Why Dairy Producers Are Considering The Switch To UV Disinfection

Recent advancements are making it more appealing than ever for the dairy industry to replace heat pasteurization in favor of ultraviolet disinfection to sterilize water for its production needs.

To comply with the Pasteurized Milk Ordinance (PMO) in producing Grade-A milk for interstate shipment, dairy plants are required to pasteurize water that comes in contact with the same surfaces as the milk. Since 2011, UV disinfection has been approved to replace thermal pasteurization for this water, if certain criteria are met.

Through decades of demonstrated and proven technology with core components, including a variety of more recent advancements, UV manufacturers are now offering energy-efficient disinfection solutions for this application. That's good news for dairy producers that expend significant resources to generate high-quality water for various processes within their operations.

Commercial UV products for the dairy industry can be applied with confidence because the PMO has set stringent standards for UV treatment, far exceeding those required for drinking water.

The UV Technology Advantage

The traditional heat pasteurization process relies on a heat exchanger, and a significant amount of energy, to enable the process water to reach a high temperature over a lengthy time. By comparison, UV systems expose the process water to ultraviolet light over a matter of seconds to achieve disinfection.

UV is a physical process, meaning that the treated water quality (i.e., pH, color) is unchanged.

It takes far less energy with UV than heat pasteurization. For example, disinfecting 480 gpm can be accomplished with a typical 3.1 kW UV system. Heat pasteurization of the same water requires approximately 400 kW, even using conventional heat recovery. This is more than 100 times the energy compared to UV.

In addition to a dramatic reduction in energy usage, switching from heat pasteurization to UV disinfection eliminates the need for heat exchangers and their associated maintenance, such as leak repair, seal replacement, and scale removal. The bottom line is that switching from heat pasteurization to UV disinfection has now become economically attractive.

UV Is Proven Technology

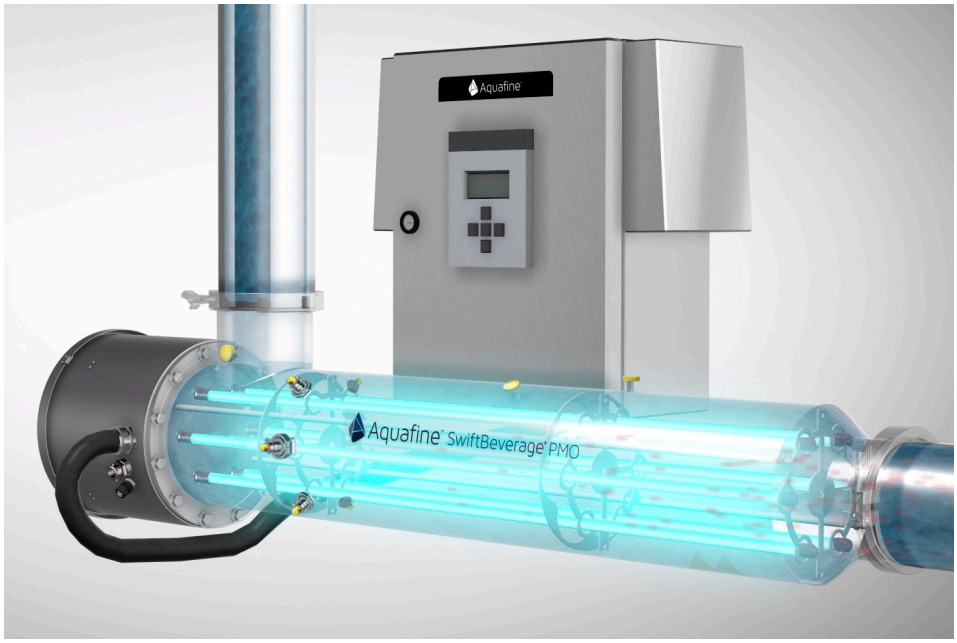
Safeguarding public health is at the core of the PMO, which includes the following requirements of UV products:

- 100 percent of the water is treated. The equipment must initiate flow diversion if there is insufficient UV energy for treatment, or if the system operation is otherwise compromised;
- UV dose of 186,000 µW-s/cm2;

- Designed for frequent cleaning;
- One germicidal UV intensity sensor per lamp;
- Recording of flow, water quality (UV transmittance), UV dose; anD
- Made of non-toxic materials.

An example of a technology that is fully compliant with the current regulations is the Aquafine SwiftBeverage PMO.

This Aquafine product line has been installed across the country in states such as California, New York, and Wisconsin in dairy production/processing plants. The systems are validated for performance by independent third-party engineering firms using the same protocols required by the EPA for drinking water facilities.



Benefits Of Low-Pressure UV Lamps

A key benefit of the Aquafine SwiftBeverage PMO is the incorporation of low-pressure lamps. Innovations in low-pressure (LP) lamp technology have significantly outpaced medium-pressure (MP) systems. This translates to higher efficiency and longer lamp life, thus significantly reducing the cost of ownership for LP systems.

LP lamps produce germicidal UV energy up to four times more efficiently than MP lamps, so energy costs are lower. Also, lamps in LP-based systems are changed annually, while MP lamps require at least two changes per year. The annual operating and maintenance costs for LP technology can be as little as half of those for MP lamp technology.

However, cost shouldn't be the only consideration when making a choice for dairy operations.

Medium-pressure lamps emit at multi-wavelengths, as opposed to low-pressure lamps, which are primarily monochromatic (single wavelength). A drawback of MP is that it produces many wavelengths in addition to the usable portion of germicidal wavelengths. Not only does this reduce efficiency, but these wavelengths can negatively affect the water through conversion of any nitrates present into dangerous nitrites.

There may also be unknown risks that other conversions of constituents in dairy plant supply water or other currently unknown negative phenomena may occur at wavelengths outside of the monitored UV germicidal wavelength range.

LP-based UV systems are more targeted, so they don't create these types of problems during the disinfection process.

Given the potential for substantial energy savings and the reduction in maintenance with heat exchangers and the associated ancillary equipment, dairy producers now have incentive to consider LP-based UV systems to provide treated water for their dairy needs. ■