DATE: June 8, 2014
TO: Dairy Processors, HR Personnel and Others Interested in Dairy Processing
FROM: Steven C. Murphy, Sr. Extension Associate

Cornell University’s Department of Food Science is pleased to offer a workshop in Fluid Milk Packaged for Consumption – Processing & Testing for Quality & Safety, July 30 – August 1, 2014. The program will be held in the Food Science Conference Center, 148 Stocking Hall on the Cornell Campus in Ithaca, NY. It begins 8:00 AM on Wednesday, July 30 and will end by 1:00 PM on Friday, August 1.

This workshop is designed for those involved and interested in fluid milk processing and testing with the intent of providing the tools to support and improve on quality assurance/control and food safety programs for bottled milks. It will be instructed by Cornell Dairy Foods Extension staff and industry experts. While the course design assumes participants have some prior knowledge of dairy microbiology & processing (e.g., Basic Dairy Science & Sanitation Course), critical concepts will be reviewed and expanded on for those who do not. This course can be taken as a stand-alone program, but it also fulfills the core training requirement of a Cornell Dairy Foods Certificate for Fluid Milk after all required prerequisite courses have been taken (e.g., Basic Dairy Science & Sanitation, HACCP, HTST). A complete program follows.

Preregistration is Required. Enrollment is limited to 30 participants. The early registration fee is $450 per person for NY companies and $540 for those out-of-state. Registration fees paid after July 21 will be higher. Materials, breaks and lunches are included. Please note that Cornell University is moving to Credit Card payment only and on-line registration. For those with difficulties paying on-line, payment by check will be accepted until the end of 2014. On-line registration requires that each attendee complete the form.

To Register On-Line, Go To:

1. Fill in all required information (to be done separately for each attendee) and click on “submit.”
2. If successfully submitted, a confirmation screen will display providing payment information.
3. If paying on-line, click on the Credit Card payment link, fill in all required fields and hit “process.”
4. You should receive a receipt of payment by e-mail within minutes.
5. Your full registration will be confirmed and you will receive specific course information prior to the workshop by e-mail from the Cornell Extension Staff. Please direct all questions on your registration to Louise Felker (lmf226@cornell.edu).

Cancellation Policy: No refunds can be given if not cancelled by COB July 21. Substitute registrants will be accepted at any time, but doing so before the July 21 deadline is appreciated.

A listing of hotels, Cornell parking permit information, directions and area maps are included with this mailing.

The course will be held in the Food Science Conference Center, Room 148 Stocking Hall on the Cornell University Campus in Ithaca, NY.

Please call Steve (607-255-2893) or Louise Felker (607-255-7098) if you have questions.

This course meets the Core Course Requirement of the Dairy Foods Certificate Program for Fluid Milk. The option to enroll in the program is included with the on-line registration. For questions/more information, contact Janene at jgg3@cornell.edu, or go to:
http://dairyextension.foodscience.cornell.edu/programs/certificate-program
# Program Draft

