MilkTech International

UW-MRIL

Cleaning and Sanitaiton: Introduction to NMC Cleaning Procedures

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Objectives

- This module summarizes the NMC guide that helps dairy producers and service personnel identify sources of microbial contamination and resolve high bacteria count problems in raw milk.
  - Its primary focus is the diagnosis of problems relating to pre-milking cow hygiene and milking equipment sanitation.

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Importance of Cleaning in Bacterial Contamination in Raw Milk

- If the milking system and milk handling equipment are not properly cleaned and sanitized, bacteria deposited may multiply and become a major source of raw milk contamination.

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Cleaning Failure

- A cleaning failure can result from a failure in any one of the processes:
  - ✓ Chemical
  - ✓ Thermal
  - ✓ Physical

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The "NMC Cleaning Procedures"

- … is a troubleshooting guide designed to help dairy producers and service personnel identify sources of microbial contamination and resolve high bacteria count problems in raw milk.

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The "NMC Cleaning Procedures"

- The methods presented in this guide deal primarily with the diagnosis of problems relating to pre-milking cow hygiene and milking equipment sanitation.
  - Methods for diagnosis and treatment of mastitis problems are covered in greater detail in other NMC publications.

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The "NMC Cleaning Procedures"

- When elevated bacterial counts are encountered, some or all of the procedures outlined in this guide may be used.
  - The process begins with simple routine testing.
  - The information gained from interpretation of initial results can be used to proceed in a logical fashion toward more complex and comprehensive testing.

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Sections of this Guide

- 1a. Routine Bulk Tank Milk Quality Analysis
- 1b. Strategic Milk Sampling
- 2a. Observation of Cleaning Procedures
- 2b. Observation of CIP Flow Dynamics
- 3. Water Quantity and Quality
- 4. Unit Flow Measurement in Milking Parlors
- 5. Milk Line Slug Flow Dynamics

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1a. Routine Bulk Tank Milk Quality Analysis

- Bacterial evaluation of bulk tank milk tests:
  - Can INDICATE whether high raw milk bacteria counts are primarily due to:
    - ✓ Poor pre-milking hygiene,
    - ✓ Equipment cleaning and sanitation problems,
    - ✓ Mastitis organisms, or
    - ✓ Incubation of bacteria within the milk handling system during the milking process.
  - Provide an overall measure of milk quality but have little diagnostic value in determining the source of bacterial contamination.

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Bulk Tank Milk Quality Analysis - Interpretation -

- Poor milking hygiene can result in an elevation of both the CC and SPC with a near normal LPC.
- When milking equipment is not cleaned effectively, both the CC and LPC will be elevated due to coliforms growing in residual films within the milking system.
- Bacterial incubation of the milk films within the milking system will cause the SPC, CC and LPC to be elevated.

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Bulk Tank Milk Quality Analysis - Importance -

- These tests can provide valuable information for the producer to assess the performance of pre-milking cow preparation techniques and equipment cleaning and sanitation regimes.

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Why Do Bulk Tank Cultures Regularly?

- Early warning of a problem
- Background history of data to aid interpretation
- Solve problems fast

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When equipment sanitation or incubation is a major source of the bacteria …

- If the bulk-tank analysis indicates that equipment sanitation or incubation is a major source of bacteria in the farm's milk, proceed with strategic milk sampling to further identify the source.

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1b. Strategic Milk Sampling

- Strategic sampling of milk in different ***locations*** will help determine if the source of the bacteria is a cleaning failure and/or an incubation problem.
  - Locations to sample:
    - ✓ In the milk line and receiver,
    - ✓ In the milk transfer line (after filters and pre-coolers), and
    - ✓ Inside the bulk tank.
- Strategic sampling of milk at different ***times*** during the milking process will determine <u>if bacterial incubation within the milk handling system</u> is a major source of contamination.

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When tests indicate that there may be CLEANING problems …

- In order to identify the specific cause(s) of equipment cleaning problems, proceed to:
  - Observation of Cleaning Procedures
- Concentrate observations on those parts of the milking system indicated by strategic milk sampling.

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2a. Observation of Cleaning Procedures

- A standard part of the assessment of any cleaning regime is to document the "as found" and "as practiced" conditions.
- The purpose is to determine if the recommended Clean-in-Place (CIP) procedures are being followed correctly.

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"As found" and "As practiced" conditions

- Observe one complete cleaning sequence to document the cycles used.
- Record the chemical concentrations and temperature of the water returning to the wash sink, both at the beginning and end of each cycle.
- Determine the frequency each cycle is performed.
  - Some cleaning cycles are disregarded either as a routine practice or to cut corners.
  - Newer automatic washers can record whether cleaning cycles actually occurred and the temperature ranges of each cycle.

