Troubleshooting high bacteria counts in farm milk

General Information

Operator_____
Phone_____ Date_____
Address_____
Equipment Dealer_____
Phone_____
Chemical Supplier_____
Phone_____

Prioritized Recommendations

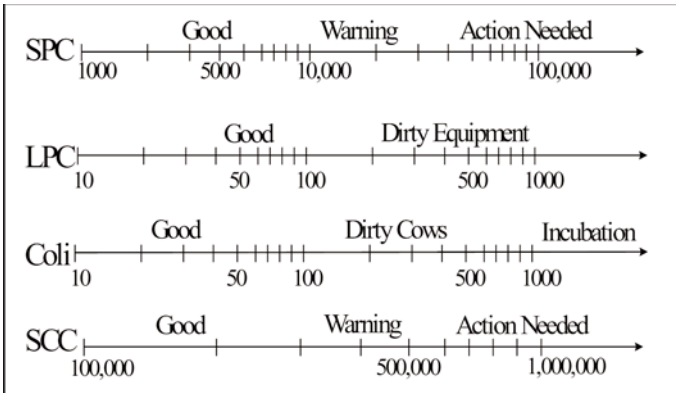
1._____
_____
2._____
_____
3._____
_____
4._____
_____

System Sketch

Part 1a — Routine Milk Quality Analysis

Bulk tank cultures can be used to diagnose equipment cleaning and sanitation problems, incubation of bacteria in the milk handling system during milking, inadequate pre-milking hygiene, and mastitis. Here is a list of goals and action levels for each type of test.

- Equipment cleaning and sanitation problems generally result in elevated LPC counts.
- Incubation of bacteria in the milking system cause elevated Coli (above 1000) and LPC counts.
- Inadequate premilking hygiene will result in elevated Coli counts (typically 100 to 1000) .
- If both SCC and SPC are high mastitis organisms may be the cause of high bacteria counts.



Composite milk samples should be taken from the bulk tank at the time the milk is shipped from the farm. The tests indicated above should be performed on a routine basis a minimum of monthly on small farms and weekly on large farms and more often if a problem situation exists. A minimum of three tests is needed to make a diagnosis. Record the culture results and test dates below:

Dates						
SPC: Standard Plate Count						
LPC: Lab Pasteurized Count						
Coli: Coliform Count						
SCC: Somatic Cell Count						

Part 1b — Strategic Sampling

If routine bulk tank analysis indicates that equipment cleaning and sanitation may be a problem it is desirable to further diagnose the source of the problem. Milk samples should be taken from the receiver(s), transfer line(s) and bulk tank after the first group of cows is milked (one cow for each milking unit) and after every 4 hours of milking (or since the system has been washed) with a final sample taken at the end of milking (or before the next wash cycle). Record the results of these tests in the following table.

SPC	After first group of cows	After 4 Hours	After 8 Hours	End of Milking
Time of Sample				
Receiver 1				
Receiver 2				
Transfer Line 1				
Transfer Line 2				
Bulk Tank 1				
Bulk Tank 2				

- Elevated counts in the receiver samples at the beginning of milking likely indicates a cleaning problem in the milking units, milk meters, milkline or hoses. If this situation exits perform the CIP flow analysis.
- Elevated counts in transfer lines but not in receiver after the first group of cows indicates cleaning failure in the transfer line and equipment between the receiver and bulk tank such as plate coolers and milk filters.
- A continual rise in counts during milking indicates incubation as the likely cause. Solutions to this problem may include washing the system more thoroughly and frequently or changing the milk filter more frequently.

Part 2a CIP Procedures Observations

Yes **No** Does the sanitary trap valve close (trapout) during the CIP procedure?

Yes **No** Is air drawn into units or wash lines at the wash sink?

Yes **No** Is the ball removed from the sanitary trap during washing?

Yes **No** Does more than 5 gallons of water drain from the balance tank after the wash cycle?

Yes **No** Does the milk pump run continuously during the wash cycle?

Yes **No** Is there any visible residue on system components?

Describe:

Location	Color	Texture	Acid Solution	Detergent Soluable	Chlorine Soluable

Yes **No** Is the system "shock" treated? **If yes**, how often? (note shock treatment dates on bulk tank culture records

_____

Yes **No** Do any system components fail to drain after CIP procedure?**If yes**, note which?

_____

Yes **No** Are any valves actuated manually before or during CIP procedure? **If yes**, note which_____

Milk Temperature:	Entering bulk tank_____ End of milking_____ At pickup:Top of tank_____ Bottom of tank_____				
	Premilking Sanatize	**Prewash Rinse**	**Detergent Wash**	**Acid Rinse**	**Other**
Start Temp					
Start Temp					
Cycle Time					
Product Used					
Label Concentration					
Label Temp					
Other Measurements (pH, alkalinity, etc.)					
Guidelines	Follow label instructions for time temp, and concentration	110 - 130 F (43-57C)	Follow label Instructions. (6-10 min, 120 F, typical	Follow label instructions. (2 min, 90-110 F typical)	

Part 2b CIP Sytem Design

Sketch the milking machine CIP on page 93

Measure length and diameter of all lines and indicate the location of air injectors.