## Wednesday July 30, 2014

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Instructors</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>Registration</td>
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<tr>
<td>8:30 am</td>
<td>Welcome &amp; Introductions – Course Objectives/Pre-Quiz</td>
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<tr>
<td>9:00 am</td>
<td>Overview of the Fluid Milk Industry &amp; Regulations</td>
<td>Kim Bukowski, Cornell University</td>
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<td></td>
<td>- Pasteurized Milk Ordinance (PMO &amp; NY Regulations)</td>
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<td>- standards of identity / labeling requirements</td>
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<td>- current trends in processing &amp; consumption</td>
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<td>9:45 am</td>
<td>Dairy Microbiology – Quality &amp; Food Safety Review</td>
<td>Steve Murphy, Cornell University</td>
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<td>- definitions / characteristics of organisms of concern</td>
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<td>- intrinsic factors for microbial growth &amp; control</td>
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<td>- pathogens of concern in fluid milk environments</td>
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<tr>
<td>10:15 am</td>
<td>Break</td>
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<tr>
<td>10:30 am</td>
<td>Raw Milk Quality for Fluid Milk</td>
<td>Steve Murphy, Cornell University</td>
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<td>- milk composition overview &amp; relation to milk flavor</td>
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<td>- non-microbial &amp; microbial defects of raw milk</td>
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<td>- microbial and chemical testing (e.g., drugs &amp; water)</td>
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<td>- significance of raw milk testing to milk quality/shelf-life</td>
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<td><em>Exercise</em> – sensory evaluation, raw milk defects</td>
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<tr>
<td>12:00 pm</td>
<td>Lunch (provided)</td>
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<tr>
<td>12:45 pm</td>
<td>Unit Operations - Conventionally Pasteurized Fluid Milk</td>
<td>Kim Bukowski, Cornell University</td>
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<tr>
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<td>- pasteurization options: Vat vs. HTST</td>
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<td>- separation, standardization, clarification</td>
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<td>- blending, vitamin fortification</td>
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<td>- homogenization, design options and pressures</td>
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<td>- pasteurized milk storage &amp; distribution piping &amp; valves</td>
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<td>1:45 pm</td>
<td><em>Exercise</em> – Standardization &amp; Valve Mapping</td>
<td>Staff &amp; Participants</td>
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<td>- group exercise &amp; presentations</td>
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<tr>
<td>2:45 pm</td>
<td>Break</td>
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<td>3:00 pm</td>
<td>Unit Operations – ESL/UP &amp; Aseptic Processing</td>
<td>Jean-Pierre Berlan, Tetra Pak, Inc.</td>
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<td>- Extended Shelf-Life / Ultra Pasteurized / Aseptic</td>
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<td>- system design criteria &amp; selection</td>
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<td>- direct, steam infusion vs steam injection</td>
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<td>- indirect; plate vs tubular heat exchangers</td>
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<td>- aseptic tanks &amp; valves; dosing systems</td>
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<td>- non-thermal treatment for extending shelf life</td>
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<td>- microbial clarification, microfiltration</td>
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<tr>
<td>4:30 pm</td>
<td>Questions &amp; Answers</td>
<td>Staff &amp; Participants</td>
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</table>
Thursday July 31, 2014

8:00 am  Day 1 Overview; Questions & Answers

8:15 am  Unit Operations – Rotary Fillers for Fluid Milk
- rotary bottle fillers for conventionally pasteurized milk;
- operation, preventative maintenance & inspection
- packaging options & single-serve packaging requirements
Bob Kuhn
Upstate Niagara Coop

9:00 am  Unit Operations – Paper Fillers for Fluid Milk
- gable-top paper fillers for conventionally pasteurized milk
- options & requirements for extended shelf-life/UP milks
- operation, preventative maintenance & inspection
- packaging options & single serve packaging requirements
Mark Tyzinski
Evergreen Packaging

10:00 am  Break

10:15 am  Cleaning / Sanitization for Fluid Milk Processing Systems
- raw milk; tank trucks, tanks, silos
- vat vs. HTST vs. UP/UHT processing systems
- past. milk storage, valves, pumps, packaging systems
- CIP circuit design; testing & monitoring
- environmental cleaning programs
Larry Bogdan
Diversey, Inc., - a Division of Sealed Air

11:45 am  Lunch (provided)

12:30 pm  Preventative Maintenance for Quality & Shelf-Life
- valves, pumps, gaskets, fillers, CIP systems & more
- in-process standard operating procedures
- likely suspects when shelf-life fails
- PM scheduling & management systems (example)
- GMP review (break-out session primer)
Staff

1:15 pm  Exercise – Rotating Break-Out Sessions
- plant tour; mapping the flow of a fluid milk system
- preventative maintenance (PM); pumps, valves, gaskets
- paper filler PM / package dye checks / sanitizer residuals
- rotary jug fillers PM or high speed ESL filler discussion
Staff & Participants

3:30 pm  Break

3:45 pm  Evaluating the Quality & Shelf-Life of Fluid Milk
- non-microbial defects in pasteurized milk
- microbial spoilage patterns & characterization
  post-pasteurization contamination (PPC)
  heat-resistant spore-forming bacteria (HRSP)
- fluid milk shelf-life evaluation programs & methods
- stress-tests & trouble-shooting tools (e.g., line samples)
  Exercise – sensory evaluation, process & shelf-life defects
Steve Murphy
Cornell University

4:45 pm  Questions & Answers, Adjourn
Fluid Milk for Consumption – Processing & Testing for Quality & Safety
Program Draft
(Continued)

Friday August 1, 2014

8:15 am  Review Days 1-2: Questions & Answers

8:30 am  Developing/Fine-Tuning a Sensory Evaluation Program
- employee screening, training, experience, attitudes
- review of basic tastes & other senses
- sensory evaluation methods
Steve Murphy
Nancy Carey
Cornell University

