) pork product is punishable by a \$1,000 fine per violation or a 180-day prison sentence.

This made it prohibitive to make financial investments while exiting the industry.

Furthermore, Stender says it was impossible for producers to obtain advanced marketing contracts that covered the cost of enlarging pens. As the proposition's deadline approached, the cost of remodeling skyrocketed due to the expense of building materials. There was also a scarcity of labor due to the need for remodeling and learning how to implement new systems.

Proponent Arguments

States have long played roles in protecting their residents by removing unsafe and morally objectionable products. "Prop 12 does exactly that, by ensuring that Californians won't be subjected to buying products they overwhelmingly consider cruel and unsafe," Brindle says.

According to Shawn Stevens, Esq., founder of the Food Industry Counsel, LLC, in Milwaukee, Wisc., and member of *Food Quality & Safety's* Editorial Advisory Board, "Supporters argued that the law applies equally to producers located within and outside of California, and that they will only have a minimal impact outside of California."

Opponent Arguments

In presenting their case to the Supreme Court, challengers of Prop 12 called the law unconstitutional because it serves to regulate the pork industry outside of California and, therefore, stands in the way of interstate commerce, Stevens says. Opponents also argued that Prop 12 regulations will drastically change farming throughout the country as producers shift to comply with its requirements.

Producers located outside of California argued that they weren't able to vote on the proposition, which now places an undue burden on them to invest capital in retrofitting production facilities and bear the cost of California inspectors traveling to their farms, says Dan Scheitrum, PhD, assistant professor in the Agribusiness Department at California Polytechnic State University in San Luis Obispo.

Outlook on the Court's Decision

How the Supreme Court will rule in 2023 is anyone's guess. "We can't speculate on how the justices will rule," Formica says.

"However, during oral arguments, the justices seemed to recognize that the Constitution's Commerce Clause, which gives Congress the power to regulate commerce among states, and the structural framework of the Constitution prohibit one state from regulating activities in other states as Prop 12 does."

Adds Travis Cushman, deputy general counsel of litigation and public policy at

One state can't make laws regulating commerce between states. This creates regulatory and financial chaos.—

MICHAEL FORMICA,
National Pork Producers Council

the American Farm Bureau Federation, "The framers of the Constitution wisely sought to prevent the balkanization that would result from states using commerce to export their own preferred policies into other states."

During oral arguments in front of the Supreme Court, Stevens notes that the justices had targeted questions for each side, demonstrating possible concerns with both sides of the argument. "The Court may decide to remand the matter back to the California courts for additional record development or hearings," he says.

On the flip side, Brindle says that by upholding Prop 12, the Supreme Court would validate the long-recognized authority of states to pass laws that protect their residents' health, safety, and morals. "Regardless of the Court's decision, it's clear that consumers don't want inhumane and unsafe products," Brindle says.

Implications for the Pork Industry

If the Supreme Court upholds Prop 12, the pork industry nationally will need to prioritize moving toward compliance with Prop 12 requirements in order to continue selling in California, Stevens says. The initial cost of complying with Prop 12 rests on pig farmers. "They will incur the costs of extensive renovations or construction costs associated with building new facilities," Formica says. Costs are

currently estimated to be \$3,500 or more per sow.

Pig farmers will also face losses in productivity as they move to new housing and management systems. "Prop 12 will lead to greater concentration in the U.S. pork industry and the loss of individual family farms and will mean significantly higher pork prices at the grocery store and fewer consumers who can afford this high-quality protein," Formica says.

Stender expects that Prop 12 will likely cause a two-tiered market, with higher-priced meat going to California due to scarcity of compliant pork and lower-priced meat for other states due to the sudden excess supply.

"Some national producers may elect to stop selling in California altogether," Stevens says. "Other producers who wish to continue selling to California most likely won't limit compliance to only pork intended to be sold in California and will instead universally adopt measures to ensure compliance with Prop 12 for all products."

Furthermore, the possibility that California or another state could pass other laws that change housing requirements may bring too much uncertainty for smaller operations to continue. "Ultimately, the increased costs and uncertainty could lead to further consolidation and integration in the industry," Cushman says.

Farmers might also cease pork production if Prop 12 is upheld because the law would prohibit farmers from raising their animals in the way that they and their veterinarians believe is best for their animals and employees, Cushman says.

Despite concerns verbalized by meat-producing organizations, Brindle notes that many pork producers do support Prop 12 and are already phasing out cruel confinement for some or all of their products. In fact, a meat industry trade publication, *Meatingplace.com*, recently noted that group housing for mother pigs now comprises about 38% of U.S. pork production (available at meatingplace.com/Industry/News/Details/106857).

In another example, Perdue Premium Meat Company, Inc., issued an amicus brief supporting the proposition, arguing that forward-thinking pork producers are able and eager to meet Prop 12 standards, Brindle says. In the brief, the company

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states, “Niman Ranch’s farms have been meeting Prop 12 standards and producing humanely raised pork for years. Hormel announced two years ago that it will do so. Even without Prop 12, the market has shifted to create strong demand for pork that is produced more humanely. Prop 12 reflects that shift in consumer preferences.”

Tyson Foods and Clemens Food Group, two other large pork producers, have also publicly stated that they are planning to comply with the proposition without any major effects on their bottom lines, Brindle says.

Other Potential Outcomes

If the Supreme Court upholds Prop 12, there will likely be many implications

for stakeholders beyond pork producers. Regarding food safety, Brindle says that 2020 research from the United Nations Environmental Programme has shown that the extreme confinement of farm animals facilitates the spread of pathogens that can cause dangerous foodborne illnesses or could potentially lead to future pandemics.

In a brief submitted in support of Prop 12, the American Public Health Association, Infectious Diseases Society of America, and Center for Food Safety conclude that the proposition addresses risks to food safety and public health by restricting the

Other Measures Addressed in Prop 12



Pigs aren’t the only farm animals addressed in California’s Proposition 12. The law required all egg farmers, both inside and outside of California, who sold shelled eggs or egg products in California markets to convert to cage-free laying hen housing by January 1, 2022, says Maro Ibarburu, business analyst in the Egg Industry Center located at Iowa State University in Ames.

The egg industry has had a gradual transition to cage free due to previous regulations that required more space per hen than conventional production: California’s Prop 2 (required as of January 2015) and the first phase of Prop 12 (required as of January 2020), says Ibarburu. As a result, some egg farmers started converting to cage-free barns long before the 2022 deadline approached.

Chad Gregory, president and CEO of United Egg Producers, says that its farmer members support all types of hen housing, with a firm emphasis on ensuring proper management of hen health and well-being, as well as meeting or exceeding all food safety requirements.

“Our members intend to comply with all new state laws governing hen housing as they are implemented,” Gregory says. “Transitions to cage-free housing are complex and costly, and they require close collaboration and conversation between egg producers and their retail and food service customers. United Egg Producer members continue to focus on the welfare of our hens and producing safe, affordable eggs that meet our diverse customer base’s needs.”

Because the egg industry has already transitioned to provide cage-free eggs to California, Ibarburu doesn’t foresee any additional adjustments occurring in the California egg market if the Supreme Court upholds Prop 12. If the proposition is overturned, however, the impact on the egg industry is uncertain. Kate Brindle, senior specialist of public policy in the Farm Animal Protection Department at The Humane Society of the United States in Gaithersburg, Md., says that many veal and egg producers are already choosing to supply California’s market with products that come from animals that weren’t cruelly confined.—KA

Regardless of the Court’s decision, it’s clear that consumers don’t want inhumane and unsafe products.—

KATE BRINDLE, *The Humane Society of the United States*

sale of pork products in California that are produced using intensive confinement practices, Brindle says. According to the brief, “More space reduces stress in sows, which mitigates the cascade of stress-related negative health impacts on sows and their piglets destined for slaughter, which—ultimately—reduces risk to California’s food safety and public health.”

Regarding costs and the effects on consumers, “If Prop 12 holds, we will see an increase in food prices and supply chain disruptions,” Formica says. A 2010 University of Minnesota study estimated that it will cost between \$1.9 billion and upward of \$3.2 billion to convert sow barns to group pens (Staff Papers 61604, University of Minnesota, Department of Applied Economics).

Another aspect that will likely increase pork costs is third-party verification and labeling, says Stender.

Furthermore, Stevens says that a ruling supporting Prop 12 could provide states with a precedent to strictly regulate other portions of the food industry, potentially with broad and significant implications. ■

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Legal Update



Geographic Origin Labeling

What foods can and must use a geographic claim, and what the risks are

BY SHAWN K. STEVENS, ESQ., AND ELIZABETH PRESNELL, MS, ESQ.

Food companies routinely make claims about the geographic origin of the food products they sell. Some notable examples include Florida oranges, Idaho potatoes, Parmigiano Reggiano cheese, and Champagne. These origins are usually associated with a perceived level of quality, and, therefore, the products that carry their name are able to command a higher cost. But, what foods can and must use a geographic claim, and what are the risks when such claims are, in fact, used?

Mandatory Country of Origin Labeling

First, in the U.S., country-of-origin labeling is required on many imported foods and on most fresh and frozen produce. This labeling requires that companies declare what foreign country the food is from in a

clear and explicit manner. In most cases, country-of-origin labeling is included on a product's label purely due to regulatory requirements, rather than for marketing purposes.

With that said, however, any required country-of-origin claims must be truthful and not misleading, or the product could be subject to regulatory enforcement action. The Federal Trade Commission regulates the use of "made in the U.S." and similar claims, and has strict requirements to ensure that any such claims made are truthful and not misleading.

Voluntary Geographic Labeling

Setting the required country-of-origin requirements aside, many foods labels are also laced with much more visible voluntary claims highlighting, with marketing prominence the geographic origin of the

food. In most cases, such claims do, in fact, accurately reflect the true geographic origin of the food.

In some cases, however, the claims may become untruthful, such as when companies change ownership or manufacturing facilities change locations. In other cases, the claims may have never had any truth at all, and were simply misappropriated by the food product manufacturers to intentionally enhance marketability and overall profit. These types of claims, where the claimed geographic origin of the product is misleading, are often the target of threatened or actual consumer class action lawsuits.

Because geographic claims are generally used to create a product that is perceived to have a higher quality, plaintiff class action lawyers have made a business out of challenging geographic claims made on product packaging or in product marketing. These claims, which in virtually all cases are styled as class actions, allege that the geographic claim was misleading and caused the consumers to spend more money on the product than they otherwise would in the absence of the geographic claim.

When such claims are asserted and lawsuits are filed, courts have treated the claims differently based upon how truthful or misleading the statements are, how the claims are actually communicated (i.e., through statements, vignettes, or other imagery), and whether there are any disclaimers or other conflicting (but truthful) geographical labeling.

In 2021, for example, a class action lawsuit against Unilever alleging the use of misleading claims was carefully assessed by the court and dismissed. The class action lawyers claimed that marketing on Maille mustard products was misleading because the labels referenced "Paris" and included words in French, which allegedly implied that the product was made in France. The court determined that, because the label did not otherwise

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represent it was a product of France, and because the product contained an accurate (required) country-of-origin label indicating that it was a product of Canada, the label was not misleading. The court concluded, in that case, based upon all of the labeling factors, that mere references to a geographic location on a label do not necessarily imply that the product is manufactured or produced in that geographic location. This was especially true given the Canada country-of-origin statement.

In 2020, the whiskey brand Widow Jane was sued because the product's label stated that the product was "Kentucky Bourbon Whiskey," but was bottled with water from New York. After distillation in Kentucky, the alcohol was shipped to New York by the manufacturer and then bottled with New York water. In response to the consumer class action suit alleging that the reference to "Kentucky" on the labeling was misleading, the court granted a motion to dismiss, finding in that case that the claim was partially true, and that any misleading label claim was not material, in any event, to the purchasing habits of the consumer—plaintiff.

Courts have, however, ruled the other way when resolving lawsuits involving more express and alleged misleading claims of geographic origin. Godiva Chocolate, for example, recently settled a class action lawsuit alleging that references to Belgium in the product label suggested that the chocolate was produced in Belgium, even though the product was allegedly not manufactured exclusively in Belgium. The settlement reportedly set a maximum value for claims totaling \$15 million, plus attorney's fees and costs.

