

Safety & Sanitation



Water, Water Everywhere

The effects of water on safety are especially pronounced in the dairy industry. Water is used in starter cultures to kick off the cheesemaking process. During cheese production, wash curd cheeses, including Colby and Monterey Jack, are cooled with water. Cheeses like Gouda are produced by removing a percentage of the whey and replacing it with hot water, which essentially cooks the curds. Fresh cheeses like mozzarella can spend months bathing in a water brine, and aging cheeses provide an ideal environment for bacteria from unpurified water to flourish.

Beyond production, water comes into contact with every type of equipment in a food plant. Incoming water can contain all types of pseudomonades, bacilli, mitochondria, psychotropic bacteria, yeasts, and molds. Some of these bacteria, organisms, and exopolysaccharides can cling to surfaces in a plant—from a pasteurizer to a separator to the miles and miles of stainless-steel tubing dairy plants contain. If biofilms are not taken care of in the cleaning process, they can release in the manufacturing process and cause problems in the dairy product. The four basic steps in equipment cleaning are pre-rinse, wash, rinse, and sanitize. Because water is used throughout this process, any impurity could be reintroduced to the equipment over and over.

The More Beloved the Ingredient, the Wider the Safety Concern

There's no question that Americans love cheese; 2022 USDA data indicate that Americans consumed close to 42 pounds of cheese per capita that year. While fluid milk sales have been softening for years, cheese consumption continues to grow. It's a staple grocery item in tens of millions of households and a component of prepared foods ranging from pre-packaged salads to frozen pizzas.

It's not just the U.S. that has a love affair with cheese. *Fortune Business*

The Clear Contaminant

Water can pose a big risk to food safety throughout the food production process

BY STEVE FUNK

According to USDA, more than 4,000,000 pounds of food were recalled in the U.S. in 2023. Food manufacturers can decrease food safety risk with a single—and often overlooked—factor: water. Water looks clean and clear coming from the tap, but the truth is that potable water is not actually pure. There's a regulatory tolerance for organisms

and pathogens in tap water that may be unnoticed in a single glass of drinking water, but these same organisms can wreak havoc in a food manufacturing plant. Properly purifying the “clear contaminant” and understanding the impact of water throughout the food production process are keys to maintaining the highest standards of food quality and safety.

Insights reports that the global cheese market is expected to grow from \$191.94 billion in 2024 to \$287.12 billion in 2032. It's a key ingredient in a variety of global cuisines, including Italian, Mexican, French, American, and many Latin American recipes. Demand for and interest in cheese is even growing in countries that don't typically use the product in traditional recipes, such as China. The popularity and wide-spread use of cheese means that a food safety issue with this product can have an extensive reach.

Traceable Safety

To keep consumers safe and minimize the extent of recalls, FDA's Food Safety Modernization Act (FSMA) of 2011 and the New Era of Food Safety in 2020 were enacted to implement a more pro-active approach to food safety, primarily through traceability. The tracking requirements in the FSMA are designed to isolate a source of contamination more quickly, limiting the size of recalls and potentially saving lives.

UV-based water disinfection systems can be custom built to the size of the plant and de-signed to purify a specific type of water.

In November 2022, FDA published a final rule called "Requirements for Additional Traceability Records for Certain Foods" with 600 pages of detail. Entities affected by the rule include farms, manufacturers, distributors, retail food establishments, and restaurants. These covered entities are required to provide traceability-related tracking to FDA within 24 hours of an official request. While only certain cheeses are included on the Food Traceability List (FTL) in the final rule, the same facilities and equipment are typically used for a wider range of products than those appearing on the FTL. In addition to supporting public safety and preventing food waste, eliminating water as a potential source of contamination can streamline FDA compliance with any official request.

What's more, covered farms are required to conduct pre-harvest agricultural water assessments once a year and whenever there is any change that could introduce a food safety concern. These assessments include location and nature of the water source, the type of water distribution system, and the type of application method. While limited to produce farms at this time, the heightened focus on water in FSMA illustrates the importance of its role in food safety.

Ultra Purity with UV Disinfection

The obvious question is how food manufacturers across the supply chain can protect and purify its water sources. The most effective and reliable form of water purification is ultraviolet (UV) disinfection.

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The Clear Contaminant (Cont. from p. 21)
infection. Alternative methods, such as carbon filter beds, work well temporarily, and then build up residue that needs to be cleaned. The unpurified water that is used to clean the residue can add new unwanted organisms, and chemical cleaning will not eliminate all of the bacteria. A plant can purify the water with UV disinfection to clean the residue, but then the question becomes why not eliminate redundancy and use UV disinfection to purify all water in the first place.

UV light purification systems are sophisticated mechanisms that remove all unwanted organisms from incoming water. In tubing, since UV can't hit water directly, a scraper can use a UV light to clean off any residue that builds up on the sleeve with a UV light. The systems last two years and are not prohibitively expensive; the cost of even just a few lost vats of cheese due to contamination is higher than the cost of an entire system.

UV-based water disinfection systems can be custom-built to the size of the plant and designed to purify a specific type of water (i.e., water from the specific municipality or a well). Some plants use thousands of gallons of water per hour, allowing new contaminants to be introduced over and over. This systemic approach to purification is more consistent and reliable, even with large volumes of water.

Higher Rigor than Regulations

While FDA and other regulatory bodies have food safety standards in place, higher rigor is required to prevent contamination from water. Water regulations are designed for potable water, and these standards don't translate perfectly to food production. What's more, manufacturers can take shortcuts—knowingly or unknowingly—and even regulations can't prevent a food safety issue when protocols aren't followed. To decrease the likelihood of missed protocols, UV light purification systems provide transmis-

sion numbers which take the guesswork out of water safety. Customers can obtain a UV transmittance (UVT) number to represent the purity of the water. A transmission number of 97 or 98 is excellent, whereas 92 or 93 indicates unsafe water with minerals and/or bacteria present.

Plants may use caustic sanitizer rinses to reduce contamination risks, install advanced air filter systems to prevent airborne contaminants, and follow all safe food handling procedures to the letter. Still, if water purification is forgotten, the facility is at risk for safety issues. Investing in the highest form of water purification can protect the integrity of the food supply, a producer's bottom line, and a company's reputation while giving consumers the benefit of safely enjoying the foods they love. ■

Funk is senior cheese technologist at Nelson-Jameson. As a dairy industry veteran with more than 40 years of experience, he provides customers with advice on ingredients, production processes, and manufacturing improvements to enhance cheese and fermented dairy product results. Reach him at s.funk@nelsonjameson.com.

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