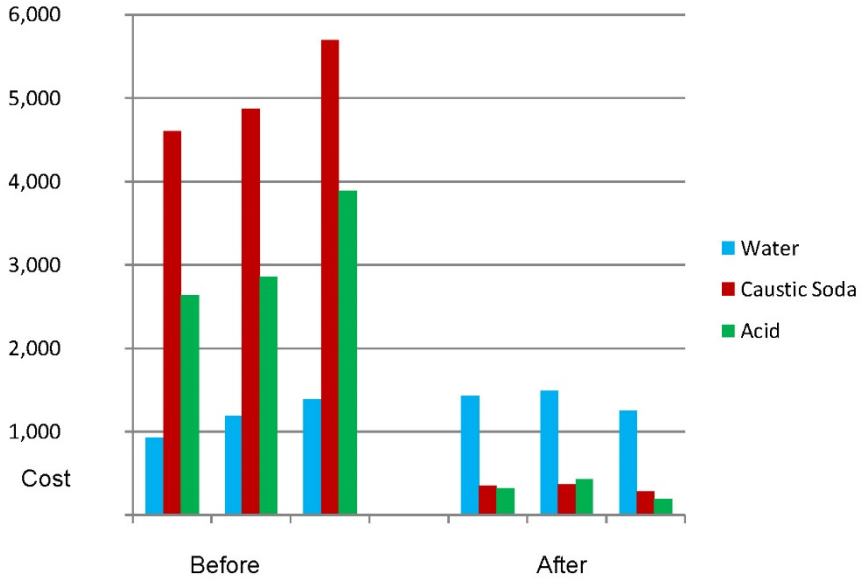
Optimizing CIP to Save Money and Reduce Waste

March 2016

This fact sheet has been created to assist milk and cheese processors to identify opportunities for reducing chemical cost, energy usage, and waste discharge from their Cleaning-In-Place (CIP) systems.

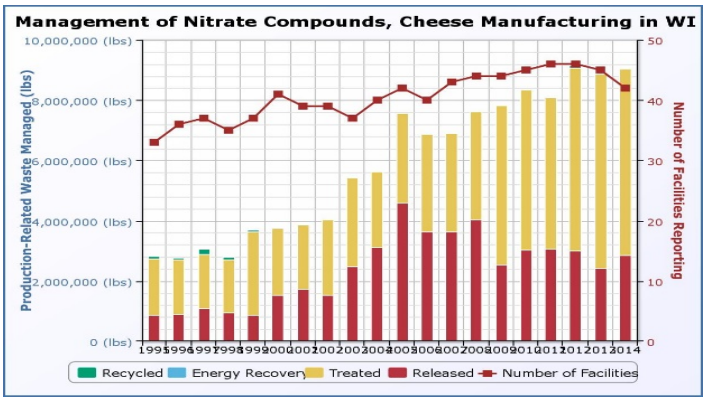
Introduction

CIP systems are a core technology in modern dairy, cheese and other food manufacturing. Protecting product quality and consumer safety often means operators are cautious about changing any aspect of a CIP system, and to err on the side of "more is better" when it comes to cleaning and sanitizing their equipment. Overuse of cleaning chemicals can damage equipment and create unsanitary surfaces. Over-cleaning and rinsing can lead to lost productivity, additional costs and excess waste from CIP. For example, the figure below provides an estimate of potential cost reduction for optimizing CIP chemical use at a large food processor, without sacrificing product quality or safety.



Annual chemical cost saving from optimizing three CIP systems
Source: Jude & Lemaire, 2009

Process wastes from milk and cheese making are also of concern. In addition to water, BOD and phosphorus, nitrogen waste from sanitizing can be problematic, especially when land spread or discharged to surface waters. The following figure shows the trend of nitrate released (red) from cheese making in Wisconsin (USEPA).



While optimizing CIP can bring benefits by reducing cost and waste, evaluating current system performance and recommending cost effective improvements typically requires a CIP expert assessment. Examples of the kinds of opportunities for increasing efficiency and effectiveness include:

- Optimizing chemical blends, concentrations and dosing
- Replacing throttling valves with variable frequency drives
- Monitoring pre-rinse volumes and tank levels
- Installing improved spray heads and strainers
- Eliminating non-sanitary fittings and seals
- Adjusting cycling times
- Recovering and reusing cleaning solutions
- Improving, operator training, processing monitoring and recordkeeping

Two-tank cleaning solution recovery and reuse system -Sanimatic

Any facility should audit the performance of its CIP system on a regular basis. But systems that have been in place for many years may benefit from a complete audit provided by a CIP expert.

Providers of CIP assessments

Ecolab Inc. Food and Beverage
370 Wabasha St. N
St. Paul, MN
Phone 608-516-8293

Hydrite Chemical Co.
300 N. Patrick Blvd.
Brookfield, Wisconsin
262-792-1450

ProActive Solutions USA
301 Bridge St.
Green Bay, WI
800-279-7761

ESC
441 Clark Street
South Beloit, IL
815-389-2291

PI-FS
N1299 O'Connor Rd.
Lodi, WI
608-332-3471

Seiberling
655 3rd Street, Suite 203
Beloit, WI
608-313-1235

References and Links

Jude, Benjamin, E. Lemaire, *How To Optimize Clean-In-Place (CIP) Processes In Food And Beverage Operations*, 2009, Schneider Electric

Palmowski, Laurence, K. Baskaran, H. Wilson, B. Watson, *Clean-In-Place – A Review Of Current Technology And Its Use In The Food And Beverage Industry*, 2005, Deakin University

Clean-In-Place Best Practice Guidelines, 2010, Smart Water Fund

Cleaner Production Assessment in Dairy Processing, 2000, UNEP

UW-Madison Milk Quality website

UW-Madison Dairy Science Cleaning and Sanitation Workshop

Optimizing CIP to Save Money and Reduce Waste
http://shwec.engr.wisc.edu/wp-uploads/2015/08/CIP-Fact-Sheet-fin-3-11-16.pdf

Contact SHWEC: 608-265-2360 or, http://shwec.engr.wisc.edu