Similarly, the Kona Brewing Co. brand, owned by the Craft Beer Alliance, also settled a claim that alleged that the product labeling implied that the product was brewed in Hawaii. Though a portion of the products sold by the company were, in fact, brewed in Hawaii, this brewery reflected only a small portion of the total brewing capacity for the Kona brand nationally. The product labels included images of Hawaiian landmarks and culture, a map of the Hawaiian islands, and language that stated, "[w]e invite you to visit our brewery" in Hawaii. In addition to required changes to the product's marketing

and labeling, the settlement included substantial financial payments to all affected consumers within the affected class, as well as attorney's fees and costs.

Protected Product Names

In the European Union and several countries outside of the EU, certain foods are regulated such that the food cannot be produced outside of the designated geographic region. For example, the EU's system designates particular origin regions for foods like Parmigiano Reggiano cheese, Gorgonzola cheese, Asiago cheese, Valencia oranges, and Champagne. These regulations are intended to recognize and protect a specific link between the food and the geographic region, while also helping consumers identify and trust the overall quality of the products. In many circumstances, these EU or country-specific regulations are incorpo-

Any required country of origin claims must be truthful and not misleading, or the product could be subject to regulatory enforcement action.



rated into trade agreements between the issuing organization and other countries, including the United States. In addition, World Trade Organization agreements protect certain geographic names through intellectual property protections.

In the United States, protections based on geographic origin can also be protected under trademark law. Though the U.S. Patent and Trademark Office generally prohibits the registration of geographic terms, regional groups and others interested in protecting a group of producers can register a certification or collective mark that is used to designate products from that geographic region. This trademarked mark could then be used only by approved foods and would show that the certified food complies with the geographic mark applied. Certification marks can also, interestingly, be registered even if the mark is a geographic term. Marks used in the United States for identifying products from a certain region include the Idaho potatoes mark, as well as protections for certain products also protected by the EU.

The U.S. Alcohol and Tobacco Tax and Trade Bureau (TTB) also oversees geographic regions associated with American wine. American Viticultural Areas (AVAs) in the U.S. are approved by TTB, and create geographic origin claims applicable to American wines. For example, Napa Valley is an AVA that limits the labeling of wines as "Napa Valley" wines to those only produced in the specific AVA.

Best Advice

When considering including a geographic claim on a food, producers should ensure that the claim is truthful, not misleading, and doesn't infringe on existing trademarks for protected product names. Products similar to, or identical to, a protected product cannot use the trademarked title or mark without approval, and consumer class actions remain a risk for any geographic claims made. In the end, nobody wants to be labeled for having misleading geographic labels. ■

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Cannabis Corner



The Importance of Evaporation in CBD Extraction

Traditional extraction processes do not always capitalize on the latest evaporation technology | BY MATT HALE

Functional health and medicinal products containing cannabidiol (CBD) are growing in popularity, and the U.S. market for CBD is now worth \$1.62 billion a year, according to research from [statista.com](https://www.statista.com).

Traditional extraction processes do not always capitalize on the latest evaporation technology, and there are a number of different techniques for extracting CBD from the hemp plant. Most of these techniques require the use of solvents that are effective at separating the CBD from other chemical compounds found in the plant. Once the CBD has been extracted, the solvent is evaporated off, leaving pure CBD oil.

Some methods use supercritical carbon dioxide in a closed-loop extractor to extract the CBD under pressure, resulting

in a liquid mixture of CO₂ and CBD, which must then be separated by evaporation, but a step involving alcohol solvents is usually still required. For this reason, liquid solvents based on alcohols (ethanol or isopropyl alcohol) or hydrocarbons (butane or propane) are also sometimes used and are much simpler and more straightforward. Unless the evaporation step is carried out correctly, however, some alcohol residues may remain in the CBD oil mixture.

It is important to remember that even where CO₂ extraction is used, a further stage involving alcohol solvents will still be required. Each method has its own benefits and drawbacks, and the best method for one manufacturer may not be right for another.

Once the CBD oil has been separated from the solvent, it is then usually refined and distilled to produce pure CBD oil that is free from other compounds, such as THC, waxes, and lipids. The exact nature of this refining process will impact the chemical profile of the resulting CBD product and depends on the extraction method used.

The Basics of Evaporation

Evaporation is the separation of a liquid from dissolved or suspended solids using energy to make the liquid volatile so that the required solids are left behind. Evaporation differs from dehydration or drying in that the product of evaporation is a concentrated liquid, not a dry solid; however, evaporation can be combined with dehydration or drying processes. It also differs from distillation in that the concentrated solution, rather than the condensed evaporate, is the valuable product.

Evaporation systems have been around for more than 100 years and are used widely in the food, pharmaceutical, and chemical industries for a wide variety of purposes. Each sector has different reasons for choosing evaporation as a process, and there are appropriate differences in implementation. For example, in the food industry, products may be concentrated to increase shelf life, reduce volume or weight, and decrease storage and transport costs. A common example is the concentration of fresh fruit juice to enable the extension of processing periods beyond the harvest window of the crop. In contrast, in the pharmaceutical sector, evaporation is often used to create concentrated solutions that can then be dried to create powdered products, as is the case with many CBD products.

Although the basic principle of evaporation remains the same—the removal of water (or another solvent) from a solution by converting that water or solvent into its vapor phase—there are a number of established and novel techniques to achieve this under different temperature and pressure conditions. The type of evaporation

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LESSONS FROM THE PANDEMIC

What have we learned, and is the food industry prepared for another surge?

BY PATRICIA A. WESTER

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With the end of 2022 upon us, data from the CDC showed that COVID-19 cases in the United States had been on the decline in recent months; however, cases are beginning to tick up over the past few weeks, which raises a question about the status of the pandemic: Is the pandemic (really) over?

Admittedly, many people in the U.S. have already returned to normal in their personal lives; few masks are seen in public these days and restaurant dining rooms are open. Supply chain concerns and personnel policy adjustments are still at the forefront of COVID-19 mitigation policies, but where does the food industry stand if another surge occurs? Are we better prepared than we were in March 2020? Are there new regulations or guidance to support risk mitigation? Will there be enforcement criteria going forward?

Nearly three years in, let's look back at the food sector's overall response and take a speculative peek into the future.

Current Data

Before evaluating the food sectors' efforts to protect both employee and food safety, let's see where we stand. According to CDC's data tracker, 2022 started with the highest number of COVID-19 cases ever recorded in the pandemic in the U.S., reaching more than 5,000,000 cases per week. As of November 28, 2022, the weekly case count sits at just upward of 305,000, up slightly from an October 2022 low mark of 265,000, a number that hasn't been seen since June 2020.



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But, before the celebrations begin, it's important to note the slight uptick in cases recently amid reports of new variants that appear to have increased vaccine immunity evasiveness. It should also be noted that a similar low point occurred in June 2021, when U.S. case counts dropped to as low as 82,000 per week, only to spike to more than a million per week by August 2021.

In the spring of 2020, COVID-19 hit the meat and poultry industry hard. Workers in close proximity to each other in poorly ventilated chilly rooms offered the perfect conditions in which the virus could thrive and spread. With absenteeism high, some companies actually incentivized workers with cash bonuses to continue working even if they were ill, a practice that was eventually stopped to prevent further spread of the disease. There were clear indications that these conditions contributed to community spread events in situations where workers often shared transportation and even lived together. According to CDC's newsletter *Morbidity and Mortality Weekly*, among 23 states reporting COVID-19 outbreaks in meat and poultry processing facilities, 16,233 cases in 239 facilities occurred, including 86 (0.5%) COVID-19-related deaths.

Guidance for Industry

The World Health Organization (WHO) published an early guidance document that offered initial steps the food industry should take as the pandemic exploded. This was a general document that was not country specific, but at least offered industry a starting point.

This was quickly followed by a guidance issued by the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (CISA) on March 19, 2020, entitled "Guidance on the Essential Critical Infrastructure Workforce: Ensuring Community and National Resilience in COVID-19," in which workers in the food and agriculture sector—agricultural production, food processing, distribution, retail and food service, and allied industries—were named as essential critical infrastructure workers (see "CISA Worker Risk Assessments," p. 18).

The agency's National Infrastructure Protection Plan (NIPP) risk management framework, which has been in place since 2014, identifies 16 industry sectors as essential, including the food and

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agriculture sector, which is composed of an estimated 2.1 million farms, 935,000 restaurants, and more than 200,000 registered food manufacturing, processing, and storage facilities, accounting for roughly one-fifth of the nation's economic activity. There are four other sectors applicable for food: water and wastewater, energy, transportation, and chemicals (pesticides). NIPP outlines the mitigation options for each sector using a matrix.

OSHA Steps In

In food facilities, COVID-19 response preparation was often assigned to food safety teams, staff who had a keen understanding of risk management but little or no public health knowledge. Although guidance was finally available, many scrambled to find accurate information for protocol development in the heat of an outbreak. This resulted in information and awareness gaps and poorly designed procedures such as the early attendance incentives, and it left workers to manage active disease cases identified during the workday.

Commonly implemented interventions included employee temperature screening at points of entry, control measures (universal face coverings), engineering controls (physical barriers), and infection prevention measures (additional hand hygiene stations). Adequate social distancing proved to be a real challenge for food producers, resulting in continued high case counts in some facilities.

In May 2020, OSHA released a COVID-19 planning guidance document based on traditional infection prevention and industrial hygiene practices. They encouraged plan managers to stay abreast of guidance from federal, state, local, tribal, and/or territorial health agencies, and to consider how to incorporate those recommendations and resources into workplace-specific response plans.

These plans should consider and address the level(s) of risk associated with various worksites and job tasks workers perform at those sites. OSHA divided job tasks into four risk exposure levels: very high, high, medium, and lower risk. The agency's Occupational Risk Pyramid shows the four exposure risk levels to represent probable distribution of risk, with "very high" and "high" at the top of the pyramid, including workers primarily found in the



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healthcare field and those who come into direct contact with infected patients. Most U.S. food workers likely fall in the "medium" exposure risk level due to the high population density found in food facilities.

The publication of the OSHA guidance completed the fundamental information necessary to develop a comprehensive plan for preparation and response to a pandemic; however, it should be noted that these are guidance documents and therefore do not represent required actions under law. In the chaos of the early days of the pandemic, many didn't know where to access CISA or OSHA documents, so there may still be implementation gaps that should be addressed. Enforcement activities remain unlikely unless actual regulations are proposed.

What Will Winter 2023 Bring?

Evidence is emerging that the Northern Hemisphere is on course for a surge of cases this winter; the question is, how large will it be? Scientists believe new immune-evading strains of the Omicron variant, behavior changes, and waning immunity could result in more COVID-19 infections.

With newer and more contagious variants of the disease emerging, a new phase of the pandemic response is likely at hand. Although largely unchanged from the August 2020 version 4.0 release, the 4.1 version of the CISA guidance encourages industry to use its recommendations to update or develop a response plan to further reduce the frequency and severity of the virus's impact in the event of another surge in cases.

Currently, more than 400,000 cases are reported globally every day, or roughly 2.8 million per week. This is not an insignificant number. Nine of 12 countries with the highest per capita case counts are in Europe, and the U.S. often follows, after a brief lag. These cases aren't equally distributed, so a review of certain countries or regions provides the most accurate data to try to predict future spikes, although it still amounts to looking into a muddied crystal ball.

European Union data is the most worrisome at present. Increasing cases, along with shifting dominance in variants and subvariants, could be a prediction for the U.S. Michael T. Osterholm, PhD, MPH, director of the Center for Disease Research and Policy (CIDRAP) at the University of Minnesota in Minneapolis, was appointed to (then) President-elect Biden's 13-member Transition COVID-19 advisory board. He reports an increase from 1.1 million cases per week in early September 2022 to 1.9 million cases

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CISA Worker Risk Assessments

- **Proximity:** How physically close are workers (and customers) to each other?
- **Type of contact:** Do workers touch shared surfaces, common items, and other workers or customers?
- **Duration:** How long does an average interaction last?
- **Number of different contacts:** How many interactions occur daily?
- **Capability to assess possible infection:** Are there screening protocols that protect workers (and customers) from interactions with contagious people?
- **Cleaning:** How frequently can the facility be sanitized and cleaned?

