QMI NEWSLETTER

MARCH 2005

QMI Proposes a method of accurate sampling of raw milk from tanker trucks !

In This Issue:

Presently approved sampling procedures for tanker trucks require a dip sample from the truck's top hatch. Regulatory procedures also require that the top hatch be closed except in the receiving bay.

The dairy industry recognizes that obtaining a representative sample of raw milk by dip sampling in the receiving bay is nearly impossible due to stratification. Accurate dip samples could be taken at the time the truck is filled; however, that is in violation of the PMO requirements of opening the lid to outside environments.

QMI is presently involved with research to validate syringe sampling for regulatory approval to sample for quality. However, at this time the FDA does not object to syringe sampling of trucks for component analysis.

QMI proposes that the sampler fitting be installed on the back cabinet of the tanker trucks. Syringe sampling after filling the truck, before the milk has stratified, will provide an aseptic representative sample . These samples will be very accurate for component analysis.

When validation procedures are completed and approved, this type of sampling device will:

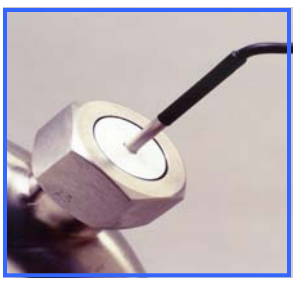
1. Allow for a more representative and aseptic sample,
2. Help the dairy industry comply with the Bioterrorism Preparedness & Response Act,
3. Improve plant operation efficiencies , and
4. Eliminate OSHA concerns when climbing on top of tanks to obtain a sample.

Also, the QMI Aseptic Sampler could accommodate temperature probes, providing a safe method of obtaining a temperature reading on raw milk loads.

Quality Management, Inc.
426 Hayward Avenue North
Oakdale, MN 55128
651-501-2337 (phone)
651-501-5797 (fax)
info@qmisystems.com

Cabinet: Proposed location for QMI Sampler

QMI Syringe Sampling



QMI Probe-Septum

Effect OF Heat Resistant Psychrotrophic Bacteria on the quality of Market Milk

There is little doubt that 25 years ago the factor that affected fluid milk quality the most was post-pasteurization contamination. However, changes in technology, improved sanitation procedures, implementation of HACCP systems and other measures have significantly reduced post-pasteurization contamination. Results of these efforts are that shelf-life of fluid milk has increased and contamination with rapid growing gram-negative bacteria has been reduced. However, this has allowed heat resistant gram positive bacteria to grow in fluid milk. These bacteria are slow growing and cause defects in 16-18 days depending on storage temperatures.

While effort is needed to continue to control post-pasteurization contamination, the dairy industry is now faced with a new challenge. The contamination and growth of heat resistant psychrotrophs is becoming the number one influence on fluid milk quality. Unfortunately at this time little is known about the sources of these organisms, what influences their growth and survival and how these organisms may be reduced or eliminated in dairy products.

In our last QMI Newsletter, we presented data from a small survey conducted at two dairy processing plants. A total of 12 samples were collected from the discharge of the High Temperature Short Time. Those samples were determined to be free of gram-negative bacteria (post-pasteurization contamination). The samples were then held at 45º F for 4 weeks.

At one week intervals, the samples were analyzed for gram-negative bacteria and gram positive bacteria. At no time during this study were any gram-negative bacteria found. However, approximately 50% of the samples showed high counts in 3-4 weeks. This suggests that the contamination of gram-positive heat-resistant bacteria is quite variable and low but can result in significant spoilage conditions.

Dr. Kathryn J. Boor and her associates at Cornell University conducted a more extensive study to determine the effect of psychrotrophic heat resistant bacteria on fluid milk quality. Their study was published in the Journal of Food Science. Samples were obtained from three commercial dairy processing plants in New York. Samples were analyzed for both microbial and sensory attributes for shelf life. The most significant factor affecting the shelf life of these samples was the growth of gram positive heat resistant psychrotrophic bacteria.

These researchers found that 50% of samples had bacteria counts greater than 1,000,000 CFU/mL after 17 days of refrigerated storage.

The most predominant microorganisms found were gram-positive rods with 87% of the microbial colonies analyzed. Gram positive cocci and gram-negative rods made up 7% and 6% of the total processed milk bacterial isolates, respectively.

