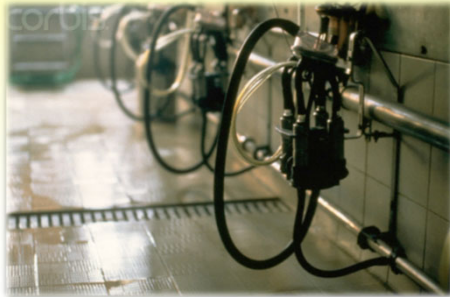




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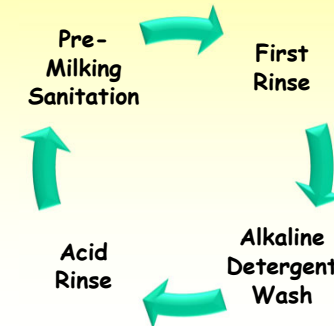
Cleaning and Sanitation: Introduction to Cleaning cycles



1

Objectives

Describe the cycles commonly used to clean milking equipment:



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Introduction

Cleaning milking equipment removes residues from internal milk contact surfaces to:

- Avoid buildup of organic deposits that provide sites for bacterial growth.
- Remove mineral deposits.

Sanitizing

- Kill microorganisms that may be present on surfaces.



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Soils that might occur in milking machines include

- Organic residues (from milk)
 - Lipids (fats), proteins, carbohydrates (sugars)
- Mineral deposits (mainly from water)
 - Calcium, magnesium, iron, others
- Bacterial films
 - Bacteria can form bio-films on organic substrates if allowed to incubate.
- Chemical residues
 - Cleaning solutions, lubricants, teat dips, teat conditioners, teat sealants

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Cleaning and Sanitizing Cycles

- 📖 A variety of methods are used around the world depending on:
 - ❶ Local cost of chemicals and hot water
 - ❷ Optimal use of resources and time
 - ❸ Size and complexity of equipment to be cleaned
 - ❹ Special types of soils to be removed
 - ❺ Quality of water available
 - ❻ Local history and regulation

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These are the cycles most commonly used in the US

- 📖 First (Pre) Rinse
- 📖 Alkaline Detergent Wash
- 📖 Acid Rinse
- 📖 Sanitize

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1st step: First Rinse

- 📖 The first rinse is the use of a clean water flow that circulates through the milking system immediately after milking.

📖 Objectives

- ❶ Remove residual milk and other soluble or suspended deposits from the internal surface of milking equipment.
- ❷ Another benefit of the first rinse is to warm the equipment, which reduces the temperature drop during the subsequent cycles.



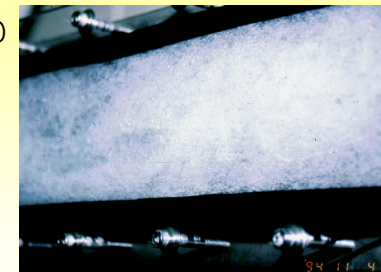
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1st step: First Rinse

- 📖 Ideally with warm water
 - ❶ 38 C to 55 C (100 F to 130 F)
- 📖 Water should not re-circulate, but be diverted to drain after a single pass through the system.
- 📖 Rinse should continue until water at the end of the system is clear.



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2nd step: Alkaline Detergent Wash



The detergent wash is the circulation of a solution composed of water and detergent (Usually a chlorinated alkaline in the US) through the milking system, after it is already free from gross residues.

Objectives

- Remove organic deposits, fatty acids and protein residues.

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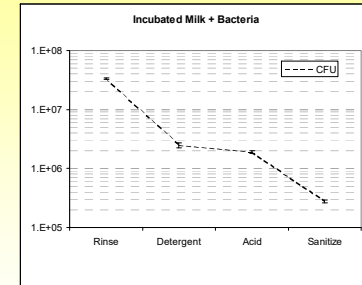
9

2nd step: Alkaline Detergent Wash

The detergent wash is the most important cleaning step to remove biofilms - or organic deposits that have allowed incubation of bacteria - forming a tenacious attachment matrix.

In this experiment bacteria were reduced .

