Diagnosing Bulk Tank Milk Bacteria Counts

Key factors influencing the level of microbiological contamination of raw milk include the health and hygiene of the cow, the environment in which the cow is housed and milked, and the procedures used in cleaning and sanitizing the milking and storage. Equally important are the temperature and length of time of storage, which allow microbial contaminants to multiply and increase in numbers.

The following is a summary of the sources and growth characteristics of specific bacteria types commonly found in bulk tanks.

Mastitis organisms
✓ Mastitis organisms that most often influence bulk milk count are Streptococcus species, most notably S. agalactiae and S. uberis.
✓ Staphylococcus aureus is not a frequent contributor to total bulk tank bacteria count.
✓ Detecting mastitis pathogens does not necessarily indicate that they originated from cows with mastitis, as environmental mastitis pathogens may appear in milk as a result of factors other than mastitis infection.
✓ Correlation of somatic cell responses and bulk tank environmental mastitis organisms is poor.

Environmental contamination
✓ Organisms associated with bedding materials that contaminate the surface of teats and udders include streptococci, staphylococci, spore-formers (or thermodurics), coliforms, and other Gram-negative bacteria.
✓ Both thermoduric (bacteria that survive pasteurization) and psychrotrophic (bacteria that grow under refrigeration) strains of bacteria are commonly found on teat surfaces. Contamination from the exterior of the udder can influence Lab Pasteurization Counts (LPC) and Preliminary Incubation Counts (PIC).
✓ Milking heavily soiled cows could potentially result in bulk milk bacteria counts exceeding 10,000 colony forming units (cfu)/ml, although higher coliform (or other environmental bacteria) counts are more likely to occur due to incubation in milk handling equipment. Elevated bulk tank coliform counts can also result from coliform mastitis in the herd.

Cleaning and sanitation
✓ Significant buildup of thermoduric organisms in milk residue to a point where they influence the total bulk tank count may take several days to weeks and is therefore an indication of a persistent cleaning failure. Old, cracked rubber parts are also associated with higher levels of thermoduric bacteria.
✓ Some types of cleaning failures can also select for faster growing, less resistant organisms, principally Gram-negative rods (coliforms and Pseudomonads) and lactic streptococci and can result in high PIC.
✓ Effective use of chlorine or iodine sanitizers has been associated with reduced levels of psychrotrophic bacteria that cause high PIC.

Refrigeration
✓ Elevated psychrotrophic bacteria counts are often associated with poorly cleaned bulk tanks.
✓ In milk produced with low initial psychrotrophic populations, psychrotrophic bacteria can quickly become dominant after incubation at 4.4°C resulting in high PIC.

Quality Milk Defined
“Quality milk can be defined as milk that consistently reaches the processor unadulterated and with low somatic cell and bacterial status. Consistency, as a concept, implies a framework of strategies and processes that reduce variation. It also implies systems that respond proactively rather than reactively when variation or the risk of variation is identified. Simply put, even on farms where milk quality is above average, we still are managing systems that tend to wait for defects to show up in the milk before we react. This sort of latitude no longer exists throughout the rest of the supply chain.”

source: Mark Wustenberg, Tillamook County Creamery Association, NMC 2009 Annual Meeting