

Comparing best practices in the dairy industry for CIP of milk evaporators to identify savings

IRELAND'S DAIRY INDUSTRY



Background

Ireland is the 10th largest dairy exporter in the world and produces 10% of the global exports of infant milk formula. Therefore, a number of dairy processing sites have milk evaporators, followed by dryers to produce this milk powder.

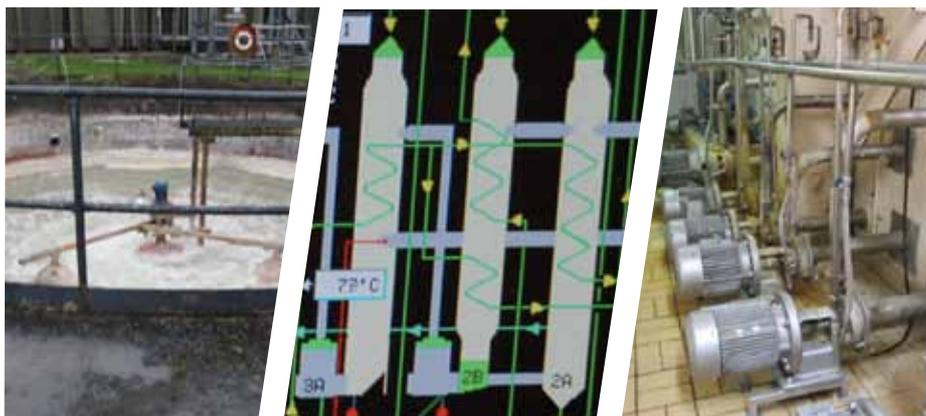
Project Description

Green Business reviewed the detailed CIP practices for evaporators across 6 different sites in order to identify differences and to see if improvements made by individual sites could be transferred to the sector. Cleaning in place (CIP) of milk evaporators is typically carried out daily, accounting for a significant usage of heat, chemicals and water, while dryers would only require cleaning on a more infrequent basis.

Findings identified:

1. Overall, there is plenty of commonality for CIP of evaporators, but also quite a range of differing practices across the companies, with some new innovations being introduced.
2. There are good practices underway at some companies, which may be transferable to the rest, that would result in savings in water and/or energy, increased product recovery, reduced effluent loading, or savings in time.
3. Total potential savings per annum across the companies have been identified to be of the order of €90,000 – €130,000, as well as potential production hours increases of 26 to 51 days, if the practices being carried out by some companies were to be adopted by all. This breaks down as follows:

Potential annual savings identified	ACROSS ALL 6 COMPANIES	
	Lower estimate	Upper estimate
Production hour savings	26 days (622 hrs)	51 days (1,222 hrs)
Financial savings in energy, chemicals & water	€90,000	€130,000
Energy savings	400,000 kWh	972,000 kWh
Concentrated cleaning chemical savings	224,000 litres	262,000 litres
Water savings	56,000 m ³	63,000 m ³
BOD to effluent savings	101,000 KG	
Product solids recovered	79 TONNES	



Financial Benefits:

Potential Cost Savings: €130,000 p.a.

Environmental Benefits:

Reduced BOD Loading: 100 tonnes p.a.

CO₂ reduced: 350 tonnes p.a.

Potentially transferable practices.

While there is a range of product types as well as varying evaporator sizes and age, the potentially transferable practices cover most of the ranges involved. Potentially transferable practices include:

- a. Longer production runs – one site has 30 hours between cleaning. The average for the other companies is 17 hours between cleaning, and for the larger high through put plants is typically every 20 hours. Longer runs will reduce CIP material and energy use and maximise production hours.
- b. The use of evaporator condensate in CIP instead of fresh water for rinses, including the final rinse. This is being carried out in some of the companies across a broad range of product types, equipment sizes and evaporator ages.
- c. The recovery of product from the evaporator prior to CIP, or at the very start of CIP during the first rinse. This is being carried out in some of the companies. This increases the amount of product, while reducing the BOD loading to effluent plant.
- d. Reuse of caustic and acid solutions. Some, but not all, of the companies are retaining caustic and acid and reusing the bulk of it.
- e. Potential for reduction in acid and caustic wash temperatures in some companies and a potential to substitute elevated temperatures in some rinse waters by ambient temperatures.
- f. Aside from the use of conductivity in control of chemical solutions, some of the companies use conductivity for control of rinse waters during cleaning.
- g. Certain management practices which could be implemented in some companies, including quantification of amounts of water used for rinses.