New solution in cleaning technology

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Dairy farms throughout the world are looking for innovative ways to operate in a more profitable and environmentally sound manner.

Global energy and water consumption are expected to continue to steadily increase over the next several decades, fuelled by economic expansion and development. The impact of this is twofold and can already be felt today: an increase of energy and water costs and an increased pressure on water resources and on carbon emission. This is a risk that cannot be ignored by forward looking dairy farmers. As well as being the single largest user of fresh water on a global basis, agriculture is also accused of being a major cause of degradation of surface and groundwater resources and of air quality.

Toughening regulations, land, water and air pollution and increasing competition for land with habitations call for new sustainable farming solutions.

Ecolab has a strong history of developing solutions that help customers minimise their impact on the environment and environmental savings continue to be key goals in their new product development process.

Milking equipment cleaning

The daily cleaning and disinfection, when required, of the milking equipment is of paramount importance for a good milk hygiene status and to maximise milk quality payment to the farmer.

The four cleaning steps with the Lactivate system: 1. milk residue in absence of pre-rinsing, 2. cleaning phase, 3. rinsing phase, 4. clean results.

Commonly the cleaning of the milking lines and of the collection tank is carried out twice a day with the alternating use of an acidic cleaner and an alkaline cleaner at concentration of 0.5 or 1% following a pre-rinsing phase.

Acidic cleaners have their main activity against mineral residues while alkaline cleaners work best against organic residues.

Milking equipment and milk tank cleaning steps consume considerable quantity of water and energy: pre-rinsing, cleaning and rinsing twice daily; heating of rinsing and cleaning water; activation of water circulation.

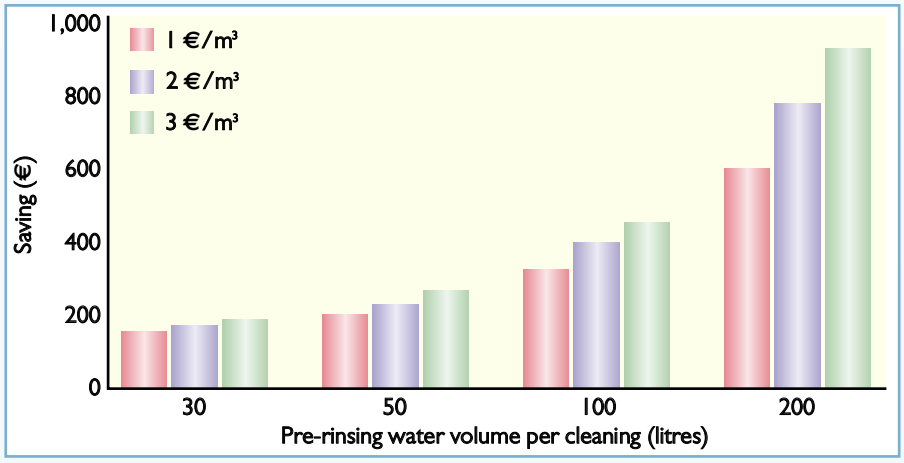
Additionally, the rinsing and cleaning water often ends up in the manure lagoon, increasing the energy and time consumption to treat or apply manure on field.

Finally, milking equipment cleaners contribute to the build-up of farm packaging wastes that are increasingly difficult to manage.

All these points made milking equipment cleaning a good target for innovating with a more sustainable solution.

Ecolab's Lactivate system is a breakthrough milking equipment cleaning programme that saves money and time, reduces the impact on the environment while still maintaining the highest quality milk results.

Fig. 1. Examples of estimated annual savings (in Euros) on water and energy, on cleaning and manure application.



Natural purification

Lactoperoxidase is a well known natural purification agent contained in milk, saliva and tears. This enzyme can be found in bovine milk in relatively high concentrations.

Combined with the right components, Lactoperoxidase produces a potent cleaning and purification system known as the Lactoperoxidase system.

Ecolab had the idea to use the Lactoperoxidase system as a new cleaning agent for milking equipment.

The concept

The Lactivate system is based on the activation of the Lactoperoxidease naturally present in the milk left in the equipment after milking. Since 1-5% of milk is necessary for the Lactivate system to work, it allows for the pre-rinse phase to be cancelled, leading to significant water and energy savings and a net benefit to the environment.

The Lactivate system consists of two products: Lactivate Acid and Lactivate Clean to be used in alternation daily. Lactivate Acid eliminates tartar and milk stone and ensures activation of the lactoperoxidase purification and Lactivate Clean provides detergency.

Continued on page 26

Continued from page 25
Both are used without pre-rinsing. Lactivate Acid and Lactivate Clean are used at only 0.25%, leading to a 50-75% reduction of packaging waste in comparison to traditional cleaners.

The benefits

The financial benefits are significant:
- Water savings: about a third (pre-rinsing volume) of water used for cleaning of the milking equipment.
- Energy savings: to heat and run the pre-rinsing water, to treat or apply manure in the field.
- Time savings: to apply manure in the field.

The environmental benefits include:
- Chlorine free.
- Less product required (only 0.25%).
- Less packaging waste.
- Less water and energy consumed.
- Less manure to be applied on crop fields.

Lactivate system validation

Given the high innovative nature of the Lactivate system and the importance of equipment cleaning on milk quality and safety, Ecolab took the time to make sure the concept was 100% proven.

After three years of laboratory development and testing, Ecolab took the concept for field validation with the recognised French 'Institut de l'Elevage' and later with a large sample (>80) of farmers for over two years.

Material and methods

The study was carried out in 14 milking parlours equipped from eight up to 12 units. A traditional products acid and detergent disinfectant with chlorine and the new concept Lactivate were compared in a Latin square design during 2 x 2 periods of three weeks.

The maximum contaminating power of the milking machine in rinsing the installation at the end of each period with sterile water was quantified.

Samples were analysed for TBC, total psychrotrophic bacteria count (PBC), psychrotrophic pseudomonas bacteria count (PPC), heat resistant bacteria count (HBC) and coliform bacteria count (CBC).

Every result was compared to a maximum authorised level given by the French Standard NF U 36015 (1983).

Milk samples taken by the milk factory in the bulk tank were also compared to the 50,000 TBC which represents the maximum level for payment of the highest milk quality in France.

Conclusion

The French 'Institut de l'Elevage' concluded that the Lactivate system for cleaning milking machines without chlorine or iodine and without pre-rinse is efficient and provides a milk of high bacteriological quality.

The Lactivate system was launched in 2006 and is now successfully used by a large number of satisfied dairy farmers in France, Germany, Austria and Italy. It is now being introduced in the rest of Europe. ■

Fig. 2. The Lactivate system provides a milk of high bacteriological quality, well below 50,000 TBC.