



## Farm Bulk Tank Aseptic Alternative Sampling Gains NCIMS Approval

### SPECIAL POINTS OF INTEREST:

- Farm Bulk Tank Sampling Without Prior Agitation
- Effective Cleaning & Sanitizing of Raw Milk Handling Equipment Will Improve Fluid Milk Quality
- Tom Angstadt Gives Presentation To Dairy Practices Council On A More Effective Method of Bulk Tank Sampling

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The National Conference of Interstate Milk Shippers (NCIMS) recently approved an alternative method of farm bulk tank sampling. This method utilizes the QMI® Aseptic Sampling system along with a peristaltic pump. Final approval of this sampling method will happen when the FDA publishes its IMS-a document of the approved actions from the 2011 NCIMS Conference held in Baltimore, MD.

The study protocol and data for the newly approved aseptic alternative sampling method for farm bulk tanks were submitted without using the currently required bulk tank agitation period done immediately before the traditional dip sample is taken.

One of the major criteria for using this newly approved method is that the bulk tank being sampled must have a working agitator with an automatic timer set to run a specific number of minutes each hour. This reduces time spent on the farm for the milk hauler. This method also improves raw milk quality by not incorporating additional oxygen into the milk consequently reducing the potential for oxidation of milk fat and reducing the growth of gram-negative bacteria. It is a safe, aseptic sampling method and allows for collection of a truly representative sample as required by the PMO (Pasteurized Milk Ordinance).

This method of sampling also is very effective for direct load and for string sampling large numbers of cows. The QMI Composite Sampling System with a Peristaltic Pump has the following advantages:

- Sampling is Aseptic
- Milk is Contained Within The Flexible Tubing - No Cleaning of Pump Is Necessary
- Obtain a Flow-Weighted Composite Sample
- Can Sample Up To 10 Hours



Peristaltic Pump For Direct Load Or Bulk Tank Sampling



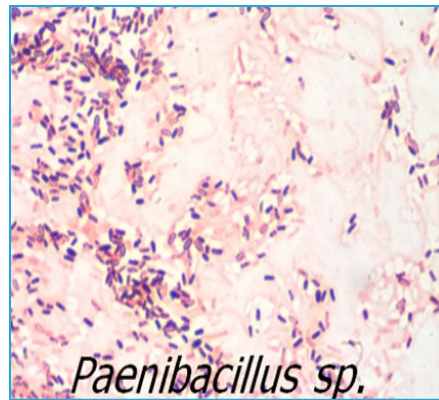
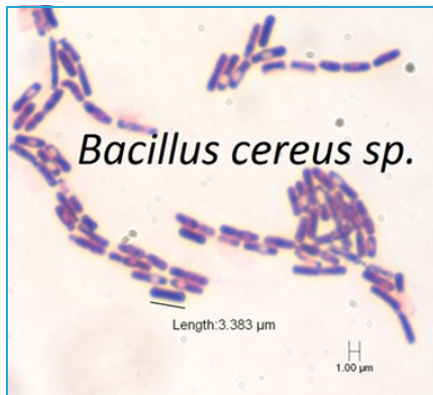
QMI Fitting & Aseptic Sampler

Peristaltic Pump and QMI Sampler used to obtain sampling data for NCIMS approval

## Effective Cleaning and Sanitizing of Raw Milk Handling Equipment Will Improve Fluid Milk Quality

Recent changes in the fluid milk industry including improved dairy plant sanitation, improved equipment and increased regulatory involvement have drastically reduced the amount of Post-Pasteurization Contamination (PPC). The result of these efforts is that the shelf life of fluid milk has increased from 10 - 14 days to 18 - 21 days. However, the reduction of PPC has allowed the opportunity for Heat Resistant Psychrotrophs (HRP) to become the major barrier to further improving fluid milk quality.

The HRP are those bacteria that can survive pasteurization and grow at refrigeration temperatures. These bacteria are primarily gram-positive rods from species of *Bacillus* and *Paenibacillus*. These sporeforming bacteria are resistant to chemicals, heat and sanitizers, and are capable of forming biofilms on raw milk handling equipment.



(Photos provided from Photomicroscopy Database of Biotest Laboratories, Inc., MPLS)

These bacteria are also present in raw milk at very low populations. Studies conducted by Dr. Mansel Griffiths, Director, Canadian Research Institute for Food Safety, University of Guelph show that the average amount of HRP in raw milk is about 1 per 54ml of raw milk. Because of this level of contamination, effective sanitation of raw milk handling is critical.

