



Quality Watch

By Dean Letter

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PI Bacteria Counts—What Every Producer Should Know

In a time when some media sources are giving animal agriculture negative publicity regarding animal care and—in some instances—milk quality, I would like to congratulate MMPA members for the outstanding job they have done in the past year. Despite low milk prices, milk quality in our cooperative has steadily improved. The vast majority of our member farms continue to qualify for raw bacteria and pre-incubated bacteria count premiums. Additionally, over the past couple of months, we have reached a milk quality milestone—our weighted somatic cell average over 1,400 member farms dropped below 200,000. This is certainly no accident. It is only through diligent effort given to quality animal care and equipment maintenance that such quality levels can be reached and maintained.

Our members recently suggested we periodically publish information on improving milk quality to explain the sources of certain milk quality issues. This month, we will cover pre-incubated (PI) bacteria. Testing for this group of bacteria involves incubating the milk at 55°F for 18 hours prior to performing the standard plate procedure (MMPA uses Foss' Bactoscan). This test is a good indicator of the level of psychrotrophic (cold-growing) bacteria in milk and on-farm sanitation.

Some of our customers use this test as an indicator of shelf-life of their finished product. There is some dispute as to whether PI counts are a good predictor of shelf-life. Some argue that it isn't because these bacteria are mostly

destroyed during pasteurization. Others counter that these bacteria can cause off-flavors, rancidity, and shortened shelf-life by altering milk proteins and fats. Their reasoning is that although pasteurization kills these bacteria, it cannot repair the damage already done by these organisms. Regardless of which argument is true, good dairying practices (GDP) will result in low levels of PI bacteria in the milk.

A good PI count is 20,000 cfu/ml. or less.

My PIC is higher than I would like it; where is it coming from?

This question is not easily answered because there are a wide variety of sources. Ultimately, milk harvested from clean, healthy cows with clean, sanitized equipment in a clean environment that is rapidly cooled below 40°F should be consistently low in PI bacteria. While this statement sounds simple, there is a lot more to it than meets the eye.

Clean, healthy cows

I say healthy cows because GDP dictates that only milk produced by healthy cows should be offered for sale. In remote instances, infected quarters may elevate bacteria counts. This seldom happens on most farms and should not be the first place to look. Healthy cows will not remain healthy for long unless they are kept clean and dry.

The one area having the greatest impact on cow cleanliness is cattle housing. It should be

cleaned and rebedded regularly and often. Traffic alleys need to be scraped often to lessen the amount of manure that cows track into the stalls because cows typically lie down with their udders resting on one of the their rear hooves. If cows are housed in older freestall barns with narrower alleys, frequent scraping is even more important to keep manure from accumulating on cows' feet. The goal of today's successful dairy farms is to milk clean cows not cleaned cows.

Excessive hair should be removed from the udder. Long hair easily accumulates debris and makes udder prep and teat sanitation more difficult. Hair is typically removed by clipping or singeing. When done properly, singeing is a quick and effective way to remove hair. Producers should try to avoid singeing in the milking area and certainly while cows are being milked because it can produce objectionable odors that can be absorbed by milk.

Water use should be minimized while prepping the cows for milking. Wet udders facilitate bacteria movement from upper portions of the udder to the teats and inflation heads while milking. If water must be used in the instance to clean a soiled cow, use an udder wash with an effective sanitizer, and dry the entire udder before attaching the milking cluster. Historically, this has been a significant source of psychrotrophic bacteria.

Milk cooling

The PMO requirement for raw milk cooling is as follows:

“Raw milk for pasteurization shall

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be cooled to 10°C (50°F) or less within four (4) hours or less, of the commencement of the first milking, and to 7°C (45°F) or less, within two (2) hours after the completion of milking. Provided, that the blend temperature after the first milking and subsequent milkings does not exceed 10°C (50°F).”