In the chaos of the early days of the pandemic, many didn't know where to access CISA or OSHA documents, so there may still be implementation gaps that should be addressed.



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per week in the four-week period from September through October 11, 2022, in the EU, as reported by WHO. The WHO/EU consists of 53 countries, 37 of which reported increasing cases; 14 reported rates increasing at greater than 20% over the prior two weeks.

According to data for this period, reviewed by Dr. Osterholm, Germany reported fewer than 30,000 cases per day, a number that increased to 105,000 cases per day, and was at or near hospital capacity, during this four-week period in the fall of 2022. France reported increases from 17,000 to 56,000 per day over the same period, and both countries reported that 80% to 90% of cases were attributed to the BA.5 variant. Austria reported 4,000 per day, increasing to 14,000 cases per day, with hospitalizations increasing from 1,100 to 2,400 during the same period. Italy's cases doubled, from 20,000 to 40,000.

While most countries have shifted to a more sustainable mode of pandemic response measures, China continues to utilize a strict zero COVID-19 policy, including the use of complete lockdowns. This policy resulted in a two-month lockdown of Shanghai earlier this year and a more recent shutdown in Guangzhou that impacted 19 million people. Several protests began in late November, as people across China have grown weary of these severe measures.

Yum China, the Shanghai-based company that owns the KFC, Pizza Hut, and Taco Bell chains in China, reports the challenges resulting from the continued shutdowns. "In October, approximately 1,400 of our stores were either temporarily closed or offered only takeaway and delivery services," the company said on November 1, 2022.

On the other end of the spectrum, Taiwan recorded relatively few COVID-19 cases until the highly infectious Omicron variant and its sub-variants began spreading in January 2022. Despite reporting more than 6.5 million infections since then, more than 99.5% of cases have been mild or asymptomatic, according to Taiwan's health authorities. This may be due to the high level of vaccination uptake; four out of five people in the country have received the vaccine and at least one booster. Quarantine requirements have been lifted for inbound travelers, and pre-entry testing is no longer needed. Japan and Hong Kong have also relaxed COVID-19 border restrictions to boost struggling tourism.

In mid-August 2022, an effort called the COVID-19 Scenario Modeling Hub laid out several scenarios for the U.S. over the upcoming months. After surges caused by the BA.5 Omicron variant, resulting in high levels of immunity in the population, the models

We now have the experience and tools to develop response plans that can reduce or prevent large scale outbreaks within food facilities. These plans will require maintenance and continued vigilance.

suggest that the U.S. could be in for a relatively quiet season at the end of 2022, as long as vaccine booster campaigns are robust and new variants don't emerge.

Even with a new variant, a big surge in U.S. cases isn't certain. More than a month into fall, hospitalizations were declining slightly, in line with projections, says Justin Lessler, PhD, an infectious disease epidemiologist at the University of North Carolina at Chapel Hill, who leads the modeling effort. But other factors on the horizon could spell trouble. As of November 28, U.S. cases and hospitalizations are ticking up in key areas.

Parts of North America are also seeing the rise of other Omicron sublineages. One such variant, BA.2.12.1, also has the capacity to evade antibodies triggered by a previous Omicron infection and vaccination, according to a study by virologist David Ho, MD, at Columbia University in New York City. The emergence of these strains suggests that the Omicron lineage is continuing to make gains by eroding immunity, says Dr. Ho. "It's pretty clear that there are a few holes in Omicron that are gradually being filled up by these new subvariants."

If SARS-CoV-2 continues along this path, its evolution could come to resemble that of other respiratory infections, such as influenza. In this scenario, immune-evading mutations in circulating variants, such as Omicron, could combine with dips in population-wide immunity to become the key drivers of periodic waves of infection.

Scientists say we could see more surprises from SARS-CoV-2. For instance, the Delta variant hasn't completely vanished and, as global immunity to Omicron and its expanding family increases, a Delta descendant could mount a comeback. Whatever their source, new variants seem to emerge roughly every six months, and scientists wonder whether this is the structure that future COVID-19 outbreaks will settle into.

While we can't predict the future with something as unpredictable as COVID-19, the virus is clearly not over yet. But we now have the experience and tools to develop response plans that can reduce or prevent large-scale outbreaks within food facilities. These plans will require maintenance and continued vigilance until the day comes that we can declare the pandemic finished—until the next one pops up. ■

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A Commitment to Quality

Case Farms Chicken wins the 2022 *Food Quality & Safety* Award in the large company category

BY LORI VALIGRA

An Ohio-based company that produces 22 million pounds of ready-to-cook chicken weekly, with a focus on accountability and product safety, was recently named winner of the 2022 *Food Quality & Safety* award in the large company category.

Case Farms Chicken of Winesburg, Ohio, which employs 3,300 associates across all of its facilities, distinguished itself from other businesses by growing a corporate culture of “getting it right” and focusing on the latest technology when it comes to food safety and quality.

The award, presented annually by *Food Quality & Safety*, honors the dedication and achievement of an organization that makes significant contributions to upholding the highest food standards supported by quantifiable results. This year, our panel of judges, composed of food quality and safety experts, determined that Case Farms demonstrated a comprehensive food safety and quality management program that included a corporate willingness to invest in advanced technology and improvements for food safety. Its *Salmonella*-reduction program yielded particularly strong results.

Founded in 1986 by Thomas R. Shelton, Case Farms started with the purchase of a family-owned farm called Case Egg & Poultry that included a processing plant in Winesburg, a hatchery in Strasburg, Ohio, and a food distribution center in Akron, Ohio. In its first year, Case Farms processed 135,000 chickens per week and had 140 employees. In the following decades, it grew by acquiring operations in North Carolina and Ohio.

The company’s core values are “honesty, accountability, trust, success, and diversity.” Its Winesburg



processing facility employs 675 associates who manufacture fresh and frozen marinated and non-marinated products, including bone-in products, portion-controlled fillets, tenders, and nuggets. Customers include some of

the largest and most recognized casual dining, food services, and quick-service restaurants currently available. The company has four facilities, with a corporate complex in Troutman, N.C.

Quality is the main topic at the company, says Larry Epling, senior director of quality assurance/food safety and regulatory, who has been with the company for seven years. “We meet with our founder and chairman of the board every Monday morning,



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COURTESY OF CASE FARMS CHICKEN

A Case Farms Chicken employee.



COURTESY OF CASE FARMS CHICKEN

The plant at Case Farms Chicken.

and the first thing we talk about is our quality,” Epling says. “It’s been like that since he started the company 36 years ago.”

A Commitment to Invest in Technology

Case Farms saw a need to update its capabilities and move to new technologies when its customer base moved from using basic raw poultry products to value-added products geared toward quick-serve restaurant chains and casual dining establishments.

In the past year or so, the company has added technologies to maintain and improve food safety. These upgrades include a conveying system that eliminates the need for associates to touch the product after it goes through the portion control sorters, reducing the potential for cross contamination. The system also helps reduce overall microorganism counts and, in turn, helps improve shelf life.

To further improve pathogen control, Case Farms uses Zee Co.’s Pathogen Control Center, a chemical intervention control system that offers precision concentration mixing and reporting for antimicrobial interventions. The system is accessible remotely around the clock and issues alerts to any disruption in the target ranges of concentrations. The processing flow includes three water jet cutting systems that include fillet-harvesting robots. This equipment aids in the reduction of the product handling of portion-control fillets, once again decreasing the possibility of cross contamination and lowering microbial loading by reducing human handling.

A variable retention time freezer helps prevent microbial growth by eliminating the long freeze times typical with conventional freezers. The enhanced freezing process also eliminates unnecessary product aging by not having product waiting to be transported to a freezer and long blast freezing times. That translates into additional days that a restaurant customer can use the product. The freezer can also reduce excess marinade. Products can be grouped and frozen independently according to their optimal freeze times, which locks in flavors and moisture.

Case Farms has installed new redundant systems to strengthen its product traceability system. That includes systems to affix product IDs and production dates and times for each case of food. The primary labeling system affixes essential information using a master case label. The secondary systems read the master bar code and spray the information onto the cases using inkjet printers. The printer data serves as a backup if any labels are lost.

The company has also added several technologies to help it improve and assure quality and respond more quickly to changing

customer demands. The SafetyChain plant management platform helps improve compliance to the specifications of different customers, which reduces or eliminates product returns. Using the system, the company can also more efficiently identify and control defects using statistical process control measures. The system alerts workers when a failure occurs so they can respond quickly.

The CFS RoboScan can automatically scan barcodes on an entire pallet of finished product cases and generate a unique label for that pallet. The system is integrated into the company’s CGS R8 inventory management system. Before, workers had to manually scan every label before a pallet could be released. Case Farms partnered with CFS while the company was developing the technology, which has industry-wide applications. The Case Farms Winesburg location was used as a pilot site.

To ensure that marinade batches are consistently accurate, the Food Processing Equipment Co.’s automatic screen prompts and computer controls make sure the proper amounts of water and seasoning are added at the proper times so that the flavor matches its original formulation and customer expectations.

One big investment was the purchase of auto deboning equipment, which helped the company provide more consistent raw materials than having the meat manually deboned by workers. It is especially important to have this consistency for its portion-control equipment and products.

The water jet cutting systems that help with safety also help ensure product quality. They often help the company quickly adapt to changes requested by customers, who frequently update their menus and portion sizes. The systems help improve product yield, keep the product consistent, reduce waste, decrease labor, and increase productivity.

Salmonella Reduction

USDA pays a lot of attention to *Salmonella* in poultry. Out of an abundance of caution, Epling says, “We consider every bird coming into the plant to be positive,” adding that the company has designed a multi-hurdle intervention process to bring the number of positive chickens down to zero. He says that, obviously, not every bird is positive, but if the company runs its program predicated on that assumption, it should catch any pathogens that come in. In line with recent regulatory changes, Case Farms uses a multiple-hurdle approach to stamp out *Salmonella* across the production environment. The plan starts with a peracetic acid bath after

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COURTESY OF CASE FARMS CHICKEN

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slaughter and defeathering. This approach means that the failure of one intervention wouldn't bring down the entire system.

Once the new system was installed at its Winesburg plant, the company conducted an efficacy study to determine optimum contact time. The system achieved better results in pathogen reduction by ensuring the antimicrobial remains on the chicken for a longer period of time. "We're gaining more contact, which gives the antimicrobial more time to be effective," Epling says.

The company has ordered two of the systems for the Winesburg plant. It has also tested the system at one of its North Carolina plants and has ordered it for that plant, too. The company is using what it learns to recommend whether the vaccines to immunize the birds need to be tweaked or new ones developed in order to further eliminate *Salmonella* before the pathogen gets into the plant.

Training Leads to Long-Term Company Viability

Case Farms relies on internal and external training programs and offers educational assistance and internal monitoring. It sees training as a tool for developing the company's future leaders. It also employs subject-matter experts in food safety who are certified through the National Registry and ServSafe. Those two expert groups, individually and together, have developed the company's internal online training sessions and are developing a food safety training program for all salaried supervisors and managers at its facilities.

Case Farms uses individual development plans to help key quality team members throughout the company progress to the next level, for example, from an hourly associate to a salaried supervisor. The company says it believes firmly that mentoring internally is the key to ensure consistency in product and critical programs for food quality and safety.

It used this approach in 2021 to help develop a HACCP coordinator into a facility quality assurance manager, and a quality assurance supervisor into a HACCP coordinator.

The company also offers a training program consisting of core subjects that includes SSOP execution, HACCP X-ray verification procedures, bird rinse sampling, and allergen control procedures. Employees also receive annual refresher training on their anniversary date using the company's online, interactive Alchemy system. This refresher training includes 25 subjects, and about one-quarter of them are focused on food safety. Included training sessions cover preventing food contamination, foreign material control, and basic microbiology. The company has a partnership with the University of Arizona that allows eligible employees to continue their academic education at a reduced cost.

Senior Management Drives the Food Safety Plan

Case Farms has a comprehensive food safety plan using SSOP and HACCP as its foundation. The Winesburg facility has three separate HACCP plans for slaughter, raw intact meat, and raw non-intact meat and maintains seven critical control points at the plant.