The primary genera for gram-positive bacteria were *Paenibacillus*, *Bacillus* and *Microbacterium* (see Table 1 below). While it is not certain that these organisms were from the raw milk supply, it would no doubt be a likely source. Dr. Boor and her associates are now conducting research to determine sources of the bacteria.

These highly significant findings stress the need for the dairy industry to conduct further research to determine sources and control procedures to reduce or eliminate the effect of psychrotrophic heat resistant bacteria on fluid milk products.

In the meantime, dairy processors can determine the effect of psychrotrophic heat resistant bacteria on their product quality.

> Utilizing the QMI Aseptic Sampler and the QMI Composite Sampling Bag, incubate the sample in the QMI bag for 18-24 days at 45ºF. At that time, conduct a Standard Plate Count (SPC). Counts of 1,000,000/mL would require identifications of the bacteria. Gram-positive rods would indicate the presence of heat resistance psychrotrophic bacteria. Call, write or e-mail us for complete instructions on procedures to determine the effect of heat resistant psychrotrophs on fluid milk quality.

Dr. Boor's research revealed some interesting facts. The *Paenibacillus* species appears to be gram-negative rods when conducting gram staining procedures. However, these organisms were determined to be gram-variable.

In summary, heat resistant psychrotrophic bacteria have always been a potential spoilage problem for fluid milk. Today's dairy plant processing procedures have reduced gram-negative contamination (Post-Pasteurization Contamination) . This has resulted in conditions allowing growth of gram-positive bacteria (heat resistant psychrotrophs) to grow in market milk. The potential growth of these bacteria will cause milk quality defects in longer shelf-life products.

Table 1 - Distribution of bacterial isolates collected from commercial fluid Milk Samples throughout shelf life

Bacterial Isolate	Initial day	Day 7	Day 14	Day 17	Total nr isolates	% of isolates
Paenibacillus	3	11	33	30	77	39
Bacillus	26	15	14	8	63	32
Microbacterium lacticum	16	10	1	0	27	14
Kocuria varians	4	5	0	0	9	5
Gram Negative	1	1	0	6	8	4
Unidentifiable	1	2	1	3	7	3

Fromm and Boor Vol. 69, Nov. 8, 2004 Journal of Food Science

Website: http://www.foodscience.cornell.edu/mqip/indexmqip.html

Profile of dr. frank busta

Director of the National Center for food protection & defense (NCFPD)

Dr. Frank Busta has had a long and positive connection with QMI since its inception. He is continuing to keep this strong relationship as a consultant and member of the Board of Directors. Frank's background, experience and professional interests are especially valuable to QMI.

In 2004, Frank was named the first director of the National Center for Food Protection and Defense (NCFPD), a Homeland Security Center of Excellence, based at the University of Minnesota. Previously he held faculty positions at the University of Minnesota, North Carolina State University, and the University of Florida. He served as Chair of the Department of Food Science and Human Nutrition from 1984 to 1987 at the University of Florida and Head of the Department of Food Science & Nutrition, University of Minnesota from 1987 to 1997. Frank became Professor Emeritus and Emeritus Head of the Department in 1999.

Dr. Busta's research areas are in food safety, growth and survival of microorganisms after environmental stress in food. He has published more than 125 refereed research papers. He continues to contribute his expertise in food safety, food control, risk evaluation, and now food protection and defense. After 15 years of service Dr. Busta recently retired from the International Commission on the Microbiological Specifications for Food (ICMSF). As a member of the FDA Food Advisory Committee, he chairs the Contaminants and Natural Toxicants Subcommittee. Dr. Busta has received many awards and values his elections as Fellow of the Institute of Food Technologists, Fellow of the American Academy of Microbiology, Fellow of the American Association for the Advancement of Science, Fellow of the Institute of Food Science and Technology (UK), and Fellow of the Academy of the International Union of Food Science and Technology. He was President of the Institute of Food Technologists (IFT) in 1995/96 and currently is Senior Science Advisor of IFT's contract from FDA entitled: Analysis and Review of Topics in the Areas of Food Safety, Food Processing and Human Health. He has had sabbatical leaves at CSRIO (Australia), Ecolab, and 3M.

Frank is looking forward to the many exciting sampling materials and approaches that QMI is introducing to address these ever-present needs.

Quality Management, Inc.
426 Hayward Avenue North
Oakdale, MN 55128