



Chlorine-free cleaning of milking equipment

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Background

- Chlorine based detergents have been commonly used for the cleaning of milking equipment on farms and equipment on processing sites
- Chlorine (sodium hypochlorite) linked to 2 residues-**Trichloromethane (TCM) & Chlorate**
 - TCM -associated with:
 - Poor plant rinsing and use of high chlorine products
 - Chlorate- associated with:
 - Chlorate increases as chlorine degrades-storage
 - Chlorate present in detergents/disinfectants and water supplies
- Chlorine removed as a cleaning agent from farms and processing sites by the 01/01/21

Challenge

Removal of chlorine has implications for the microbiological quality of milk

Research:

- Research studies demonstrated that chlorine-free cleaning was effective when examined over a 3-month period
- New cleaning protocols developed
- Studies undertaken on commercial farms



Chlorine-free cleaning- What is required

- Removal of chlorine is compensated by key changes to existing wash protocols- individual or combinations of changes
- For example:
 - » Higher sodium hydroxide concentrations in product/wash solution
 - » Increased hot water usage
 - » Increased use of acid descale products and Peracetic acid

Successful cleaning will depend on following a recommended cleaning protocol

Chlorine-free cleaning- sodium hydroxide concentration

- Sodium hydroxide concentrations in liquid CF products: 21-29%
- Usage rates increased- hot (0.7%) or cold (1%) water
 - Need to know level of water used for main wash cycle
- Liquid based caustic solution should not be recycled



Chlorine-free cleaning-Hot water usage

- Adequate hot water is vital-9 litres/unit
- 7 hot washes per week-minimum
 - » Less hot washes required when using powder
- Water temperature- check in the wash trough
 - Start of cycle -75/80°C : End of cycle -45/55°C

Achieving correct detergent wash cycle temperature

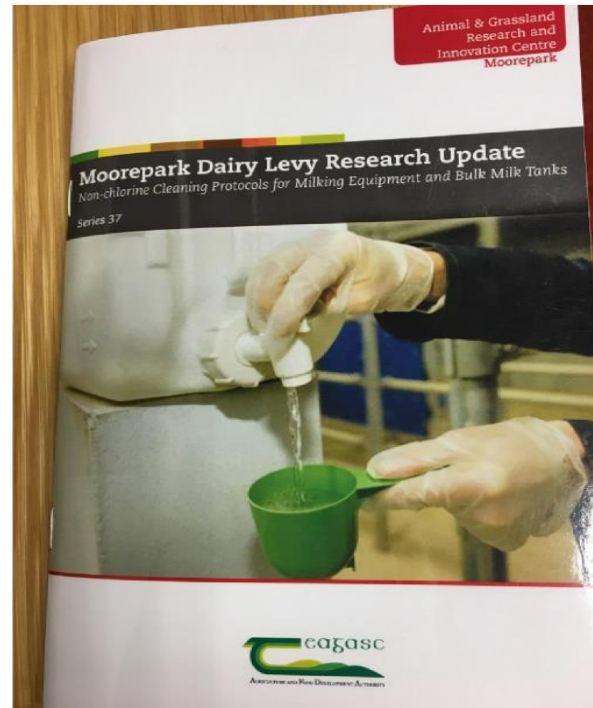
- Warm post-milking rinse-20/30°C
- Option to send to dump first 10/20 l of hot water
- Circulation times for detergent cycle too long- 8 to 10 min sufficient
- Some new water heating systems can maintain temperature during the complete cycle

Chlorine-free cleaning-Use of Acid products

- 3 to 12 acid washes per week –depends on the protocol
- Descale acid products-contain phosphoric/nitric acid-same as used for traditional wash protocols
- New 'ONE for ALL' acid based products – descale/clean/disinfect
- Peracetic acid-only alternative to chlorine

New cleaning protocol options designed for farmers

Dairy Levy Booklet



- 5 x milking machine chlorine-free cleaning protocols recommended
- 3 x bulk tank chlorine-free cleaning protocols recommended

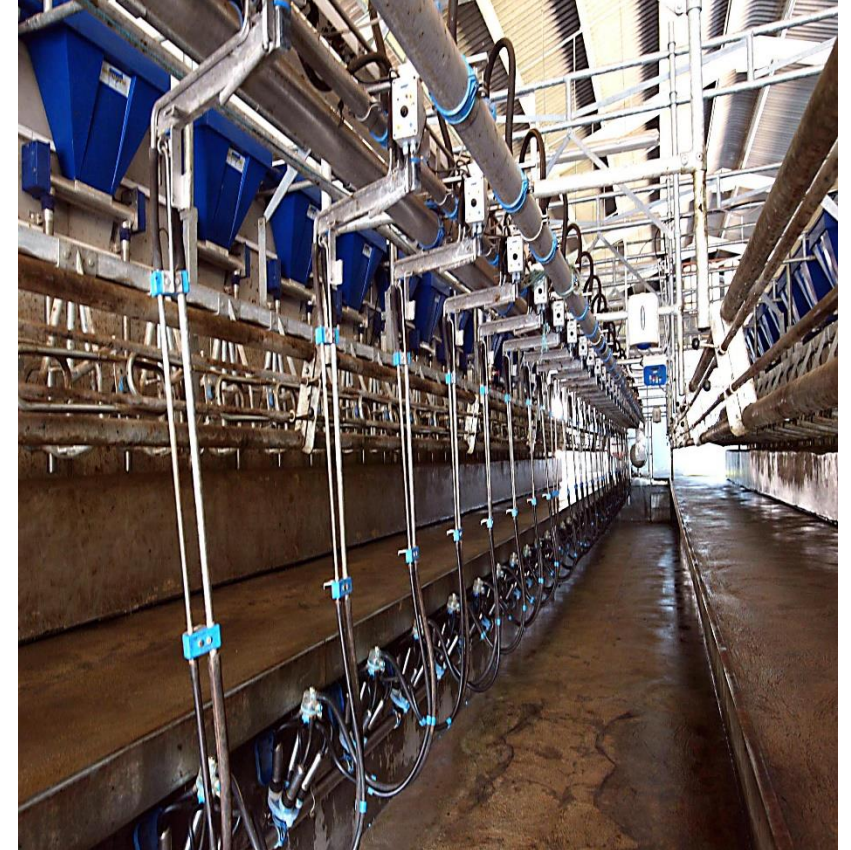
Option chosen may depend if manual or automatic cleaning

- *higher acid washes –more suited to automatic systems*
- *powder washes-more suited to manual systems*

Monitoring the impact of chlorine-free cleaning on commercial farms

Research study:

- 4 Milk processors- 36 farms
- 2 cleaning categories:
 - Chlorine used for machine & bulk milk tank (C)
 - Chlorine-free used for machine & bulk milk tank (CF)
- Range of microbiological tests undertaken



Bacterial counts for farms, using chlorine products (C) and chlorine-free products (CF)

Cleaning protocol	C	CF	Significance
Total Bacterial counts	12,454 ^a	3,168 ^b	0.0001
Psychrotrophic	2,442 ^a	838 ^b	0.0007
Thermophile	50 ^a	1 ^b	0.0016
Laboratory Pasteurisation Count	92	43	NS
Faecal Streptococci	68	147	NS
Bacillus Cereus	0.022 ^a	0.001 ^b	0.07

Conclusions

- Good quality milk with minimum residues can be achieved on-farm without chlorine
- Following a recommended cleaning protocol is critical



Thank you