The HACCP program is managed by a trained HACCP coordinator. The company has a cross-functional HACCP team. Each of its plans is reassessed annually. It conducts reassessments of the plans internally and occasionally uses a third-party consultant to validate its reassessment process.

The food safety program has multiple hurdles that use several separate programs to work in conjunction with each other to ensure product safety. Senior management drives and supports the company's food safety mission. Epling says that the key to the company's success is the food safety and quality leadership from all members of management, along with the education and training offered to associates; these ensure the safety of its products—from development all the way through to the consumer.

All of the company's non-packaging vendors must supply an independent GFSI audit each year, and it also has a certified auditor on staff who conducts animal and quality systems audits.

Case Farms has partnered with Zee Co. to supply antimicrobial intervention compounds and conduct monthly audits of its intervention program. Additionally, the company has partnered with QSI as a contract sanitation service.

Sustainability

The company is committed to environmental sustainability. One example of this commitment is its use of a new storage and distribution center in Winesburg that has eliminated the need to transport products to other cold storage facilities. This investment has reduced the company's amount of landfill by moving from corrugated combo bins to reusable plastic ones, resulting in a reduction of 154,791 pounds of corrugated material going to a landfill in 2021 over the previous year's rate, and it also reduces the use of paper.

Epling says that quality assurance is sometimes seen as a cost center at a company because it doesn't always garner a monetary profit. He sees it differently, however. "The reality is that increased quality brings you more business and brings more money to the bottom line," he says.

We couldn't agree more. ■

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History in the Making

King Arthur Baking Company wins the 2022 *Food Quality & Safety* Award in the small business category

BY LORI VALIGRA

A company whose founding dates as far back as the original 13 states and Martha Washington’s handwritten apple pie recipe has been named winner of the prestigious 2022 *Food Quality & Safety* award for small businesses.

The award, presented annually by *Food Quality & Safety*, honors the dedication and achievement of organizations that make significant contributions to upholding the highest food standards supported by quantifiable results. This year, our judging panel deemed that King Arthur Baking Company, born in 1790 in Boston but now headquartered in Norwich, Vt., distinguished itself from other businesses in the category with its investment in technology and a strong food safety culture.

The company’s food safety culture, which is backed by a distinctive model of employee ownership, is so strong that the company almost doesn’t have to wait for an outside audit to identify areas of improvement, says Robin Beane, senior director of manufacturing, quality, regulatory, and safety for the company. “From the group of people who manufacture

the products to the people on the front line, they have a keen eye toward anything that is out of place,” she says. “They’re always raising their hand that they saw something in a raw ingredient or a piece of fiber from a bag that shouldn’t be there. They pay very close attention to the quality and safety of our products.”

Learning from Each Other

Beane says the company uses external experts and a highly trained quality team, in addition to employees who are well trained in quality, to train its employees. She herself is also a food safety instructor who teaches a Hazard Analysis and Critical Control Points (HACCP) course from the International HACCP Alliance (IHA).

The company teaches the IHA HACCP course internally to a diverse group of employees using its own products and examples to increase the understanding of HACCP principles and food safety within the company. More than 50 employees at all levels of the company have

(Continued on p. 26)



King Arthur Baking Company employees at company headquarters.

COURTESY OF KING ARTHUR BAKING COMPANY

(Continued from p. 25)

passed the IHA course. All employee training is documented, implemented, and includes annual refresher courses. Beane says the quality assurance team is already highly qualified through its members' many years of experience in the food industry and educational backgrounds that include microbiology, nutrition, and culinary arts.

IHA HACCP training includes developing, maintaining, and monitoring food safety plans and setting corrective action procedures and critical control points. It also includes personal hygiene for handling food products and food contact surfaces. Employees are taught good manufacturing practices and are instructed on food handling, food processing and equipment, sampling and test methods for raw materials, packaging, work-in-progress and finished products, allergen management, and environmental monitoring. They also are taught how to detect food fraud, which Beane says is a growing problem, especially in the face of supply chain disruptions. The facility is also Safe Quality Foods (SQF) certified, which includes an additional training component and meets FDA training requirements for a preventive controls qualified individual (PCQI).

The annual training program is presented in three separate sessions so employees can acquire a thorough education and have time to discuss what they learned with each other. Beane says that this approach has increased understanding of the company's policies, programs, sanitation, and other operating procedures among employees.

The company says the training empowers each employee to "own food quality and safety every day" as they produce products. Through key performance indicators, King Arthur has seen a reduction of scrap, a significant increase of first-time-right metrics, and other improvements. Before developing the comprehensive training program, the company says, there was too much costly scrapped raw materials, and with increased training and tracking through KPI metrics, a reduction in waste has been realized.

There are also single-topic trainings on corrective action, preventative action, and cross trainings of employees to improve and expand employee knowledge. Personnel also receive annual performance reviews to verify comprehension and retention of training content.

Innovations and Food Safety Investments

The company has implemented a few software systems in the past year or so, one of which allows it to stay in contact with and closely monitor suppliers so that employees can get information in a timely manner and make sure that the raw materials it receives are safe.

The supplier management software provides a digital document and ingredient data management platform so King Arthur can review all approved supplier documents before they expire and remain compliant with Food Safety and Modernization Act (FSMA) regulations. The company uses the platform to create a report card and identify trends in performance, quality, or safety. It can put suppliers on hold or even inactivate them if there is a problem and there are no improvements.

King Arthur also procured a productivity and quality software system that helps it reduce paper waste. The system lets the



More Than 200 Years in the Making

America's first flour company, Henry Wood & Co., of Boston, started in 1790, by importing flour from England. Later to become King Arthur Baking Company, the company began milling flour from American-grown wheat in the 1820s. A more bountiful wheat supply from the western United States, along with the opening of the Erie Canal in 1825, allowed Henry Wood to stop importing English wheat and to start selling American milled flour.

The company was renamed King Arthur in 1896 at the Boston Food Fair. It cited attributes from Arthurian legend—purity, loyalty, honesty, superior strength, and a dedication to a higher purpose—for the name change.

The business expanded in the 1960s and became New England's largest bakery supply distributor by 1968, offering nearly every ingredient used by professional bakers—from pie fillings to flavorings to ice cream toppings. But in the late 1970s, it returned to its original mission of selling flour to home and professional bakers.

After being headquartered in Boston for almost 200 years, King Arthur moved to Norwich, Vt., in 1984. It grew quickly over the next decade, building up its flagship location, which includes an education center, into a campus the company affectionately calls "Camelot."

By 1990, demand for the flour grew beyond New England, and the company launched The Baker's Catalogue, which it mailed to 10,000 customers. The catalogue included flour, baking tools, bowls, and other products.

In 1992, the company started its middle school outreach program, the Life Skills Bread Baking Program, and taught 900 schoolchildren in Connecticut to bake bread and share it with the less fortunate. That program has been expanded nationwide and has reached hundreds of thousands of middle school kids.

Christmas Day 1996 marked the company's website launch. The site included 13 recipes and information on four different flours. Today, the site offers more than 2,000 recipes, more than 1,500 blog posts, and 1,000 baking products.

A big move that the company credits for its high quality and safety came in 2004, when employees took over ownership of the company. In 2007, it became a founding member of B Corp, meaning it adopted beneficial and ethical principles of business among itself, business partners, the community, and the environment.

The company's employee ownership has given workers a strong commitment to using quality ingredients and exacting standards.—LV

COURTESY OF KING ARTHUR BAKING COMPANY

company perform and track quality checks in real time and creates data for statistical process control. The program can deliver in-process triggers such as warn, fail, or pass at strategic quality points during production. Every record can be reviewed while production continues, and a line or process can be audited without disrupting production. A PCQI conducts a final review to meet FSMA requirements.

The company has also invested in a water moisture meter for its raw material certificate of analysis verification, which ensures its raw materials meet specifications when they arrive at its warehouse. A new colorimeter measures the color of flours to ensure consistent milling. The company has increased the number of ATP units in the factory to verify that sanitation requirements are met.

Even smaller investments make a difference in product quality. King Arthur has invested in gram scales to improve accuracy, as well as better lighting in multiple areas to make inspecting lines for quality and sanitation easier. It has added an additional metal detector to help reduce foreign objects, such as a piece of a conveyor belt, that may inadvertently get into a raw material. It has automated the capping process on its jar line and added a fume arm in its batching area to reduce airborne particles.

Vigilance about safety is especially important as the food industry faces more recalls, war that impacts availability, and food fraud, says Beane, adding that every company needs to be aware of these attacks on the food supply and make choices on new and evolving technologies that provide the tools to combat these challenges.

This year, the company plans to make additional investments, Beane says, including new blenders, conveyor systems, and new printers to help code products for traceability efforts.

Food Safety Plan with Multiple Inputs

King Arthur makes every effort to assure its food safety plan is complete. Beane says that the company brings together employees from different parts of the company to review the plan to ensure nothing is missing. That includes workers from quality assurance, purchasing, warehouse, research and development, manufacturing, shipping and receiving, and retail.

The hazards the company monitors include pathogenic microorganisms that can cause illness, food allergens or production chemicals, and foreign objects that might cause injury or choking. Flour might be thought of as a dry product, but it is a raw agricultural product in which *Salmonella* and *E. coli* can thrive. It is important to watch for rodents and flour beetles and, in the summer, flies or mosquitoes, which could come in through door openings. The company makes sure there are no bushes or grass around the perimeter where such insects or vermin could hide.

The company has developed a hazard analysis risk-based preventive controls food safety plan that conforms to the 12 steps in the Codex Alimentarius Commission's HACCP guidelines, the current version of the SQF code, and FSMA. King Arthur's PCQI, system quality manager, food safety regulatory manager, and senior director of quality and regulatory developed the plan and collectively oversee and maintain it.

Several food safety plans are in place to cover all products manufactured at the Vermont facility.

Each food safety plan reflects preventative controls and HACCP principles and includes procedures to monitor and implement



Employees inside the King Arthur Baking Company facility.

preventive controls for all identified hazards. Controls include corrective actions and verification procedures. The company has descriptions for all finished products, as well as information relevant to product safety, such as pH, water activity, composition, and storage conditions.

Beane says that the company has a robust audit program in place both for its suppliers and in-house operations. The responsibility and procedures to select, evaluate, approve, and monitor a supplier are handled by a cross-functional internal team comprising research and development, quality, regulatory, purchasing, and finance functions. The company uses a detailed supplier questionnaire at on-site supplier audits. It has supplier management software for all approved suppliers, audits, and required documents that are reviewed annually.

The company has trained its internal auditors, who are members of its quality team. They conduct regular inspections of the site and equipment to meet SQF certification requirements.

Environmental Impact

As early as 2007, the company began monitoring its environmental impact and, in 2019, appointed a vice president of sustainability. The company is a B Corp, or benefit corporation, meaning it meets certain standards of social and environmental performance, accountability, and transparency. It partners with farmers and suppliers to encourage environmentally and socially responsible practices in line with its centuries-old stewardship heritage. "I ask those tough questions and gather the resources to answer them," says Suzanne McDowell, vice president of corporate responsibility and sustainability at King Arthur. "This work pushes us to confront the challenges and dream more significantly about the positive impact we can make on our environment."

McDowell wants to help create a more resilient, equitable, and ecologically sound future, starting with wheat, where decisions have the greatest impact, she adds.

Beane says that the employee-owners feel a sense of being part of the bigger picture as well in doing their part to assure their products are safe, sustainable, and of high quality. "We think of ourselves as bakers," she says. "We are very good customers of our own products, and our families use our products."

We think this speaks volumes about a company that has proven itself to be a cut above. ■

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Safety & Sanitation



Utility Waste Monitoring for Food Processing Facilities

How tracking water and utility waste can optimize your sanitation process | BY BARRY SPERLING

Today's food processors face more complexities than ever in the sanitation process. Labor shortages, water scarcity, changing environmental regulations, and rising energy costs have created no shortage of challenges for food processors all over the globe. Droughts, climate change, the war in Ukraine, and other factors have prompted an urgency around water and utility management that the industry will have to grapple with for the foreseeable future.

It's no secret that food processing and sanitation require large amounts of energy and water to reduce food safety risks; however, many processing facilities may lose precious resources through inefficiencies in processes and equipment, whether that means incremental loss through steam leakage or unnoticed water usage.

