

Evaluating Milk Quality
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Dairy producers marketing their milk through a Southern Marketing Association member will have a new milk quality incentive program that includes Preliminary Incubation Count (PIC) sometime during 2005. The demand for higher quality milk comes from retailers and major food service companies that supply milk and dairy products to the consumer. Consumer demand for a product that has consistent quality, good taste and a longer shelf life will ultimately benefit dairy producers by increasing consumption of this type of high quality products.

In order to meet this demand, dairy producers should strive to produce the highest quality product possible. Producing a high quality product not only helps boost or maintain fluid milk consumption (which increases Class I utilization), but the incentive payments for meeting the various quality standards can be essential in improving or maintaining the profitability of a dairy operation. Therefore, it is important to understand what factors may interfere with milk quality.

One measure of milk quality is the bacteria content of the raw milk. This is often termed the raw count or the Standard Plate Count (SPC). The SPC determines the total number of bacteria in a milk sample that can grow and form countable colony forming units on a Standard Methods Agar plate when 1 ml of milk is incubated aerobically at 90°F for 48 hours. Ideally, raw milk should contain less than 5,000 bacteria/ml. If sanitation in the cows, the milking procedures and the milking equipment is good; and cooling is adequate, a SPC of 10,000/ml or less should be achievable by most farms. The maximum legal limit for SPC is 100,000/ml. The SPC is the test used by the Louisiana Department of Health and Hospitals to determine the bacteria count of milk. If the herd is experiencing an SPC above 10,000/ml or higher the following are some areas to check.

1. Improper cleaning of milking equipment after each milking or neglecting to sanitize equipment before the next milking.
2. Wash water temperature should start at 155-170°F and drain at above 120°F.
3. Using the wrong amount or type of detergent, acid or sanitizer.
4. Gaskets, teatcup liners, rubber parts and hoses need to be clean, free of cracks and deposits and replaced when needed.
5. Problems with debris buildup in receiver jars, sanitary traps, plate coolers and chillers.
6. Keep your animals out of the mud! Animals with excessive or long hair on their udders may need their udder hair clipped or singed.
7. Poor udder sanitation procedures or excessive water use to wash teats. Teats need to be clean, sanitized and dry before milking.
8. Check your bulk tank cooling system. Slow cooling bulk tank or temperature above 40°F. The bulk tank milk temperature should be less than 40°F within two hours of milking and kept below 45°F during milkings.
9. Mastitis infections due to *Streptococcus agalactiae* can lead to a large number of these bacteria being released in the milk. Several cows infected with *Strep. Ag.* can cause the bulk tank SPC to be elevated.

Another measure of milk quality is the Preliminary Incubation Count (PI count or PIC). To determine PIC, a sample of milk is incubated for 18 hours at 55°F followed by the SPC procedure. The PI count is based on the theory that the normal microbial flora of the cow will not grow substantially when incubated at this combination of time and temperature. Other microorganisms present in milk due to poor sanitation, cooling and milking practices CAN grow to significant levels at these times and temperatures. These microorganisms are called psychrotrophs or cold-loving bacteria. Psychrotrophic bacteria will continue to grow at temperatures below 45° F. These organisms and the enzymes they produce are

associated with off-flavors, milk spoiling and short shelf-life. This has led some people to believe that PIC is the best measure of raw milk keeping quality and sanitation practices on farms. Currently there is not a legal limit for PIC. A PIC of below 50,000 is acceptable, but a goal of 25,000 or less should be achievable. Many can have a PIC of 10,000 or less just like the SPC if sanitation, cooling and milk procedures are done properly and monitored. Another approach for determining the quality of the milk and good practices on the farm is the PIC in relation to the SPC. If the PIC ≥ 3 times the SPC, then there is a potential problem. For example a milk sample has a SPC of 10,000 and a PIC of 11,000, then no substantial increase occurred and the PIC would not imply poor cooling, milking or cleaning practices. If the PIC had been 30,000 or greater, this would imply that procedures on the farm should be checked. Another example would be the sample has a SPC of 100,000 and a PIC of 115,000. Although the PIC count is greater than 100,000, the sample provides no additional information, as no substantial growth occurred. In this case an SPC of 100,000 would be indicative of a bacterial problem by organisms that grow poorly at 55°F within 18 hours.

The same check list that was used for troubleshooting elevated SPC can be used for PIC. Improper sanitizing or failing to sanitize the system before each milking seems to be one of the major causes for a high PIC.

Another measure of milk quality that is sometimes used is the Coliform count. Coliform counts are associated with fecal and environmental contamination of the milk. Seldom do cows with coliform mastitis cause the milk coliform count to rise. Counts in raw milk should be less than 50/ml. Counts of 10/ml are achievable and desirable.

The table below should help determine the sources of the microbial contamination that are detected by these selected bacteriological procedures.

Procedure ¹	Natural Flora	Mastitis ²	Dirty Cows	Dirty Equip.	Poor Cooling
SPC > 10,000	Not likely	Possible	Possible	Possible	Possible
SPC > 100,000	Not likely	Possible (rare)	Not likely	Possible*	Possible*
PIC High vs SPC	Not likely	Not likely	Possible	Possible*	Possible*
SPC High / No Increase in PIC	Not likely	Possible	Possible but not likely	Possible but not likely	Not likely but possible
Coliform Count High	Not likely	Possible (rare)	Possible	Possible	Not likely but possible

¹Table was adapted from *Dairy Science Facts* – Cornell University 1998

²Culturing for mastitis bacteria and SCC data would be helpful

*A more likely possible cause

Monitoring the milking procedures, equipment cleaning and milk cooling should go a long way in producing high quality milk that is low in bacteria. If you are having a bacteria problem, contact your local county agent and milk company or coop field representative.