



Advanced Food Safety Microbial Control Systems

Cheese Brine Disinfection

Application Note

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The Application Challenge

You know the challenge. Your high capacity brining system sitting there in the open. Listeria is always a concern because it survives and grows at low temperatures even in saturated brine. Mold and its spores can be harbored that later grow and spoil packaged cheese, especially sliced products.

Ultraviolet radiation becomes ineffective as the brine gets cloudy and turbid. Ultrafiltration is troublesome at best, with membrane performance degradation and expensive replacements. Hypochlorite shock treatments have limited efficacy and reduce plant capacity waiting for free chlorine levels to go down. And none of these generate the reactive oxygen species needed to inhibit biofilm formation. Potential alternatives like chlorine dioxide bring their own hazards and expensive ongoing chemical purchases. None are likely to provide you with the regulatory "clean break" that could substantially reduce the scope of a potential recall.

Fortunately, an effective solution is now at hand, proven in large commercial installations and in demanding laboratory trials. It's based on a chemical-free catalytic method similar to that in your car's catalytic converter, only done at low temperature. It's called the BioIonix Advanced Brine Disinfection Process.



BioIonix Advanced Cheese Brine Disinfection

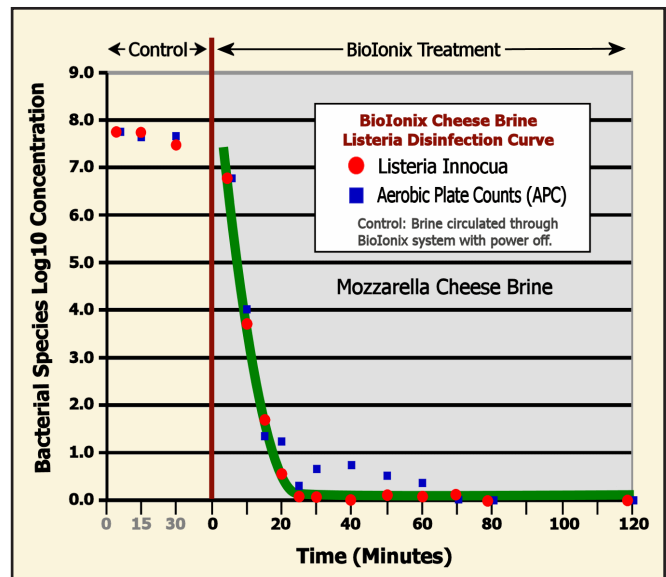
The breakthrough BioIonix electrocatalytic process continuously disinfects cheese brine by generating a powerful combination of reactive oxygen and activated chlorine species right from the brine stream itself. These BioIonix SuperOxidants™ attack microbials by complementary methods of action, including direct DNA destruction, cytoplasm impairment and cell wall disruption. It's activated chlorine alone is up to one hundred times more powerful than hypochlorite as a disinfectant. BioIonix effectively disinfects even opaque, colored brine that contains significant levels of suspended and dissolved solids.

BioIonix Process Benefits:

- Effective and fully automated disinfection.
- Eliminates mold and yeast, extending shelf life.
- Prevents biofilm buildup on brine system surfaces.
- No chemicals to buy or dispense.
- Continuous 24/7/365 treatment.
- Designed to 3A standards and for full CIP.
- BioIonix's exclusive QA benefit:
 - A real-time online disinfection efficacy estimate!



BioIonix brine disinfection system. Its compact footprint fits even in tight plant layouts.



The graph above demonstrates the powerful efficacy of the BioIonix process. Well-used brine from a major manufacturer of mozzarella and string cheese was seeded with a seven log concentration of *Listeria innocua*, a proven disinfection performance proxy for highly pathogenic *Listeria monocytogenes*.

Samples were taken throughout the test to measure *Listeria* counts, with APCs confirming these. The brine was first circulated through the BioIonix system for 30 minutes as a control to measure untreated *Listeria* decline. Then the BioIonix process was activated. An approximate one log kill was achieved within five minutes, four logs in ten minutes and seven logs in twenty minutes.