The cost to processors in both scenarios can be high and leaving water and utility management as an afterthought is no longer a viable option; however, runaway resource consumption not only impacts a company's wallet, but it can also alter the efficiency and adequacy of the sanitization process and have sustainability implications. Food processors who want to cut costs and conserve resources while ensuring food safety need to prioritize total resource management.

Total Resource Management: Taking Advantage of Data

Many industries have capitalized on the wealth of insights that data analysis can provide; however, data analytics is a relatively untapped resource in the food processing industry, particularly in sanitation and resource management. With new soft-

ware and data experts emerging in the industry, facilities can gain a bigger picture of their water and utilities use and monitor critical data points affecting efficiency, sustainability, compliance, and costs.

It is common for some processors to track basic resource use, such as flow and water and air pressure. But understanding exactly how those resources are consumed empowers food processors to get ahead of potentially significant losses before they even happen. Continued technological innovations allow for tracking detailed utility usage throughout an operation, allowing companies to expose leakages or areas of egregious use that may have gone unnoticed. With accurate insights, plant managers can address loss prevention and forecast their needs more accurately, ultimately conserving resources and optimizing their sanitization process.

Going Beyond Surface-Level Tracking

Improving sanitation and efficiencies in food processing has been limited to periodic audits and automated equipment. Until recently, supervisory control and data acquisition (SCADA) included high costs, so planning and design focused on the production metrics, such as volume and temperature, that would gain the most profitable use of investment.

For example, plant managers could measure the flow of chemicals used in open plant cleaning procedures daily, as seen in Figure 1 (p. 29). This information, however, doesn't provide insights into where, why, or when usage varied so heavily between the two dates. It shows plant managers that something happened to cause the fluctuation, but without more detailed information, the facility is limited to what it can do to prevent future loss.

Beyond preventing potentially egregious losses such as those in the above scenario, dynamic data is also essential for monitoring fluctuations in resource use, as inconsistencies can lead to incremental losses—of both resources and money.

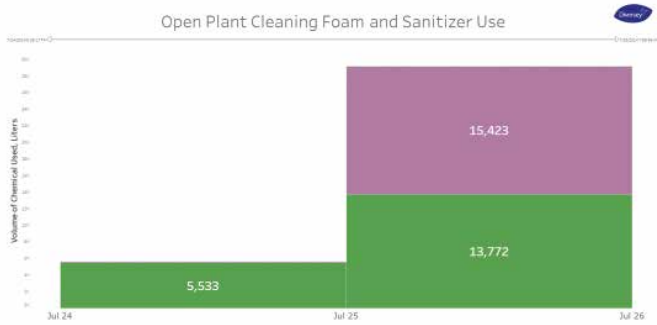


Figure 1: Example of non-dynamic chemical consumption. Captured data provides how much was consumed in a single day with no insight into how the use changed through the cleaning event.

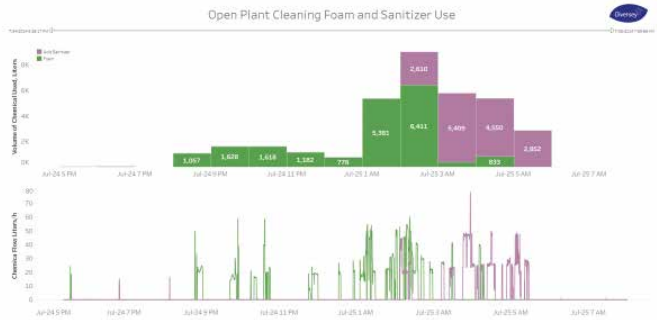


Figure 2: Example of dynamic chemical consumption. Consumption data is captured in hour/minute intervals. This method presents data that reveal cleaning start/stop and volume spike periods throughout the cleaning event.

“Small” changes are currently buried in plants using legacy sensors, monitors, and data, meaning that they have a massive opportunity for realizing savings and sustainability goals.

Why More Dynamic Data Matters for Sanitation

While awareness of these factors is important for cost savings and sustainability initiatives, these insights are also invaluable when it comes to chemistries and sanitation. Both overuse and underuse of chemicals can pose problems in the process. Chemical overuse means not only lost chemicals, but also potentially damaged equipment over time. Underuse can be even costlier, posing food safety and product recall risks.

Beyond chemistries, having the full story of the resource management in your plant can help you get ahead of other food safety and sustainability issues, as well. Take, for example, clean-in-place systems in dairy and beverage plants. For an effective run, a plant needs to heat water to a certain temperature for a prolonged

period. If heat is lost in that process, the plant may have to rerun the cycle, which means valuable resources can go down the drain. If the facility doesn't have access to the data alerting it to a potentially non-compliant clean, that poses a food safety risk.

The Next Level of Tracking is Dynamic and Continuous

The good news is that plant managers now can have greater visibility into these issues—down to the hour—with data analytics programs, dynamic flow meters, and auditors who go beyond a single audit. Advances in analytics software give us insight into more factors than ever before: electricity, water, and steam flow; water temperature; gallons of water used per minute; and others.

Such programs also allow for continuous monitoring of these factors, which means that facilities can now understand where they're losing steam or electricity, as well as how much water is being distributed, for how long, at what pressure, and at what temperature.

Figure 2 (left) illustrates the more dynamic factors that new programs can measure. Here, we can see the variations in cleaning foam and sanitizer use over several hours, rather than at the end of the day. This information allows us to focus on the factors that could have contributed to the variances on that shift.

Figure 3 (below) shows the gallons of heated process water used per minute in one plant over an hour, a day, and a week.

These abilities are crucial—they can alert plant managers to potential issues and tell the story of what happened during a shift. Plant managers can pinpoint outliers, such as a water hose operating at a pressure that is too high, to identify potential causes and prevent future losses. Such information can help plant managers take corrective action, keep stewardship top of mind, and—most importantly—avoid potential food safety concerns and unnecessary costs.

Food processing facilities may, perhaps, have more challenges to navigate now than in the past. But they also have more information—and power—at their fingertips for getting ahead of those challenges. Knowledge-based services such as data analysis can help businesses across industries make more informed decisions, and the insights we can garner from new technology will be critical in helping food processors to meet sustainability and food safety goals.

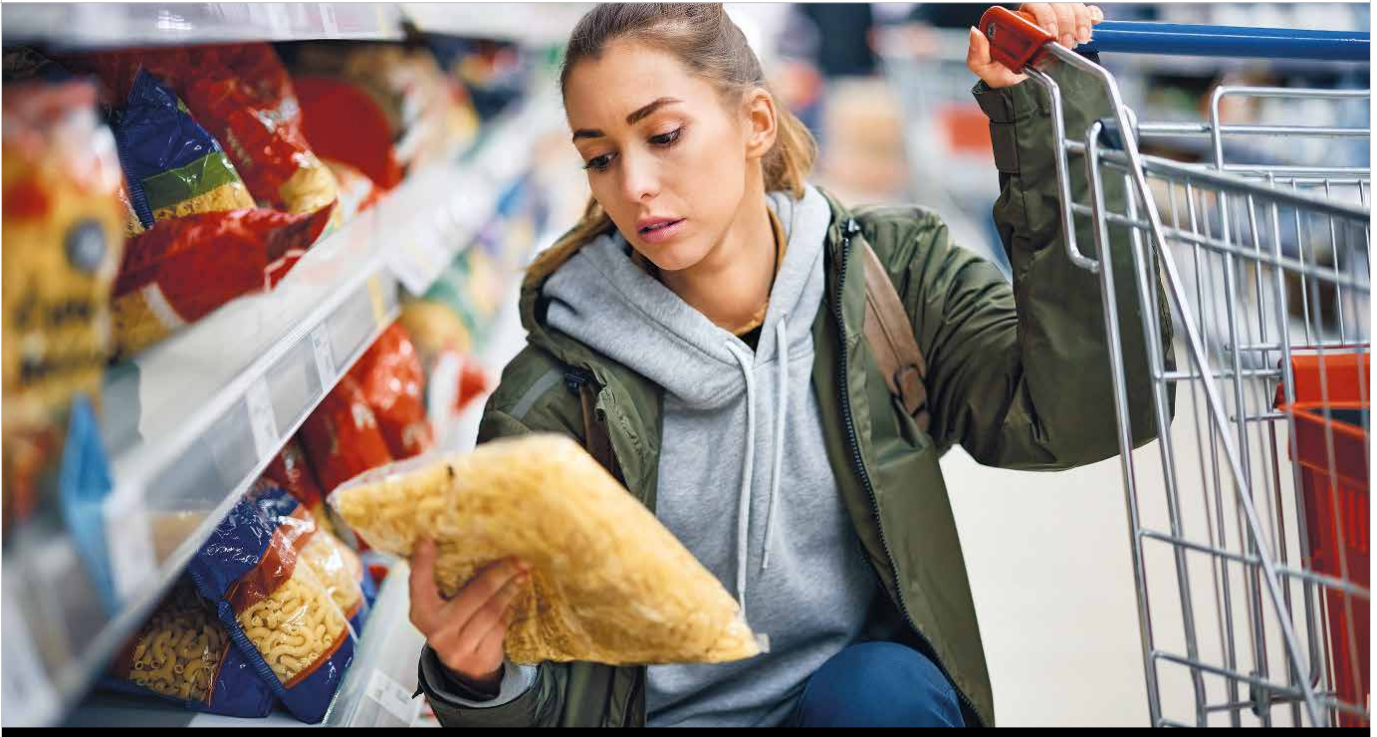
As we continue to face issues such as inflation and water scarcity, it will be even more critical for food processors to harness the tools at their disposal to protect their customers, the bottom line, and, ultimately, their greatest resources. ■

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Figure 3: Water use data demonstrating flow rate and hourly, daily, and weekly volume aggregation. This data shows that while similar water needs were steady throughout the week during the production time period, volume rates changed dramatically, revealing the potential for water optimization.

Quality



Food Date Labeling

Major grocery stores in the U.K. and EU have recently dropped “best before” dates from some products; will the U.S. follow?

BY ANDREA TOLU

In 2022, several major grocery chains in the U.K.—Waitrose, Marks & Spencer, ASDA, Sainsbury’s, and ALDI—announced that they would scrap the “best before” date from fresh fruits and vegetables.

The move is an effort to reduce food waste in households. Several studies show that many consumers can’t tell the difference between best before (a reference for quality) and use by (a reference for food safety). According to a survey of U.S. consumers published 2021 in the *Journal of Nutrition Education and Behavior* (doi: 10.1016/j.jneb.2021.03.007), only 64% of respondents understood the meaning of a “best if used by” date. In a similar survey conducted in the EU in 2015, 47% of re-

sponses were correct, although with vast differences among member states (available at europa.eu/eurobarometer/surveys/detail/2095).

This misinterpretation can lead consumers to throw away food that is perfectly edible, thinking that it’s not safe to eat. ReFED, a nonprofit organization dedicated to ending food waste, estimates that confusion over the meaning of date labels accounts for about 7% of all consumer waste in U.S. households. In the EU, up to 10% of food waste generated each year is linked to date marking, according to a 2018 European Commission study (available at food.ec.europa.eu).

In the U.S., confusion over food dates is worsened by the lack of common defi-

nitions and practices. Without a national law on food date marking, except for infant formula, each state has its own regulations as to what labels to apply, what wording to use, and whether it’s possible to sell or donate food once it has passed one of the dates.

The Food Labeling Modernization Act

In 2017, the Consumer Brands Association started a campaign to push 25 CPG and grocery retail companies to reduce food date labels to “best if used by” for quality and “use by” for food safety. Results so far have been quite positive: “By December 2018, survey data showed that 87% of respondents adopted the endorsed label phrases. By the end of 2019, adoption rate was 98%,” says Katie Denis, VP of communications at the Consumer Brands Association.

Voluntary adoption, however, can only go so far. The variety of regulations continues to be an obstacle. “We have several different types of state legislations regarding date labels,” says Jackie Suggitt,

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ReFED's director of capital, innovation, and engagement. "That's a problem for manufacturers; if I have a plant that's servicing four different states with four different legislative requirements, it's very hard for me to make a change."