- 3 times in the first rinse
- 15 times in the detergent wash cycle
- 1 time in the acid cycle
- 10 times in the Pre-milking sanitation cycle



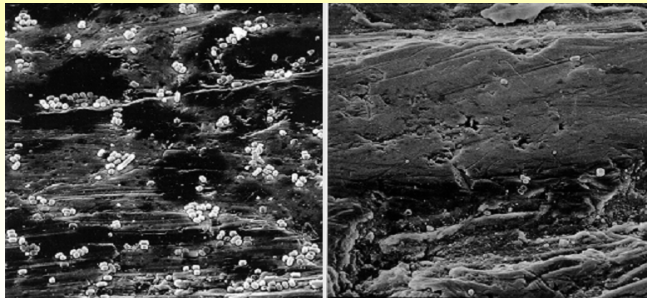
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2nd Step: Detergent Wash

This electron micrograph shows removal of bacteria from a polished stainless steel surface (before and after detergent cleaning).



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2nd step: Alkaline Detergent Wash

Implementation

- Use hot water as indicated on the product label.
 - Starting temperatures usually recommended
 - 160-170 F (70-77 C)
 - Ending temperatures are usually recommended to be about 110F (43C)
 - Sometimes 120 F (49 C) with difficult to clean milk meters in the system

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2nd Step: Alkaline Detergent Wash

- ☞ Detergent solutions should be re-circulated for 8 to 10 minutes.
- ☞ Maintain the proper level of water in wash vat to prevent air induction at the water intake.
- ☞ The amount of detergent needed depends on the
 - ❶ Water volume
 - ❷ Water hardness
 - ❸ Soil load
 - ❹ Size and type of equipment
- ☞ Follow label directions and correct for water hardness.

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Chlorinated Alkaline Detergents

Typical Components

- ☞ Sodium or Potassium hydroxide
- ☞ Sodium or Potassium hypochlorite
- ☞ Sodium or Potassium silicates
- ☞ Sodium or Potassium phosphates
- ☞ Phosphonates
- ☞ Acrylates
- ☞ Surface active agents

Functions

- ❶ Saponify fatty acids
- ❷ Peptize proteins
- ❸ Disperse and maintain soil in the solution
- ❹ Prevent the precipitation of minerals
- ❺ Remove micro-organisms from the milk contact surface

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3rd step: Acid Rinse



- ☞ The acid rinse is the circulation of an acid solution through the milking system after it is free from gross residues, fatty acids and proteins.
- ☞ Objectives
 - ❶ To dissolve and keep in suspension mineral deposits.
 - ❷ To prevent bacterial growth by forming a bacterio-static film on milk contact surfaces.

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3rd step: Acid Rinse

Implementation

- ❶ The pH of the solution should be 3.5 or lower
 - ✓ If there are silicates in the water, pH should be less than 5 to 6.
- ❷ Use warm water
 - ✓ 100-120 F; 38-49 C) - check label instructions
 - ✓ If rinse is 68 F (20 C) or less, use non-foaming acid

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Acid Rinse Components

- ☞ A blend of
 - ❶ Phosphoric acid
 - ❷ Nitric acid
 - ❸ Sulfuric acid
 - ❹ Citric acid
 - ❺ Surface active agents
- ☞ Acid washes are:
 - ❶ Strong solutions designed to remove accumulated mineral deposits.
- ☞ Acid rinses are:
 - ❶ Milder solutions designed to prevent the buildup of mineral deposits.

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4th step: Pre-milking Sanitize



- ☞ Circulation of sanitizing solution shortly before milking
 - ❶ Usually sodium hypochlorite (5.25 to 12.5%)
 - ❷ 200 ppm final chlorine concentration
 - ❸ 3-4 minutes circulation time
 - ❹ Temperature typically 95-110F (35-45°C)
- ☞ Objectives
 - ❶ Kill any remaining microorganisms remaining on milk contact surfaces.

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Bulk Tank Sanitation

- ☞ Same procedure as pipelines, but use higher concentration of detergent and acid.
- ☞ Typically
 - ❶ 50% more for tanks 1500 gallons (6000 liters) or less
 - ❷ 100% more for tanks above 1500 gallons (6000 liters)

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Drainage



- ☞ It is very important that the drainage be effective between each cleaning cycle so that the solutions do not interfere with each other and no accumulated residues remain in the system.

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Additional Steps

-  Wash and sanitize by hand all small parts not normally in contact with the sanitation products during CIP cleaning.
-  Wash exterior surface of milking equipment.
 - NOTE: Use manual cleaner for all manually cleaned surfaces.