Type of system: Parlor ☐ Round-the-barn ☐

Number of units: _____

Claw type: _____

Shell and liner type:_____

Milk meters or weigh jar type: _____

Other equipment: _____

Automatic washer type: _____

Washline diameter: _____

Air injector types: _____

Milk/wash valve type: _____paddle _____butterfly _____plug

Yes **No** Restrictors on jetters or jetter hoses? Hole sizes _____

Yes **No** Restrictors on wash lines? Hole sizes_____

Date of last liner change_____ How often are liners changed?_____

Date of last change of hoses and other rubber parts_____

Other CIP system notes or characteristics:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Part 3 — Water quantity and quality

Water hardness_____

Water iron content_____

Water softener? **Yes** **No**

Is water softener charged **Yes** **No**

Water Heater	Temp	Capacity
Tank 1		
Tank 2		
Tank 3		
	Wash sink	

Other water test results_____

Determine the minimum water volume required per wash cycle for proper flow dynamics in air-injected milking systems. Use this estimate to size wash sinks in new systems or to check if the actual water used per cycle is higher or lower than the minimum requirement. The requirement for milk meters, wash vat and precoolers are approximate and may vary with different component designs. If air injection is not used multiply the total gallons for the milkline by 3. If weigh jars are used, multiply the milk meter gallons by 4.

		(x) Multiplier		(=) Gallons
Feet of milkline				
	Line diameter 4 in.	x	0.12	=
	Line diameter 3 in.	x	0.07	=
	Line diameter 2.5 in.	x	0.05	=
	Line diameter 2 in.	x	0.03	=
	Line diameter 1.5 in.	x	0.02	=
Feet of wash draw and milk transfer line				
	Line diameter 3 in.	x	0.34	=
	Line diameter 2.5 in.	x	0.23	=
	Line diameter 2 in.	x	0.15	=
	Line diameter 1.5 in.	x	0.09	=
Receiver(s) Volume (gallons)				
		x	0.33	=
Number of milking units				
		x	0.25	=
Number of milk meters				
		x	0.25	=
Feet of milk hose				
	Hose diameter 9/16 in	x	0.012	=
	Hose diameter 5/8 in	x	0.012	=
Number of precoolers				
		x	2	=
Number of wash vats				
		x	8	=
		Total Gallons		=

Part 4 Unit Flow Measurement for Milking Parlors

Measure unit flow at first, middle and last unit on each side of the parlor. Also measure any units that appear dirty. Unit flow analysis; units should have no less than 3 L/min with no more than 50% variation between highest and lowest unit. Higher flowrate may be required to clean some components such as milk meters or weigh jars. Consult manufacturers recommendation.

Unit No. (Refer to sketch)	**Restrictor type and size**	**Water Volume (Liters or lb.)**	**Time of sample (min)**	**Average flow rate** (L/min or lb./min)
As Found				
After Change				

Estimate Air injector open time	Injector 1	Injector 2
Slug travel distance from air injector through air injector line and milkline to receiver (feet or meters)		
Expected air injector open time: divide slug travel distance by 28 ft/sec (8.5 m/s) or other slug speed (seconds)		
Estimate expected time between vacuum drop at test points	**Injector 1**	**Injector 2**
Distance between test points (points at which vacuum recorder attached to milk line) (feet or meters)		
Time between vacuum drops: divide distance between test points by 28 ft/sec (8.5 m/s) or other slug speed (seconds)		

Vacuum Drop and Slug Speed Measurements: Attach vacuum recordings to form

			If Sequenced		Time between vacuum drop at test points		Slug Speed		Vacuum Drop At Test Points			
	Injector Closed	Milkline injector open	Washline injector open	Injector airflow rate setting	Loop 1	Loop 2	Loop 1	Loop 2	Loop 1 Point 1	Loop 1 Point 2	Loop 2 Point 1	Loop 2 Point 2
As Found												
1st Adjustment												
2nd Adjustment												
3rd Adjustment												
Final Setting												
Guideline	Long enough to form a slug	Just long enough to move slug to receiver	Just long enough to clear wash line	Adjust air flowrate to change slug speed			23 - 33 ft/sec 7 - 10 m/s		4 - 9 in. (12-30) Hg for 3" line 5-7 in Hg. (18-25kPa for 2 in. line			

Vacuum Drop at other locations

Location (refer to sketch)											
Vacuum Drop											