An important step forward will be the Food Labeling Modernization Act of 2021, a bill proposed in the U.S. that would supersede all state laws, making "Best if Used By" and "Use By" the only two date labels allowed on food packaging.

The law, which is pending release from the committees of the Senate and House of Representatives, will also allow food that has passed the quality date to be donated. "The donation part in the proposed bill is really important because right now that varies by state, and we have a lot of edible safe food that is being restricted from donation, especially fresh foods," says Suggitt.

Such a variety of regulations also makes it difficult to educate consumers

More Date-Free Products

Currently, the EU is working on a reform of its food date labeling regulation, with the explicit goal of reducing food waste. Adoption of the new rules is expected by the end of 2022.

As of this writing, it's still not clear what changes will be implemented; however, it's unlikely that the "Best Before" label will be eliminated altogether. Although a source of confusion and food waste, it's also an important reference for quality: "Consumers want to know what to expect from a product," says Palumbo. "After three years on the shelf, biscuits will still be safe to eat if the packet is unopened, but they might have become damp, or fats might be a bit rancid."

Information about quality is in the brands' best interest too: "Scrapping quality date labels would take away a resource that has proved successful for its intended purpose," says Denis.

A more likely change in the EU regulation (and one that might be considered by American lawmakers) will be the extension of the list of foods that are not required to have any date label. Currently, the list includes foods with a long shelf life such as wine, vinegar, salt, and sugar, but also fruits and vegetables. Beginning next year, additional foods, such as pasta, rice, and coffee, might be added.—AT

about the difference between quality and safety labels. "We can't go out there and educate consumers on a two-label system right now. It wouldn't be very efficient, because it's not yet what people are experiencing when they go to a grocery store," says Suggitt.

Which Label to Use

While the proposed bill establishes a single national label system with a standard wording, food manufacturers will be able to decide when to use a discard or a quality label. "Leaving this aspect unregulated is a workable solution, but it's not ideal, as it might create a situation where two manufacturers choose to use different labels on similar products," says Norbert Wilson, a professor of food, economics, and community at the Divinity School at Duke University in Durham, N.C.

Survey data from the EU show that this risk is real. In the EU, the two-label system was established in 2011. The regulation states that the "use by" date should be applied to highly perishable foods that, from a microbiological point of view, are likely to constitute an immediate danger to human health after a short period; however, different interpretations of the phrases "highly perishable," "immediate danger," and "short period" mean led to different labeling practices among member states. For example, unlike in the rest of the EU, all fresh milk in the Nordic countries has a "best before" date. In the yogurt category, about 70% of products have a "use by" date, while 30% have a "best before" date. In Italy, a national law requires fresh milk to have a "use by" date of a maximum of six days from pasteurization, while in Sweden, a "best before" label is typically used for cold smoked sliced salmon.

Less "Use By," More "Best Before"

These gray areas create confusion, and possibly more food waste, but also present an opportunity for brands to replace the "use by" dates with "best before" dates on certain fresh products. That is what the U.K. grocery chain Morrison's has done recently on most of its own brand of milk, encouraging consumers to use "a sniff test" to decide if the product is still good. According to the retailer, this change will prevent millions of pints of milk from being wasted every year. (While the U.K. is

no longer part of the EU, it still follows EU-retained food labeling regulation.)

Risk-averse businesses, however, might not be willing to shift more respon-

Our industry desires uniform standards that are clear to follow, so they can comply without complications.—

KATIE DENIS,
Consumer Brands Association

sibility toward consumers: "Using the 'Best Before' date on certain perishable products would definitely help reduce food waste, but it might create problems when it comes to attributing responsibility," says Valerio Palumbo, a food labeling consultant at LegisLAB, a law firm with offices in Italy and France. "If a consumer feels sick after eating a fresh product that has passed the 'Best Before' date, who should be to blame? The manufacturer, the retailer, or the consumer? What's more, the 'Best Before' date should guarantee that the product is safe after it has passed. But, while that's true for food with a long shelf life, like spaghetti, it wouldn't necessarily be true for yogurt."

According to Wilson, manufacturers in the U.S. are unlikely to imitate Morrison's move on their own, especially without any clear guidelines from lawmakers. "Beyond worries about litigation, if enough consumers are exposed to products that are not of the quality that is expected, even if no one ever gets sick, brands could face some damage. Cost of reputation is tremendous, so I doubt that manufacturers will want to go down that path," he adds.

The Consumer Brands Association also supports the need for definite rules. "Our industry desires uniform standards that are clear to follow, so they can comply without complications. Changing a label is not a simple process and having little to no guidance will cause confusion, often at a cost to both the industry and the consumer," says Denis. ■

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Testing

GLUTEN-FREE ASSURANCE



Gluten Testing 101

4 tips for providing safe, allergen-free product

BY TAYLOR LECY

In the past decade, understanding and awareness of food allergens have only grown among consumers. Food allergies can be life threatening for allergenic individuals, as very small amounts of allergenic foods can cause severe allergic reactions. Gluten sensitivity, although different from other allergies, has also received a lot of attention in recent years. While reactions such as

anaphylactic shock may not be caused by consuming gluten, the ingestion of gluten sources (wheat, rye, and barley) by a sensitive individual can result in detrimental health effects.

According to The University of Chicago Medicine Celiac Disease Center, one in 20 Americans is affected by celiac disease, which prevents people from being able to safely consume products containing glu-

ten. Additionally, a 2020 study conducted by the University of Nebraska-Lincoln estimated that 25% of American consumers willingly choose to follow a gluten-free diet. As with all food allergens, complete avoidance of gluten sources by sensitive individuals is the most effective preventive measure to avoid an adverse effect.

Allergic individuals rely on the ingredient information declared on the food label to prevent the intake of allergenic foods. Thus, an accurate declaration of ingredients by food processors is critical. In 2014, FDA released new regulations around gluten content, making it the only allergen in the U.S. to have a regulatory set amount—20 parts per millions (ppm)—that a product can contain and still be considered gluten-free. Allergen mislabeling is the No. 1 cause of food safety product recalls, which makes understanding regulations around allergens and having a thorough and robust allergen control program incredibly important for food processors. Controls implemented by the industry prevent a food from being contaminated, and the efficiency of those controls is verified through testing.

Here are four tips to help ensure that food producers are accurately and efficiently verifying the efficiency of their implemented allergen control measures to increase the delivery of safe food for consumers of all diets.

1. Identify the Right Test Method

Selecting the right method comes down to risk and, as allergens are incredibly high risk for consumers, producers want to ensure they are using the most diligent test method for their needs. There are numerous methods available to test for allergens, but the four most common include general protein tests, lateral flow devices (LFDs), enzyme-linked immunosorbent assay (ELISA) tests, and adenosine triphosphate (ATP) tests.

- **General protein allergen tests.** These are commonly used for testing for allergens in the food industry because they are easy to use and provide a quick time to result. These types of tests are qualitative and detect whether any protein is present after the cleaning process, including allergenic protein; however, these tests are not capable of indicating which specific allergen has

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been detected and are limited to testing on environmental surfaces only. There are a variety of commercially available general protein kits with different sensitivities; however, a highly sensitive method should be preferred for allergen cleaning verification.

- **LFDs.** Unlike a general protein test, immunoassay-based test methods such as LFDs can identify specific allergenic proteins. While still a highly commercially available qualitative protein test, this method requires producers to use LFDs customized to the allergen they are searching for, such as a gluten lateral flow. While they are not applicable to every food processor and situation, there has been an increase in guidelines looking for the protein-specific methods that LFDs can provide. This testing option is commonly used for cleaning verification because it is easy to use and provides a quick time to result. As an additional advancement compared to general protein tests, some LFD tests on the market have the capability to test a wide variety of sample types, such as raw material, first product off the line, environmental swabs, or clean-in-place rinse water.
- **ELISA tests.** This is another available protein and allergen-specific testing method that can provide a quantitative result informing producers how much of a specific allergen is present. This can be useful for cleaning validation as well as for food processors working with gluten-free products, because they are able to test how much gluten is present to meet gluten content regulatory levels; however, due to its ability to quantify results, this testing method requires more time, expertise, and equipment, making it a less viable option for daily verification. The ELISA method is beneficial for confirmation testing and pairs well with an initial qualitative test like an LFD, as well as cleaning validations. If food processors do not have the ability to bring this test method in house due to its complexity, they have the option of sending samples to a third-party laboratory to test when needed.
- **ATP tests.** These types of tests are commonly used for general cleaning verification but are sometimes used

to trace present allergens; however, because ATP is easily removable from a surface (unlike proteins) and not all foods that have proteins contain ATP, these types of tests are not a best practice for producers wishing to conduct allergen testing, due to the fact that the allergenic protein could still be present on a surface even if it is free of ATP. Therefore, a protein-specific method is preferred for the safest and most accurate allergen testing programs.

Allergen mislabeling is the No. 1 cause of food safety product recalls, which makes understanding regulations around allergens and having a thorough and robust allergen control program incredibly important for food processors.

2. Conduct a Method Feasibility Study

No matter which testing method is selected, it's important to ensure that the method is fit for purpose, a step often overlooked but critical for ensuring proper test method selection. A method feasibility study allows producers to verify that the method they are wanting to use for allergen testing can indeed detect the allergen of concern within the products. When food proteins in a sample undergo food processing steps, such as heat processing or fermentation, the structure of the protein can change. When this happens, the testing method may be unable to detect the allergen proteins, especially immunoassays that rely on specific binding between an antibody and a certain region of a protein. If a method feasibility study has not been completed to verify that the test method is in fact detecting the protein, false negatives, mislabeling, and, potentially, product recalls may result, putting consumers in danger. As a result, conducting a method feasibility study can help protect the food processor and their brand, saving them time, money, and en-

ergy on product recalls by ensuring that the chosen test method can accurately detect the allergenic proteins.

3. Become Gluten-Free Certified

Another beneficial resource for manufacturers looking to build out safe and robust gluten-testing programs is the Gluten-Free Certification Organization (GFCO). This organization works with food manufacturers to help develop reliable testing options and cleaning processes. Additionally, consumers can look up products and brands that are GFCO certified (products that contain 10 ppm of gluten or lower, rather than FDA's regulation of 20 ppm), and manufacturers can find certified testing options such as GFCO-certified gluten LFDs. Receiving this certification can help ensure that a food manufacturer is being as diligent as possible in its gluten allergen testing.

4. Provide Proper Training

Lastly, and most importantly, any thorough testing program must include sufficient training of its technicians. To ensure proper safety and accurate results throughout the manufacturing process, the technicians performing the allergen tests must undergo proper training to make sure they feel comfortable and confident in running the selected test method. Prioritizing proper training will, in turn, help create a solid food safety culture that understands the risks of allergens.

As consumer awareness of allergens, specifically gluten, continues to increase, it will only become more important for food processors to ensure that they have an adequate allergen control program and are conducting adequate allergen cleaning procedures that are verified through allergen testing. A manufacturer's thoroughness benefits consumers and provides cost savings by avoiding product recalls and fines that may result from mislabeled products.

By selecting the right protein-based allergen test method, conducting matrix verification, receiving GFCO certification, and providing proper training, food manufacturers can feel confident about delivering safe and reliable gluten-free products. ■

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Know Your *Salmonella*

Biomapping data can help establish statistical process control

BY VIKRANT DUTTA, PHD

The year 2022 has been a significant one for all things *Salmonella* related. With the recent USDA announcement classifying *Salmonella* as an adulterant in breaded and stuffed raw chicken products when exceeding 1 colony-forming unit (CFU) per gram, as well as the selection of a new *Salmonella* testing method of choice for USDA-Food Safety Inspection Service laboratories, there seems to be an increased interest from the poultry industry in how biomapping data can enhance statistics-based process control from flock to fork. The process of quantifying pathogens and microbial indicators, i.e., biomapping, has been described as an effective tool for process control, as it can highlight the effective interventions, provide a real-time status of the health of the process, and, ultimately, allow for risk-based decision making.

Despite many interventions over the past 20 years, the number of *Salmonella* incidences has not decreased significantly. This has been attributed to various factors but, when we look at available testing approaches, there are a few things to keep in mind, no matter what your method of choice is:

- **Testing alone will never reduce the prevalence or quantity of *Salmonella*.** The old saying that you cannot test your way to food safety remains true. A single test is unable to provide a full view of the information needed to identify points of concern within the production process. Furthermore, the testing data must be ana-

lyzed within the context of process metadata.

- **Your method of choice must accompany a statistically valid sampling plan.** This is the only way to ensure that your statistical process control programs are working properly.
- **Don't run microbiology tests if you don't have a plan for the data.** Otherwise, you're wasting time and money. Data produced from tests help you understand gaps in your process and enable decision making about what tools are needed to address concerns.

Biomapping helps processors monitor the efficacy of antimicrobial interventions by sampling at critical control points (CCPs) where contamination levels can be assessed. When implemented accurately, biomapping can help to:

1. Improve processors' understanding of the antimicrobial interventions efficacy;
2. Provide a holistic view of the process while providing deeper insights through monitoring CCPs; and
3. Ultimately, improve the microbiological quality of processors' products through better process controls.

Biomapping of CCPs allows for continuous improvements including improved risk assessments of the overall production process. If you don't have a biomapping element in your testing process, you can incorporate one into existing protocols by identifying CCPs where contamination challenges are evident by existing microbial indicator data.

Quantification

Biomapping via quantification of non-pathogenic microbes has long been a way to perform sanitation verification or biomapping. More recently, though, the tools for quantification have evolved from the use of indicator organisms to a more specific *Salmonella* quantification, and the quantification technology has evolved to more precise quantitative (q) PCR. As it stands today, this combination of indicator and *Salmonella* quantification remains the most potent way to understand the microbial makeup and load of the process. Also, with the availability of the qPCR technology, this trend of specific pathogen quantification is likely going to intensify via better use of data, and a potential expansion to include other pathogens of interest.

As is the case in our technology-driven world, however, all methods are not created equal, and technology advancements happen faster than we can keep up with them. Existing microbial quantification options have their drawbacks: Direct counting (optical microscopy) has a limited application, most probable number (MPN) is cumbersome and expensive, and direct plating does not offer a high certainty that a contaminant is *Salmonella* and therefore requires confirmation. The emergence of qPCR technologies, with or without enrichment, can correlate inversely with target DNA fragments, allowing for a validation on a per matrix basis (i.e., carcass versus parts versus ground) and decision making in a time bound manner. While biomapping remains a viable means of process improvement, the end will, and should, remain with how we leverage the data for improving our processes.

As someone with a passion for translating science into action, it is my deep belief that data enable us to make superior decisions and to raise the bar for food safety across industries. The democratization of technology should allow for easy and pertinent data collection. The focus now passes to how we use these data. It will be interesting to see where the collective industry goes from here and what the future holds for food safety and, ultimately, global food security. ■

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Manufacturing & Distribution

The Jungle's Last Mile

Food safety standards for delivery services could help us get through the thick of it

BY NEIL COOLE



It's been more than 100 years since Upton Sinclair's book *The Jungle* hit shelves. Since then, most consumers feel relatively comfortable and safe with current food standards; however, as consumer habits continue to evolve, with more food being purchased online and distributed through a network of unknown entities, the bad news is that we are not out of the jungle yet. About 48 million people in the U.S. (one in six) get sick, 128,000 are hospitalized, and 3,000 die each year from foodborne diseases, according to recent data from the CDC.

The last mile of food delivery could prove to be one of the most dangerous unless some real changes are made. Currently, around 60% of Americans order takeout or delivery at least once a week. There is no sign of a slowdown in online ordering; it's growing 300% faster than in-house dining. And they want it fast, faster, fastest: 33% of consumers say they would pay a higher fee for faster delivery.

When you combine this online growth with a high demand for speed, a thick jungle of food consumption dangers lies ahead.

Innovation without Regulation

The COVID-19 pandemic demanded innovation and rapid acceleration from last mile food delivery options. Consumers prioritized safety over all else and looked for options that allowed them to avoid crowded grocery stores and restaurants. Distanced drop-offs and fast home delivery options became the norm for many consumers.

This rapid innovation existed in a vacuum, however, without government regulations. A gap was created between social distancing safety and food consumption safety. While cooked food models are relatively safe, groceries and meal kits face large risks around refrigeration and contamination. Food shipped directly to consumer homes needs to stay at a safe temperature to prevent the growth of germs that could cause serious illness. This includes mail-order food and subscription meal kits, according to the CDC.

Risk Factors

Currently, there are many factors that could lead to food safety failures. The most basic of these are human error, lim-

ited professional equipment, and a gap in training programs. While intentions may be good, a lack of knowledge around contamination and cold-chain management could put individuals who rely on last mile delivery at risk.

The reliance of many local last mile programs on gig workers increases risk. Average, untrained people looking to supplement their income could unintentionally cross-contaminate groceries. For example, accidental placement of raw fish or meat alongside vulnerable raw produce items, or even simple mix-ups for those with food allergies, could be deadly.

Now, as COVID-19 cases wane and we are in a safer environment, businesses must take a moment to evaluate their last mile delivery structures and prioritize beyond distance drop-offs and fast home delivery.

Keep Ahead of the Curve

Innovation is typically driven by one of two things: consumer demand or litigation. Life during the COVID-19 pandemic saw innovation by way of consumer demand; however, the risks listed above could force demand by way of litigation if businesses are not proactive. Rather than wait for these events to happen, some companies are choosing to innovate ahead of the curve and solve problems before they arise.

A strong example of this type of problem solving comes from Japanese logistics company Yamato Holdings. The company wanted to reduce last mile delivery risks to build trust in the industry, grow the market, and expand its business globally. Yamato Holdings partnered with BSI to develop a food delivery standard, known commonly as a Publicly Available Specification (PAS), for their company to follow. The fast-track standard establishes best practice in refrigerated delivery services, bringing benefits for both businesses and consumers.

The creation of PAS 1018, which has since been adopted by the International Organization for Standardization (ISO),

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defines good practice in a fast-growing and important industry, helping to protect and reassure consumers, expand the global market, and position Yamato as a trustworthy leader in the field.

Solution: Standards

Standards provide a solid foundation for organizations to operate in great periods of change. The United States adopted The FDA Food Safety Modernization Act (FSMA) of 2011 to transform its food safety landscape and ensure that higher standards were met across the country. While FSMA prompted rapid change that includes cold chain controls for portions of the delivery phase, innovation across the industry has left room for error in the food industry. The rise of mobile applications, consumer ordering behaviors, and pressure on businesses for speed and delivery options have all added to the risk factors across the past 11 years.

The solution to many of these modernizations is simple: updated standards. When companies like Yamato update

standards to fit the modern environment, they significantly reduce the risk of litigation and consumer complaints. Some updates from the comprehensive PAS included:

- Monitoring and improving the refrigerated delivery service, including parcel handling;
- Transportation of chilled or frozen parcels in temperature-controlled vehicles via geographical routing systems;
- Requirements for resources, equipment, operations, and communications; and
- Conditions for operation sites, work instructions, operational manuals, and staff training.

The results of adopting these standards can bring companies dividends for years to come. Having stringent standards helps build trust with consumers, partners, and investors alike, and ultimately expands businesses. Standards also push industries to increase quality and consistency to remain competitive. Finally, they are better for our consumers; consumers

who enjoy safe, quality food will ultimately have a better quality of life.

Bushwhacking Barriers

While we are not out of the jungle yet, we have been given strong tools to help us forge a path forward. By adopting rigorous standards and holding last service deliverers accountable, it is possible for us to better regulate the innovations that came about during the COVID-19 pandemic. It will be up to businesses to proactively monitor for food safety issues and try to become leaders in safety before pressures from governments and consumers make it a mandate. Those organizations that choose to use globally recognized standards, like ISO 23412, an international standard that aims to set guidelines for refrigerated delivery service providers, to prove their promise of safe food distribution will have a competitive advantage in a highly competitive industry. ■

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The Importance of Evaporation in CBD Extraction *(Continued from p. 15)*

most suitable for a particular purpose depends on several factors, including the nature of the solvent and the solution, the required end product, and the energy available.

In practice, depending on the technology used, evaporation can produce solutions containing anything from 0% to 92% solids. High-efficiency evaporation is more energy and cost efficient than drying or other methods of removing water and produces higher concentrations of solids than other methods of concentration, such as reverse osmosis or ultrafiltration. Evaporation may be carried out as a batch or in a continuous process. It consists of two elements—a heating phase and a vapor/liquid separation phase—although both may be incorporated in a single vessel.

Considerations for CBD Evaporation

To maintain the characteristics of the CBD oil, low-temperature evaporation techniques have to be used, often involving separate vacuum extraction systems to reduce the boiling point of the solvent.

At a small scale, a laboratory-based rotary evaporation system, with or without vacuum extraction, may be suitable, and indeed is one of the most common systems used today. But as the market grows and producers need to scale up production, they are likely to look to the type of low-temperature evaporator used in pharmaceutical or food production. In addition, because maximizing solvent recovery with such a system requires a high level of vacuum control, it often requires skilled oversight.

Multi-stage falling-film evaporation processes are highly efficient and allow much higher throughputs. As a continuous system, it does not need to be disassembled and cleaned between each run, and clean-in-place (CIP) is used to maintain hygienic conditions and prevent contamination. Having different temperature regimens in each evaporation stage improves ethanol removal, and the unit is highly efficient because each evaporation stage is held at a lower pressure than the previous one.

In falling film evaporators, the product is introduced at the top of a vertical tube

bundle, where it is evenly distributed and falls downward as a thin film against the tube wall. On the outside of the tube, a heating medium, often steam, is applied to raise the temperature of the product, and evaporation takes place at the liquid film surface. The vapor generated as the product is evaporated travels down with the liquid film, and the steam velocity helps to move the film along the surface of the tube wall.

This method of evaporation offers several advantages, including very high levels of heat transfer and lower power consumption than some other types of evaporation. Finally, because evaporation takes place inside the evaporator tubes themselves, no temperature gradient is applied to the recirculating product. These characteristics of falling film evaporators make them particularly well suited for applications in which the service fluid temperature is close to the evaporation temperature. ■

Hale is international sales and marketing director for HRS Heat Exchangers. Reach him at matt.hale@uk.hrs.he.com.

NEW PRODUCTS



Automated Total Nitrosamine Testing System

The Automated Total Nitrosamine Analyser (ATNA) allows for rapid testing of apparent total nitrosamine content (ATNC) and has the right selectivity and sensitivity to quickly identify whether nitrosamines are present down to 1ppb levels. The ATNA provides results without requiring testing to be outsourced at different stages of the manufacturing process. It is comprised of Ellutia's 800 series Thermal Energy Analyser (TEA) interfaced to an autosampler configured to perform the chemical reactions and a bespoke inlet to introduce the sample to the TEA detector. Current recognized methods for nitrosamine testing in food include gas chromatography-mass spectrometry (GC-MS) or liquid chromatography (LC)-MS. The new analyser is an alternative to GC and LC-MS instruments and can be used to screen samples for nitrosamine content before a more detailed speciated analysis is performed if required. **Ellutia, ellutia.com/atna.**



Pump and Hose

Certa Sine pumps from Watson-Marlow Fluid Technology Solutions can be used in many stages of food and beverage processing—from unloading raw material to a storage tank, through transfer to a mixer/agitator/reactor/cooking vessel, to final transfer to the filling line. This food pump technology delivers high suction capability to handle viscous products and, unlike traditional pumps with rotors that cut through the fluid, the pump's sinusoidal rotor carries fluid through the pump to reduce shear. The pump uses 50% less power than lobe or circumferential pumps. With 3A certification as standard, users can be assured that even chocolate, cheese curd, soft fruit, sauces, and pie fillings are pumped without degradation. The Aflex Fabline hose is a food-grade flexible hose developed to meet the latest hygiene standards. The PTFE-lined hose with standard 316 stainless steel braid ensures efficient product transfer and handling while simultaneously offering longer life than rubber hose alternatives. **Watson-Marlow Fluid Technology Solutions, wmfts.com.**



