Chlorine-free cleaning protocols for milking equipment

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Summary

- It is increasingly difficult to achieve dairy product specifications with regard to Trichloromethane (TCM) and Chlorate residues, when chlorine-based cleaning products are used in milking equipment cleaning routines.
- Chlorine-free cleaning protocols require increased usage of hot water, acid detergents and higher working solutions of caustic.

Introduction

There are increased food safety concerns regarding the use of chlorine for cleaning milking equipment, due to residues of TCM and Chlorate. The removal of chlorine from cleaning routines would significantly reduce the risk of these residues in milk and consequently, in final products, such as lactic butter and milk powder. The adoption of chlorine-free cleaning of milking equipment is currently an on-going process. Some milk processors have already requested their milk suppliers not to use cleaning products that contain chlorine. Others are focussing initially on removal of chlorine products from just bulk-tank cleaning routines.

Necessary steps associated with changing to chlorine-free cleaning

Re-calibration of the automatic detergent dosing systems for both milking machine and bulk milk tank:

This will ensure correct uptake rates of the different detergent products; uptake rates may be lower for some chlorine-free products that have slightly higher caustic content than products previously used. Higher working solutions of caustic (0.7–1%) are now applied when cold water is being used.

Hot water for daily cleaning

When chlorine-free liquid based cleaning protocols (as opposed to powder products) are used, regular hot washes (70/80°C) are necessary, with temperatures remaining ≥40°C on completion of the wash cycle. A suggested routine may involve hot and cold circulation cleaning to be operated after AM and PM milking, respectively.

Peracetic acid: a replacement for chlorine

Peracetic acid has similar antimicrobial properties to sodium hypochlorite and is effective against a broad spectrum of bacteria, spores, yeasts, moulds and viruses. Post milking wash routines can include an additional rinse involving peracetic acid. But caustic detergent solution used for the main circulation must be rinsed thoroughly from the plant before the additional rinse containing peracetic acid. This is important both for safety concerns and effectiveness; otherwise, the caustic could neutralize the acid, making the peracetic acid ineffective.

Chlorine-free cleaning protocols

Using powder products:

A number of potential options can be considered in addition to the use of the caustic powder product:

- Include up to three hot acid washes (phosphoric acid) per week.
- Include peracetic acid in an additional rinse twice daily.
- Add hydrogen peroxide to the diluted powder solution on one occasion per week.

Using caustic liquid and acid:

Combinations of caustic and acid based products can be selected for use in weekly milking machine wash protocols:

- A caustic liquid product (21/29%) used with hot water (70/75°C) four times weekly after AM milking and used with cold water seven times weekly after PM milking. Acid (phosphoric) is then used with hot water on the remaining three times weekly after AM milking.
- Alternatively, a caustic liquid product (21/29%) used with hot water seven times weekly after AM milking and used with cold water seven times weekly after PM milking may be put in place. An additional rinse containing peracetic acid should be carried out after the completed detergent rinse cycles at both AM and PM milking.

Using acid as the main cleaning agent

'One for all' acid based cleaning products (chlorine-free) have been developed. This simplifies the cleaning protocol as one product is multi-functional; this removes organic materials and also sterilizes the stainless steel surfaces.

Chlorine-free cleaning of the bulk milk tank

Various options can be used for fully automatic wash systems:

- Dosing unit can be programmed to use caustic detergent (21/29%) after two collections and an acid detergent (phosphoric/nitric) after the third collection, using hot water (60/75°C) at each collection.
- Alternatively, the caustic detergent could be used daily with hot water and a second pump could be used to add peracetic acid to an additional final rinse after each collection.
- If an acid-based 'one for all' product is used, then no other product is required.

Conclusions

Visit the Teagasc milk quality webpage to get more information on chlorine–free cleaning of milking equipment:

https://www.teagasc.ie/animals/dairy/milk-quality/