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Registering Data

	Premilking Sanitize	Pre-wash Rinse	Detergent Wash	Acid Rinse	Other
Start Temp					
End Temp					
Cycle Time					
Product Used					
Label Concentration					
Label Temperature					
Concentration Used					
Other Measurements (pH, alkalinity, etc.)					
Guidelines	Follow label instructions for time, temperature and concentration	43-54 C (100 - 130 F)	Follow label instructions. 6-10 min, typically 49 – 77 C (120-170 F)	Follow label instructions. 2 min, typically 32–43 C (90-110 F)	

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Cleaning Instructions

- Every milking system should have a set of written instructions for the CIP process.
  - This should include the recommended cycles with the suggested times, temperatures and chemical concentrations specified for each cycle.
  - If the equipment and chemical consultant has not provided these instructions, these sections of the forms can be used to establish them.
- Note: Make sure that all milking personnel are aware of, and trained in, the recommended CIP procedures.

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Looking for signs of cleaning effectiveness

- Important questions to ask are:
  - Are there any residual films?
  - Are "shock" treatments used?
  - Does the system drain well?
  - Is milk being cooled properly?

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Looking for signs of cleaning effectiveness

- Residual Films
  - Check if there is visual buildup or residual film on any parts of the milk harvesting or storage equipment.

Is there any visible residue on system components?						Y	N
Describe:	Location	Color	Texture	Acid Soluble	Detergent Soluble	Chlorine Soluble	
	_____	____	_____	_____	_____	_____	
	_____	____	_____	_____	_____	_____	

Looking for signs of cleaning effectiveness

- "Shock" treatments
  - Verify if shock treatments (commonly performed using higher than usual concentration of chemicals) are being required to reduce bacteria counts.

Is the system "shock" treated?	Y	N
If yes, how often? _____ (Note shock treatment dates on bulk tank culture record.)		

Looking for signs of cleaning effectiveness

- Drainage
  - Inspect for pipes, hoses, fittings and equipment that do not drain after the system is shut down.
    - ✓ All parts of the milking system (both sanitary and non-sanitary) should drain when system is shut off.

Do any system components fail to drain after the CIP procedure?	Y	N
If yes, indicate which components_____		

Looking for signs of cleaning effectiveness

- Other parts of the system:
  - Verify if seals and gaskets and all rubber goods must be in good condition.
  - Perform a visual inspection of airlines and ancillary equipment.

Further Investigation Procedures

- If milk quality tests indicate a cleaning problem in the milking system yet all cleaning cycles were observed and properly executed, proceed to:
  - Observation of CIP flow dynamics

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2b. Observation of CIP flow dynamics

- A cleaning failure will result if cleaning solutions are not adequately distributed to all parts of the milking system.
  - If little or no cleaning solution comes into contact with certain portions of the milk contact surfaces, the chemical and thermal actions cannot take place.

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CIP flow analysis

- A complete CIP flow analysis should be conducted whenever:
  - A new system is installed,
  - A change is made to an existing system, or
  - The recommended CIP procedures are being followed, but milk quality tests indicate a cleaning problem exists.

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3. Water Quantity

- Inadequate water volume may result in ineffective air injection.
- Excessive water volume may result in flooding and/or excessive chemical and hot water use.
- The water volume required for proper flow dynamics can be estimated.
  - Note: calculations will be explained in other module.

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3. Water Quality

- Water hardness should be recorded to determine if the chemical concentrations are appropriate.
  - The concentration of cleaning chemicals may need to be adjusted for hard water.
- There may be other components in water that compromise the cleaning process.

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4. Unit Flow Measurement in Milking Parlors

- Water flow should be as uniform as possible through all milking units.
  - Uneven distribution is a common problem.
- Visual indicators of low flow include:
  - Reverse flow in jetter hoses, and
  - Claw never floods during cleaning.

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4. Unit Flow Measurement in Milking Parlors

- Measure flow rate at milking units/meters at the:
  - First,
  - Last, and
  - Middle units, and
  - Any units that appear unclean.

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5. Milk Line Slug Flow Dynamics

- Slug flow is created in the milk line by the air injector.
- A vacuum recorder is required to fine-tune specific air injector settings for each individual milking machine.
  - Learn more about this subject in another MilkTech module.

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The "NMC Cleaning Procedures"

- The methods presented in this guide deal primarily with the diagnosis of problems relating to pre-milking cow hygiene and milking equipment sanitation.
  - Methods for diagnosis and treatment of mastitis problems are covered in greater detail in other NMC publications.
- When elevated bacterial counts occur these procedures can be used to diagnose and solve the problem.