While meeting this requirement allows for the sale of raw milk, it is not optimal for maintaining low PI counts, especially over an extended period of time. To maintain low PI counts, milk should be stored below 40°F (ideally, between 36° and 38°F). Be sure that the indicating thermometer is accurate and the milk is agitated for five to ten minutes at least once each hour. Remove the dust from the bulk tank compressor condenser coils periodically to increase cooling efficiency. Provide adequate air flow to the condenser coils, particularly in warmer weather.

Well water plate coolers can quickly and economically cool milk by 30°F or more if they are properly sized and there is a sufficient supply of well water. Expect to need to supply the plate cooler with about two gallons of water for each gallon of milk passing between the plates. The other economic benefit of plate coolers is that the water can be reused to hydrate cows and wash down the parlor.

Replace rubber parts

All rubber parts in a milking system have a finite product life. Depending on the component they are made of, the product life can be as short as ninety washings to as long as a year or so. Over time, especially with prolonged contact with chlorine, rubber becomes increasingly cracked and porous. In this condition, rubber does not effectively clean and may harbor significant numbers of bacteria.

Equipment sanitation

Most people agree that equipment cleanliness and

sanitation has the greatest impact on PI counts. Bulk tanks have the greater influence on PI counts simply because the milk is in contact with this vessel for the greatest period of time. Many tanks today are cleaned CIP (cleaned in place) with a circulation pump and some sort of spraying mechanism.

Temptation is great to rely on these washers to clean the tank without fail. All cleaning systems fail sooner or later; bulk tanks should be visually inspected with a bright light prior to use. Pay close attention to both sides of the agitator and the outlet valve. Some CIP systems still require that the outlet valve be cleaned manually.

Periodically, the CIP cycles should be checked. Be sure that the correct amount of the correct detergent is being used with the correct amount of water in each cycle. This is especially important with automated dispensing systems that can fail without apparent indication.

Insufficient water temperature is one of the most common reasons for cleaning failure. This can result from a water heater malfunction, water heater of insufficient capacity (usually when equipment is updated without updating the water heater), times of extreme hot water demand (attempting to wash the bulk tank and pipeline concurrently), plugged water inlet screens, or some other washer malfunction. Periodically check the “start” and “dump” temperatures to determine if this is a problem. Cleaning detergent suppliers can provide the water temperature requirements for their detergents.

In pipeline or parlor systems, it is also important to check water flow through the milk clusters because sensors or meters have specific water flow requirements in order to clean consistently. Many of these systems use jetter restrictors to achieve desired water flow. If debris plugs the restrictor or the jetter water supply line, water flow can be dramatically affected.

In addition to water flow, wash “slug” formation and speed should be monitored. Doing so will determine whether the divert valve(s) and air injector(s) are operating properly. Simply looking for a splash in the milk receiver generally is not adequate. Dairy equipment professionals have graphing equipment available to measure the wash “slug” size and speed. The “slug” should be of sufficient size to make adequate contact with the top of the milk line without being so large that it floods the milk receiver. It should move around the line quickly enough to shear the milk soils from the pipeline without being so fast that it “flattens” as it moves around corners.

Those farms that have extended milking times need to shut down and wash the milking system every eight hours. Milk filters should be replaced at least twice as often.

Sanitize equipment just prior to milking

The subtitle just about says it all. The value of sanitizing with an effective sanitizer is underappreciated on some dairy farms. Coupled with properly cleaned equipment, this step assures that milking equipment sanitation will not contribute to an elevated PI count. When possible, run the sanitize cycle on the pipeline within thirty minutes before the next milking. Avoid having chlorinated products in contact with milk contact surfaces for an extended period of time because it can prematurely break down rubber components such as inflations and gaskets. Chlorine, when in contact for extended periods of time, will break down rubber components such as inflations and gaskets.

MMPA has member representatives trained to evaluate CIP systems and troubleshoot PI counts. Please contact your MMPA Member Representative for more information.