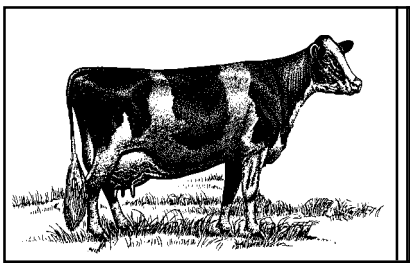

B.C. DAIRY TALK

Editor: Annette Moore

Solving Persistent Bacteria (SPC) Counts

compiled by
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Does the following sound familiar?

"We have an 80 cow freestall barn, milking in a parlor that has been having troublesome bacteria problems for the last 7 months. Our bacteria (SPC) counts range from a low 5,000's (raw) to as high as 80,000. The vet says its equipment, the equipment dealer says its cows. The entire milking system has been checked out several times with no results — the high counts keep coming back. Where do we go from here?"

If this is you, consider the following...

Over 75% of high bacteria counts (SPC) are due to improper cleaning or sanitizing. The next most common cause is cooling problems and the least likely cause is the cow herself. But never rule anything out! Check the entire system — each claw, all the equipment, including vacuum and milk lines, and the bulk milk tank. Remember bacteria grow very rapidly in milk. E. Coli doubles every 12 minutes. One bacterium dividing every hour will result in 4,096 bacteria in just 24 hrs! Cold temperatures do not destroy bacteria, they only inhibit their normal development. A clean and proper functioning system will help you produce a quality product that has a longer shelf-life and no off-flavors.

Common Places to Check

An effective cleaning system requires time, temperature, turbulence and balanced cleaning solutions. A number of variables both in the system and in the barn can effect each of these critical components.

Cows and Milking Procedures

- Keep alleyways and pens clear of manure and moisture.
- Keep stalls clean, dry and well bedded.
- Handle cattle calmly to reduce soiling and contamination of udders.
- Keep udders clean. Clip udder hair regularly.
- Dry udders thoroughly (clipping promotes faster drying).
- Stop and clean the system if milking longer than 4 hours. Environmental bacteria will grow during extended periods, especially milk filters.

Equipment

- Examine the washing process. (Use chart on page 4.) Check all the times, solution concentrations and cleaning sequence. This is particularly important in automatic systems. Example checks:
  - plugged solution line.
  - too high a concentration (breaks down rubber components prematurely).
  - pre-wash water that is too hot (bakes milk components on).
  - wash water that is too cool (re-deposits milk components).
- Ensure a functioning water heater. Heavy-duty, commercial water heaters or on-demand flow heaters are needed to produce sufficient vol-

umes of hot water to clean cows and equipment. Check wash cycle water temperatures regularly (in-line discharge thermometer works well).

- Examine the *inside* of the equipment. All inside surfaces should be completely clean and shiny. Look for any film, water droplets, or fat rings concentrating in any areas. Check for dead ends, rough spots or sharp corners that can slow cleaning solutions.
- Examine ***all*** rubber and plastic parts, both in the milking system and the bulk tank. Inflations, claws, jettercups, milk-lines, gaskets or caps should not feel slippery, greasy or leave any residues on your hand. Look for holes, cracks or deformations. Old, worn jettercups can create vacuum leaks during wash, reducing solution turbulence.
- Examine all the nooks and crannys. Check the probes in the receiver jar, valves, corners, flow sensors, hoses, sanitary traps, tops and bottoms of weigh jars, etc. They all should be clean and free of film, deposits and water.
- Check for loose fitting joints. If milk can leak out, bacteria-laden air can get in.
- Check the air/vacuum side of the system. Air can carry bacteria into milk from other equipment surfaces. Clean air lines and sanitary or moisture trap(s) regularly. Discuss the best method for washing these lines with your equipment dealer.
- Ensure cleaning compounds are stored in a clean, cool, dry place. Ensure all cleaning and sanitizing compounds are tightly closed as they can lose their strength. Regularly check that all the reservoirs are full and working properly.
- Check that the system drains well. Look for any residual water and detergents. Pooling water or detergent residues left between milkings will allow bacteria to grow.
- Do regular equipment checks. This includes the cleaning action, e.g., ensure air injectors are set and positioned properly for good scrubbing action. Check that screened air injectors are not blocked.
- Keep bulk tank spray ball(s) or tubes functioning properly. Ensure cleaning solutions contact *all* the interior parts with sufficient force to remove any milk deposits. Check hard to reach spots and angled areas (e.g. agitator paddle(s)). Check spray heads for plugging.
- Check the bulk tank is cooling properly. It is critical to mix the incoming milk with the milk already in the tank to maintain a lower blend temperature. Turning on the agitator manually during milking will help to achieve the desired temperature readings in the table below.

Milking	1st hr after milking	2nd hour after milking
1st milking	0 - 10½ C	0 - 4½ C
Subsequent milkings	0 - 4½ C	0 - 4½ C
At pick-up	0 - 4½ C	0 - 4½ C

If after you have done all this, and a problem still exists…

- Check the water source(s). Water is never pure. It can contain organic matter, bacteria, algae, minerals, salts and gases. Check water sources for contaminants annually, particularly if on a well. Check water hoses too. Intermittent water contamination can be difficult to identify. Look for periods when water volumes are low in the reservoir(s).
- Evaluate any changes that have occurred in the last 6 months. Sometimes a simple adjustment, an equipment change or a change in cleaning solutions can alter how the system cleans. Keep in mind that it may not be the new part or solution that is at fault, but how the system responds to it, e.g., a new detergent may not be compatible with the water source.
- Everyone should follow the same routine at *every* milking, e.g., changing milk filters. If more than one person works in the parlor, do a system check together — quite often things come to light faster.
- Culture mastitic cows — some mastitic organisms will show a high SPC (e.g. Strep. ag.).