9:15 am  Exercise – Blind Tasting
- identifying defects, causes & solutions

9:45 am  Overview of Food Safety Systems
- HACCP, FSMA, GFSI
- hazards defined for fluid milk
- environmental control & sampling
Kim Bukowski
Cornell University

10:30 am  Break

10:15 am  Exercise – Developing a Milk Quality / Safety Program, Case Studies:
- raw milk receiving program and limits
- daily activities (sanitation, inspection, monitoring)
- scheduled preventative maintenance programs
- sampling & testing plan; corrective actions
- customer complaint response
Participants & Staff

11:30 am  Program Summary, Questions & Answers; Final Exam

1:00 pm  Adjourn

Course Instructors
Tim Barnard, Gary Billings, Kim Bukowski, Nancy Carey, Deanna Simmons and Steve Murphy
Cornell University, Department of Food Science

Jean-Pierre Berlan
Vice President of Sales
Tetra Pak, Inc.

Larry Bogdan
Business Development Manager
Diversey Inc., a Division of Sealed Air

Bob Kuhn
Corporate Quality Assurance Director
Upstate-Niagara Cooperative

Mark Tyzinski
Senior Food Scientist
Evergreen Packaging

Cornell Dairy Foods Extension Programs are Supported by the NY State Milk Promotion Order
Cornell Dairy Foods Extension  
Program Syllabus – Fluid Milk Processing for Quality & Safety

Instructors:
Course Organizer - Steve Murphy, Sr. Extension Associate; e-mail: scm4@cornell.edu; phone: (607) 255-2893.  
Instructors and contributors to this course include other dairy extension staff and outside industry experts.

Course Contact:
Steve Murphy; e-mail: scm4@cornell.edu; phone: (607) 255-2893

Overview:
This course provides instruction on processing fluid milk products for quality & safety and is based on knowledge gained from years of research and extension activities under the Cornell Milk Quality Improvement Program, which is funded by the NY State Milk Promotion Order. This is the required core course for those enrolled in the Dairy Foods Extension Fluid Milk Certificate Program (see attached). The course can be taken as a stand-alone program and should meet the needs of those responsible for ensuring the quality and safety of fluid milk products. It is a 2.5 day course, offered once per year. A course outline follows.

Learning Outcomes:
This course will provide attendees with information in the key program areas listed below.

Basic Microbiology in Relation to Milk Quality & Safety; Participants Will:
- Learn about specific spoilage organisms and the intrinsic factors that influence microbial growth and how these factors are used in controlling quality defects & safety concerns in fluid dairy product.
- Understand the microbial hazards commonly associated with raw milk and fluid dairy products and how they are controlled through processing and sanitation programs.

Influence of Raw Milk Quality on Pasteurized Milk Quality & Shelf-Life; Participants Will:
- Be able to identify and determine the causes of non-microbial defects in pasteurized milk directly related to the raw milk supply and handling conditions (e.g., oxidation, hydrolytic rancidity, chemical).
- Understand and identify the causes of microbial defects in pasteurized milk directly related to the raw milk supply, including total numbers at processing and heat-stable psychro-tolerant spore-formers.

Fluid Milk Processing Parameters; Participants Will:
- Review the basic components in milk processing and packaging systems and their influence on product quality & shelf-life. Learn how sanitation, processing & packaging procedures extend shelf-life.

Factors Influencing the Quality and Shelf-Life of Packaged Pasteurized Milk; Participants Will:
- Learn critical factors that help ensure quality and shelf-life with focus on preventing post-pasteurization contamination (PPC) and protecting the product from non-microbial defects (e.g., light induced).
- Be able to develop sanitation and preventative maintenance programs to ensure quality and minimize product failures due to PPC.
- Understand the spoilage patterns of psychro-tolerant spore-formers that limit the shelf-life of fluid milk in the absence of PPC and possible control measures.

Tools for Assessing Milk Quality and Shelf-life; Participants Will:
- Be able to develop quality assurance and shelf-life monitoring programs that detect sanitation program deficiencies and product defects such that corrective actions can be taken to minimize failures.

Evaluation:
A pre-test will be administered to determine the incoming knowledge base of course participants. A post-test will be given addressing materials covered in the training. Participants must receive a passing grade on the post-test in order to receive a Certificate of Completion for this course. For those enrolled in the Cornell Dairy Foods Fluid Milk Certificate Program a final exam will be administered with questions based on materials covered in this course and as well as materials covered in other required courses (e.g., HACCP; Basic Dairy Science). A Dairy Foods Certificate in Fluid Milk will be award to those passing the final exam after completion of all required course work.