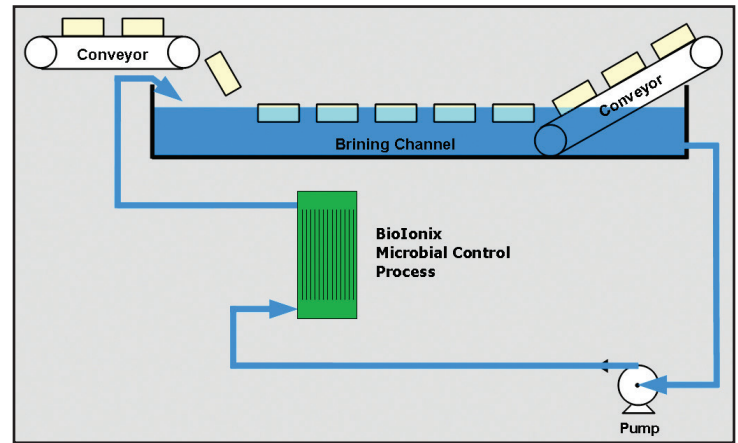
In actual plant production, BioIonix has been shown effective both for bacterial control and for the elimination of mold and yeast growth in the packaged product. And in taste tests, cheese salted with brine that utilized BioIonix microbial control was graded the same as the cheese made with untreated brine.

Cheese Brine Disinfection

BioIonix's Cheese Brine Microbial Control Process

Adding a BioIonix disinfection system to your plant is a straightforward project. The BioIonix reactor module, where platinum group catalysts disinfect the brine as it flows through the reactor, is simply installed in a convenient location along with the power and control unit. BioIonix's small footprint facilitates retrofitting into tight plant layouts.

The schematic at the right illustrates the cheese brine disinfection process. A pump brings brine from the discharge side of the brine channel through the BioIonix unit for disinfection. The disinfected brine then is returned to the brine channel at the cheese loading end. Normally no brine filtering is required, but a strainer can be added before the BioIonix reactor if large particles are present. A simple layout designed for easy maintenance and CIP.



BioIonix Features and Benefits

Labor savings. The process eliminates the ordering, stocking and dispensing labor associated with disinfection chemicals while eliminating personnel hazards.

Automated controls. BioIonix features a fully automated control system that provides consistent disinfection performance with hands-off operation. The full color touchscreen displays alerts and operational details. Remote monitoring of the BioIonix process is possible for QA and other authorized personnel at their desktop workstation.

Online disinfection efficacy estimate. A BioIonix exclusive! Unlike other microbial control methods, you are never in the dark on expected disinfection performance. The control system monitors a combination of sensors and other parameters to forecast disinfection efficacy and displays the results in a highly visible and easily understood red-yellow-green format on the control screen and remote stack lights. While

the estimate needs confirmation by normal lab procedures that can take 24 hours or more to obtain, this forecast has proven to be effective and useful in a number of commercial installations.

Data recording. A feature highly appreciated by QA and management, the system records minute-by-minute operating data for documentation and analysis purposes. Should an operating anomaly occur, the exact running conditions at the time can be reviewed.

Full CIP cleaning. The BioIonix system is designed to 3A standards and for clean-in-place (CIP) cleaning using standard food industry chemicals and procedures.

Food industry design. FDA approved materials are used for all process liquid contact surfaces. USDA FSIS allowed for meat and poultry processing. The power and control system is housed in a watertight, stainless steel, NEMA 4X enclosure.



The Company

BioIonix, Inc. is located in the Madison, Wisconsin area, home to many high technology companies. BioIonix's breakthrough disinfection process eliminates the costs and hazards of chemical disinfectants and overcomes the disadvantages of other disinfection methods in food processing applications. This energy-efficient, environmentally-friendly process solves serious biological disinfection and water reuse challenges facing food processors worldwide.



BioIonix's test lab and field pilot units demonstrate equipment performance for new customer applications.



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To find out more about the BioIonix disinfection process please contact:

BioIonix, Inc.

4603 Triangle Street
McFarland, WI 53558
608-838-0300
info@bioionix.com
www.bioionix.com