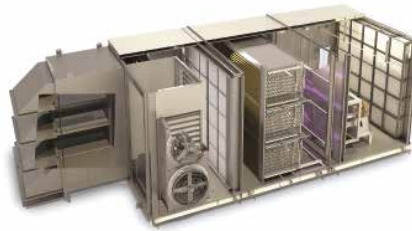
Automated Sample Preparation System

The new Thermo Scientific Extrema ASE Accelerated Solvent Extractor can automatically extract and concentrate analytes of interest from solid and semi-solid samples, such as persistent organic pollutants (POPs), polycyclic aromatic hydrocarbons (PAHs) or pesticides, in a single instrument, eliminating manual sample transfer for a walk-away sample-to-vial workflow. The system can also perform four sample extractions and concentrations in parallel. With manual intervention significantly reduced by a factor of three, in some cases, results can be more accurate and reliable—allowing users more time to focus on value-added tasks. Analytical labs extracting from solid or semi-solid matrices can pair the sample prep instrument with gas chromatography (GC), GC-mass spectrometry (MS) or liquid chromatography (LC)-MS systems. **Thermo Fisher Scientific, thermofisher.com/extrema.**



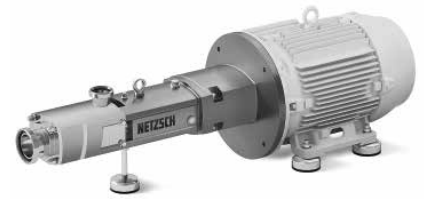
Industrial Control Valves

Warren Controls has released the Series 2900 industrial control valves, ideal for food and beverage. The control valve features cast iron bodies and is available in a variety of trim materials, including bronze, 300 stainless steel, 17-4pH stainless steel, and Alloy 6 (cobalt-chromium-tungsten). Available valve body styles include two-way single seat unbalanced, two-way cylinder balanced, two-way double seat balanced, three-way mixing, and three-way diverting. The equal percentage and linear plugs in the two-way valves and linear plugs in the three-way valves provide excellent modulating control of a wide variety of fluids. **Warren Controls, warrencontrols.com.**



Hygienic Air Units

Johnson Controls has enhanced its product line of Frich AcuAir Hygienic Air units. The line of systems now includes a standard mixed air-style product line featuring 19 models and has been designed to improve the delivery of sanitary air to food-process rooms. Using standardized models allows proposals and submittal packages from food processing plants capable of delivery within hours. The units are designed to help processors manage conditions to meet comply with government requirements for food safety and keep process room temperatures between 35° F and 40° F, reducing the need for daily sanitation cycles and increasing production. Additional enhancements to the can help reduce energy use, manage condensation, remove contaminants, and limit air migration. **Johnson Controls, johnsoncontrols.com.**



Twin Screw Pump

Netzsch Pumps North America, has introduced the Notos Sanitary 2NSH Twin Screw Pump, ideal for meeting the requirements of the food and beverage industries. Working at both low- and high-working pressures, the pump maintains product integrity and natural properties without any quality loss. It meets 3-A Sanitary Standards and can be disassembled quickly for maintenance. It features a pump housing with a full service-in-place design, enabling pump disassembly without having to disconnect it from the piping. Made of AISI 316L stainless steel and polished according to international standards, the pump is easy to clean-in-place (CIP) and sterilize-in-place. There is no contact between the rotating parts, so pump speed can be increased and cleaning fluid can be carried out without the need for an auxiliary system or a separate CIP pump. The pump covers a wide capacity and pressure range, with flow rates up to 880 gallons per minute and pressures up to 230 pounds per square inch. The design of this positive displacement pump means it can convey media ranging from low to high viscosity, with or without solids, as well as shear sensitive and shear stable product. The new pump is a good choice for transferring products such as chocolate, fruit, yogurt, and juices. With its compact design, the pump can fit in small spaces, in horizontal or vertical positions, and is offered with both foot and flange mounting options. It is available in 20 different size and screw geometry combinations, covering a wide range of flowrates to meet the needs of many industry segments. **Netzsch Pumps & Systems, pumps-systems.netzsch.com.**



Large-Diameter High-Pressure Processing Press

The QIF400L scalable high-pressure processing (HPP) press features an 18.5-inch (47 cm) diameter vessel for increased versatility and lower per unit production cost. The modular 400L series scales in four increments, from 4000 lbs to 7000 lbs (1800 kg to 3200 kg) per hour. **Quintus Technologies, quintustechnologies.com.**

SCIENTIFIC FINDINGS

For access to the complete journal articles mentioned below, go to “Food Science Research” in the December 2022/January 2023 issue at foodqualityandsafety.com, or type the headline of the requested article in the website’s search box.



Biosensor Technology for Analyzing Milk and Dairy

Biosensor technology is relatively new to the dairy industry although it has been used successfully elsewhere including medical devices. This review summarizes biosensors with different combinations of biological receptors and transducers that were used to analyze components in milk. Quantification of individual milk proteins and specific detection of lactose were clearly demonstrated. Strain-specific enumeration of pathogens were also reported along with analyses of raw milk quality parameters relevant for processing. The advantages of using biosensors were consistently shown across numerous studies. Biosensors provide rapid, simple, and analyte-specific techniques, offering solutions to support continued innovation in dairy products and processes. *International Journal of Dairy Technology*. 2022;75:738-748.

Vitamin D Delivery Systems for Foods and Beverages

Over the past few decades, vitamin D deficiency has been recognized as a serious global public health challenge. The World Health Organization has recommended fortification of foods with vitamin D, but this is often challenging due to its low water solubility, poor chemical stability, and low bio-availability. Studies have shown that these challenges can be overcome by encapsulating vitamin D within well-designed delivery systems containing nanoscale or microscale particles. The characteristics of these particles, such as their composition, size, structure, interfacial properties, and charge, can be controlled to attain desired functionality for specific applications. Recently, there has been great interest in the design, production, and application of vitamin-D loaded delivery systems. Many of the delivery systems reported in the literature are unsuitable for widespread application due to the complexity and high costs of the processing operations required to fabricate them, or because they are incompatible with food matrices. In this article, the concept of “Fortification by Design” is introduced, which involves a systematic approach to the design, production, and testing of colloidal delivery systems for the encapsulation and fortification of oil-soluble vitamins, using vitamin D as a model. Initially, the challenges associated with the

incorporation of vitamin D into foods and beverages are reviewed. The Fortification by Design concept is then described, which involves several steps: (i) selection of appropriate vitamin D form; (ii) selection of appropriate food matrix; (iii) identification of appropriate delivery system; (iv) identification of appropriate production method; (vii) establishment of appropriate testing procedures; and (viii) system optimization. *Comprehensive Reviews in Food Science and Food Safety*. Published on December 5, 2022; doi: 10.1111/1541-4337.13066.



Aroma Chemistry and Sensory Characteristics of Alcohol-Free Beers

Alcohol-free beers have gained popularity in the last few decades because they provide a healthier alternative to alcoholic beers and can be more widely consumed. Consumers are becoming more aware of the benefits of reducing their alcohol consumption, and this has increased the sales of nonalcoholic alternatives. However, there are still many challenges for the brewing industry to produce an alcohol-free beer that resembles the pleasant fruity flavor and overall sensory experience of regular beers. The aim of this review is to give a comprehensive overview of alcohol-free beer focusing on aroma chemistry. The formation of the most important aroma compounds, such as Strecker aldehydes, higher alcohols, and esters, is reviewed, aiming to outline the gaps in current knowledge. The role of ethanol as a direct and indirect flavor-active compound is examined separately. In parallel, the influence of the

most common methods to reduce alcohol content, such as physical (dealcoholization) or biological, on the organoleptic characteristics and consumer perception of the final product, is discussed. *Comprehensive Reviews in Food Science and Food Safety*. Published on November 18, 2022; doi: 10.1111/1541-4337.13068



Consumer Acceptance of Reduced Sodium Bread

Chronic consumption of sodium in quantities exceeding recommendations has led to sodium being designated as a nutrient of health concern for overconsumption. As a result of the prevalence of sodium overconsumption, the Food and Drug Administration (FDA) released voluntary sodium reduction goals for a wide variety of products on both short- and long-term timespans. As food palatability may decrease when sodium is reduced, flavor enhancers such as monosodium glutamate (MSG) may provide a promising solution to mitigate such palatability loss. The objective of this research was to investigate consumer acceptance of white and multigrain breads with either a 43% or 60% reduction in sodium content and with and without MSG as well as to investigate the influence of information on consumer acceptance of these breads under blind, informed, and informed with education conditions. Seventy-eight frequent bread consumers participated in the evaluations. A significant difference was evidenced across breads with different levels of sodium content and MSG status, although no difference was seen across the different evaluation conditions. Consumer segmentation found multiple consumer clusters showing different liking patterns of the bread treatments for both white and multigrain breads. Breads with sodium content set at the FDA's long-term goal with and without MSG were liked no differently in nearly all attributes evaluated than the full-sodium bread demonstrating the feasibility of producing acceptable

reduced-sodium breads. Future research characterizing the predominant sensory attributes of full-sodium and reduced-sodium breads with and without MSG would be valuable for identifying the drivers of liking in such products. *Journal of Food Science*. Published on December 5, 2022; doi: 10.1111/1750-3841.16395.

Polyols and Chocolate Technology

Reducing the sugar level in chocolate and developing low-calorie products are important for meeting consumer expectations, supporting public health, and adapting to current consumption trends. However, the identification of bulking agents to be used for this aim is a critical factor. The most commonly used sugar alternatives for this aim are polyols. In this study, recent advances and developments for using possibilities of polyols in chocolate technology are discussed and future perspectives are highlighted. Partially and/or complete replacing of sugar with polyols can provide a low-calorie product. In addition, the use of mixtures consisting of more than one polyol is an approach that can be used in chocolate sugar substitution. Optimization of the refining, conching, and tempering processes by considering polyol type and content may contribute to the development of chocolate with improved quality properties and shelf life. However, polyol and bioactive compounds interactions and possible effects on bioaccessibility, bioavailability, and stability of these compounds in chocolate composition and pre- and post-digestion periods



should be deeply investigated. In addition, the conching methods and conditions used is another factor to be considered in the use of polyols. *International Journal of Food Science and Technology*. Published on November 2, 2022. doi: doi.org/10.1111/ijfs.16175.

The Impact of Iron Treatments on Wine Grape Quality

In this study, eight-year-old wine grape plants (Cabernet Sauvignon) were subjected to five different iron treatments: ferrous sulfate, ferric ethylenediaminetetraacetic acid (EDTA-Fe), ferric citrate, ferric gluconate, and ferric sugar alcohol, and conventional fertilization. Foliar spraying with clear water was used as the control treatment. The effects of different iron treatments on berry quality and flavonoid accumulation in grape



peels were explored. All five iron treatments affected the sugar, acid, and peel flavonoid contents of grape berries, but the contents varied greatly among the different iron treatments. Foliar spraying with iron increased berry sugar content and reduced acid content. In addition, foliar spraying with ferrous sulfate, EDTA-Fe, ferric gluconate, and ferric sugar alcohol reduced the total anthocyanin, flavanol, and flavanol contents in the peel. The unique flavonoid monomer content of the peel was significantly higher under ferric citrate treatment than under the control and other iron treatments. Moreover, the results showed that foliar spraying with ferric citrate balanced the berry sugar–acid ratio and increased the anthocyanin, flavanol, and flavanol contents of the grape peel, thereby improving the overall nutritional status of the berries and the final wine quality. The results obtained in this study demonstrate that different iron treatments could improve grape berry quality and clarify the effects of different exogenous iron treatments. *Food Science and Nutrition*. 2022;10:3598-3607.

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 Visit foodprotection.org/europeansymposium.

8-11
Food Safety Summit
 Rosemont, Ill.
 Visit food-safety.com/food-safety-summit.

20-23
National Restaurant Association Show
 Chicago, Ill.
 Visit nationalrestaurantshow.com.

JULY 2023
16-19
IFT First Annual Event and Expo
 Chicago, Ill.
 Visit iftevent.org.

16-19
International Association for Food Protection
 Toronto, ON, Canada
 Visit foodprotection.org.

SEPTEMBER 2023
11-13
Pack Expo Las Vegas
 Visit packexpolasvegas.com.

Have an Upcoming Event to Promote?

If you have an upcoming industry event that you would like considered for inclusion in our online and print listings, go to foodqualityandsafety.com/events for info or contact Vanessa Winde at vwinde@wiley.com.

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