A summary of the difference between PPC and HRP is pointed out in the table below:

<b>Microbial Spoilage In Market Milk</b>	
<p style="text-align: center; color: #00AEEF;"><b>Post-Pasteurization Contamination (PPC):</b></p> <p>Spoilage 10-14 days                      Gram-Negative Bacteria                      Stress Test: Growth                      Mosely Test: Out of Specification                      Coliform Test: Out of Specification                      Line Sample: Gram-Negative</p>	<p style="text-align: center; color: #00AEEF;"><b>Heat-Resistant Psychrotrophs (HRP):</b></p> <p>Spoilage 18+ days                      Gram-Positive Bacteria                      Stress Test: No Growth                      Mosely Test: Within Specification                      Coliform Test: Within Specification                      Line Sample: Gram-Positive</p>

The likely sources of HRP include the raw milk handling equipment for these reasons:

1. *Bacillus* species tend to form biofilms.
2. A cold environment will favor psychrotrophic bacteria.
3. These bacteria are stressed when nutrients are removed resulting in sporulation.
4. High humidity conditions favor sporulation.
5. Effective sanitation of raw milk handling equipment is often neglected.
6. Contamination rates as low as 1 bacteria per liter can cause quality defects.

A suggested specification for samples stored at 45°F for 18-21 days, should not exceed one million per ml ( $10^6$ ). The University of Cornell study showed that 50% of milk samples exceeded this specification due to the growth of HRP. A study conducted by the University of Minnesota and QMI showed that 80% of the samples taken from the High Temperature Short Time (HTST) exceeded this specification.

To further study this situation using the QMI 2L Sampling Bag and QMI Sampler, samples were collected at the HTST at Turkey Hill Fluid Milk Plant in Pennsylvania. 2L bag samples were held at 45° F for 18 days. The samples were analyzed by Penn State University. Fifty four samples were collected and only four exceeded the  $10^6$  specification. This is a 7% failure rate which is far below the average dairy plant failure rate.

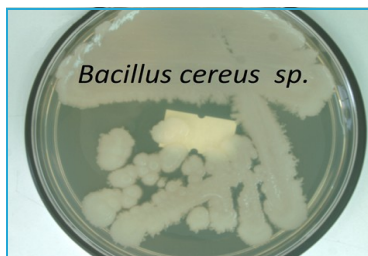
Quite likely the reason for the very low failure rate was effective sanitation of the raw milk handling equipment (tanker trucks and silos). As stated by Peggy Good (QC Manager at Turkey Hill), “this plant has an intense truck and raw silo sanitation program including truck washing at the plant, spray ball monitoring, visual inspection of surfaces, monitoring CIP solutions (time/temperature, concentration, pressure and flow) hygiene monitoring systems and routine acid washing.”

Another contributor to the very low failure rate is the excellent quality of the raw milk supplied for this study by Mount Joy Cooperatives in Pennsylvania. The Standard Plate Count (SPC) of the supply routinely averages less than 10,000/ml. The Somatic Cell Count (SCC) routinely averages 220,000/ml or under. The Preliminary Incubation (PI) count routinely averages under 20,000/ml. Raw milk samples were also collected at the same time as the study above. They were analyzed by Penn State and also indicated good quality raw milk.

While complete elimination of psychrotrophic bacteria from fluid milk products is unlikely, effective sanitation can limit the amount of contamination by these bacteria and improve fluid milk quality.



QMI Aseptic Sampler & Composite Bag for collecting samples at the HTST.



Typical Colony Morphology for *Bacillus cereus*.

(Photos provided from Photomicroscopy Database of Biotest Laboratories, Inc., MPLS)



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## Tom Angstadt Presentation to Dairy Practices Council QMI® Aseptic Sampling Options



Jeff Bloom, Executive Vice  
President of The Dairy Practices  
Council presenting Tom Angstadt  
(right) with the Honorary Life  
Membership Award.

The Dairy Practices Council (DPC) Annual Conference for 2011 (held in Manchester, NH, in November) included a presentation by Tom Angstadt on QMI Aseptic Sampling of Dairy Operations. Tom is the Director of Technical and Laboratory Services at Dairylea Cooperative in Syracuse, NY. He presented summaries of QMI sampling applications, Standard Operating Procedures (SOPs), efficiency and cost factors, NCIMS and FDA approvals, and sampling for the future of milk quality.

For copy of his Powerpoint handout, please  
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