Testing Procedures

Determine the types and source of organisms growing by taking bacterial swabs or milk samples at different points in the system. Take a series of sequential milk samples from the beginning to the end of milking.

- Start on an empty tank. Take samples at the tank as the milk comes in. If the system is clean then the initial samples should be clean. If the system is dirty the initial samples will be high in bacteria. If the tank is dirty the high bacteria

count may not show until the milk hits the surface. Bulk tank samples should be taken at different stages of filling.

- Identify problem spots. Just because you can't find something on the initial samples, does not guarantee a problem isn't there. By isolating out each piece of equipment peculiarities in each may appear. For example, in one situation the plate cooler, with warm milk running one way and cold water running another, the metal flexed sufficiently to open microscopic pits and holes to allow cross contamination. Repairing the plate cooler fixed the problem. The same dynamic process can occur with rubber parts, valves, etc. The solution is not always obvious!
- Take reliable and accurate samples. Be extremely careful not to contaminate the sample. Use new, unbroken sample bags or vials and intact swab kits. Wash hands or wear clean, preferably new rubber gloves when sampling. Take samples with a sanitized dipper. Label samples with permanent, waterproof markers with your name, sampling location and date. Ship samples in clean coolers with ice packs. Milk samples and swabs can be frozen.

Bacterial Swabs

By using sterile prepackaged swabs, swabbing the area(s) of concern can pinpoint or eliminate components quickly and easily. Remember though to be careful not to touch anything else with the exposed swab!

Milk Samples

Standard Plate Count (SPC): This tests raw milk samples by putting the milk on a standard culture medium that supports bacterial growth. This test is routinely done on bulk tank samples twice a month here in BC and is what is printed on your monthly statement. This procedure counts most live bacteria in the milk, whether they're derived from equipment, cows or the environment. The upper legal limit for SPC's in BC, is 50,000 colony-forming units per milliliter (cfu/ml). An achievable goal for quality milk is to consistently keep this count under 5,000 cfu/ml.

The SPC is a good indicator of problems, but may provide only limited information. Undesirable bacteria can come from many sources. Rapid milk cooling can hide the presence of undesirable bacteria that later will deteriorate milk flavor and/or severely limit product shelf life. To determine if this is happening, other types of tests may be required.

Preliminary Incubation Count (PI): This test takes raw milk samples and holds it at 13½ C for exactly l8 hours to simulate poor milk refrigeration. This test is an excellent measure of sanitation practices as it allows bacteria from dirty cows and equipment to multiply faster than with the SPC. Milk that is cooled at temperatures greater than 4½ C will also have higher PI counts. Whenever the PI count is more than two times the SPC, or when the PI exceeds 50,000 cfu/ml, check trouble spots. An achievable goal is to have PI counts below 40,000 cfu/ml on a consistent basis.

Laboratory Pasteurized Count (LPC)*: In this test the raw milk is pasteurized in the laboratory. This test counts bacteria that can survive pasteurization and remain in processed milk. Many of these bacteria come from the farm environment and grow readily on improperly cleaned or unsanitized milking equipment and/or milk filters during long milking cycles (>4 hrs). Typically, a high SPC with a low LPC indicates a mastitis problem, rather than dirty equipment or dirty cows. Guidelines for satisfactory pasteurized counts are approximately 500 cfu/ml, but maintaining the LPC under 100 cfu/ml is achievable.

**Laboratory Pasteurized Count (LPC) should not be confused with Looped Plate Count (LPC) another method of doing a Standard Plate Count (SPC).*

Coliform Count: Coliform bacteria in milk indicate unsanitary production conditions. While coliforms come from the digestive tract of animals, they can be carried on hands, clothes, milking equipment, dirt and even in the air. Coliforms are easily killed by pasteurization and as a result does not often cause milk spoilage. However, high numbers of coliforms usually coexist with high numbers of cold-loving, pasteurization-resistant spoilage bacteria. These result in a shorter shelf-life and off-flavors. If coliform counts are greater than 25 cfu/ml, watch for dirty cows, worn rubber components, or poor premilking sanitation. An achievable goal is to always have a coliform count under 10 cfu/ml in raw milk.

Bottom-line

Don't give up and check the system completely and regularly. Never assume one spot is the only trouble-spot. Once you have determined the problem make notes so that when you check the system the next time, you and your staff will know where to look.

A thank you goes to Roger Pannett and John Murray, BCMAFF Provincial Inspectors for their help in writing this Dairy Talk.

Month: _____

Monthly Milking Equipment Wash Check List

Wash Cycle	Task Checking	Critical Control Points	Yes √	Comments
Pre-wash	Water temperature	35- 43°C		
	Cycle sequence	Circulates once & dumps		
Wash	Detergent dilution rate	pH 11-12		
		chlorine 50-80 ppm		
	Water temperature	min. 74°C at start		
		end >50°C		
	Time of cycle	5-10 minutes		
Acid Rinse	Acid dilution rate	pH 3		
	Time of cycle	2-5 minutes		
	Water temperature	35-43°C		
Sanitize	Done before every milking			
	Water temperature	Product temperature requirement: ____ °C		
	Time of cycle	5 minutes		
	Sanitizer dilution rate	Chlorine 200 ppm		
		Iodine 25 ppm		
Bulk Tank Wash	Wash spray angle correct			
	Diffuser position correct			
	Spray ball action working			
Milk Filter	Use 1 per milking			
	Plate coolers require filter during wash cycle			

Special Notes: