FSMA Progress and other Federal News – A primer on Dairy Pathogens, Recent outbreaks in the industry, Happenings in Dairy Extension.

REQUIRED REGISTRATION
• REGISTRATION REQUIRED starting this Fall
  – Open Season is OCT – DEC of this year
  – AND EVERY EVEN YEAR THEREAFTER
  – http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/RegistrationofFoodFacilities/OnlineRegistration/default.htm
  – IF you are SUSPENDED FOR ANY REASON:
    – No food moves out of your facility
    – Can produce food but you will have no outlet until you regain registration back

Keep Excellent Records
• Corrective actions
• If you have no problems, you will become a suspect plant
  – Be honest
  – Record all actions taken to correct problems
• If it’s not required, it’s worth not having around
  – 7+ year old records
  – miscellaneous things not required for food safety

Overview
• Foodborne disease burden data
• 2011 Food Safety Issues
  – The “raw milk issue” and why I should care
  – Other stuff
• The bugs of interest – same old and some new
  – E. coli O157 and “non-O157 STEC”
  • What happened in Germany?
  – Listeria monocytogenes
  – C. botulinum
• DNA fingerprinting: getting better, cheaper, and more commonly used: a cheese case study

Microbial foodborne diseases (2011)
• 47.8 million cases of gastrointestinal illnesses; 9.4 million due to known and 38.4 million due to unknown pathogens
• 127,000 serious illnesses resulting in hospitalizations; 56,000 due to known and 71,000 due to unknown pathogens
• 3,037 deaths (range: 1,492–4,983); 1,351 due to known and 1,686 due to unknown pathogens
What’s the relevance of this?

- The usually suspects are still a problem
- *Listeria monocytogenes* and *Salmonella* will continue to be a focus of the dairy industry
- Stay on top of new information – the unknowns

### Salmonella

- Increasingly recognized as a pathogen that can survive extremely well and for extremely long time in
  - Dry food environments (cereal plants, powdered products)
  - Low water activity foods (peanut butter, cereal, flour, spices)
- Can cause disease even if no growth occurs in food
- Heat resistance is increased tremendously if *Salmonella* is present in a dry matrix
  - Temperatures that yield a >5 log reduction of *Salmonella* in milk may be virtually ineffective in reducing Salmonella present in low water activity food or ingredients

### 2011 Food Safety Issues

- Raw milk: Campylobacter and the bigger picture...
- Global Impacts of Outbreaks
- Canadian Listeria Outbreak and Ramifications
Campylobacter

- Generally causes mild gastrointestinal human illness
  - Campylobacteriosis is one of the most common bacterial foodborne illnesses
- Linked to Guillain–Barré syndrome (acute neuromuscular paralysis)
- Linked to chicken and poultry, but also dairy and dairy products
- About 850,000 foodborne cases and 75 deaths/year in the US


- Non-pasteurized products are approx. 150 times more likely to cause disease outbreaks as compared to pasteurized products
- Outbreaks linked to non-pasteurized products disproportionally affect persons <20 years old
- States that restricted sales of non-pasteurized products had fewer outbreaks

Nonpasteurized Dairy Products

<table>
<thead>
<tr>
<th>Nonpasteurized Products</th>
<th>Pasteurized Products</th>
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<tr>
<td>E. coli</td>
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Figure 1. Number of dairy product-associated outbreaks, by year and pasteurization status of product, United States, 1993–2006.
Impact of raw milk related illnesses?

- Bad reputation for milk and dairy products
- Jeopardizes export markets (January 19, 2012; Ingredients Network)
  - US trade data is expected to reveal record exports for several dairy products; demand was particularly strong in China, Mexico and South Korea; exports to SE Asia surged 44%.
  - Exports of non-fat dry milk replaced dry whey as the US’ most popular dairy by type/volume, fuelled by Chinese demand and infant formula manufacturers.
  - Total US exports in the year to November hit $4.39bn, comfortably beating the $3.71bn achieved in 2010.

Chinese demand for US Dairy Products is at least partially driven by strong desire for safe products

- “Many Chinese millionaires express increasing concerns about social issues such as China’s one-child policy, food safety, ….” (Nov 2011, CNN)
- Large Chinese middle class is willing to pay higher prices for safer food for their single baby/child
- Unlike in the US, there is no a priori assumption that food is safe
  - Melamine etc.

Listeria monocytogenes

- Causes septicemia, abortion and encephalitis in humans and in animals
- Incubation period 7 - 60 days
- Human listeriosis occurs in both epidemic and sporadic cases
- Affects predominantly elderly and immunocompromised people, pregnant women and newborns
- Approx. 1,500 human cases/year in the U.S., resulting in approx. 250 deaths/year
- Responsible for majority of microbial food recalls

Widespread Listeriosis Outbreak Attributable to Pasteurized Cheese, Which Led to Extensive Cross-Contamination Affecting Cheese Retailers, Quebec, Canada, 2006

- 38 cases; pasteurized washed rind cheese incriminated as outbreak source
- Cross contamination at retail as a major issue
  - Increasing focus on L. monocytogenes at retail; potential for issues affecting dairy and particularly cheese manufacturers

Large Listeriosis Outbreak Linked to Cheese Made from Pasteurized Milk, Germany, 2000–2007

- Outbreak with likely >50 cases linked to commercial cheese (acid curd) made from pasteurized milk (“Harzer Käse”; ripened with a red smear, Brevibacterium linens)

Wisconsin Requests Recall for Some Shredded Cheese

- The state of Wisconsin has requested a recall of cheese shredded at a plant in which Listeria was later detected as one brand that had been processed at the facility.
- Alpine Skiing and Cheese Consumption of listeria-associated recall Sunday.
- The company says testing by an independent laboratory confirmed that some products processed on the same line contained Listeria.
- World Cheese says it is recalling all its cheeses that were shredded in the affected plant.
- The following Miller’s shredded cheeses are being recalled.

- Study done by Center for Science in the Public Interest (CSPI)
  - 189 outbreaks with 4,565 cases were linked to dairy products, including cheese, pasteurized and raw milk, and ice cream.

US Outbreaks 1998 – 2007 (cont)

- Raw milk or products made with raw milk accounted for 65 outbreaks (34%) and ~80% of the fluid milk outbreaks.
- Milk was the vehicle in 64 (34%) outbreaks with 1,605 cases.
- Cheese was implicated in 57 outbreaks resulting in 1,436 illnesses.
- Ice cream was the cause of 38 outbreaks with 702 cases.
- In dairy foods, *Salmonella*, *Campylobacter* and *Norovirus* represented the most significant hazards, (all are killed by pasteurization).

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Cornell University Dairy Extension
Dairy Certificate/Continuing Education Program

Food Science Dairy Extension Team
[http://www.cals.cornell.edu/cals/foodsci/extension/dairyfoods-extension-programs.cfm](http://www.cals.cornell.edu/cals/foodsci/extension/dairyfoods-extension-programs.cfm)
607-255-2892

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- Overview—Cornell Dairy Science Extension Program
  - Mission/Current Program
- Parallel Extension Programs—Other Universities
  - University of Wisconsin
  - University of Vermont
- Proposed Cornell Dairy Extension Program

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The mission of the Food Science Dairy Extension Program at Cornell University:

- Provide information and training programs to dairy production/processing industry;
- Address industry and consumer inquiries/concerns.
- Provide applied hands-on training at an inspected state-of-the-art training facility.
FS Dairy Extension Program Partnerships:
- NYS Department of Agriculture & Markets
- NYS Milk Promotion Board/Milk Quality Improvement Program
- NYS Cheese Manufacturers’ Assoc.
- NYS Association for Food Protection
- NE Dairy Foods Research Center
- The Dairy Practices Council
- US Food & Drug Administration
- National Conference on Interstate Milk Shipments

Among the 20+ workshops and seminars offered annually:
- HTST Pasteurizer Workshop
- HACCP Training for Dairy & Juice
- Regional Laboratory Workshops
- Basic Cultured Products Workshop
- Vat Pasteurizer Workshop
- Cheese Making/Cheese Grading Workshop
- Basic Dairy Sanitation Workshop

Department of Food Science
Future of Cornell Dairy Science Extension

Cornell Dairy Extension Certificate Program
Program Areas:
- Fluid Milk
- Fermented & Other Dairy Products
  - Basic Certificate
  - Advanced Certificate
- Cheese Making
  - Basic Certificate
  - Advanced Certificate

Basic Dairy Sanitation and Safety– REQUIRED PRE-REQUISITE

Course participants completing the three-day Basic Dairy Sanitation/Safety Program will receive a certificate of achievement that satisfies the pre-requisite dairy science and GMP requirements for each of the certificate program areas.

Core Competencies:
- Dairy Microbiology for Quality & Safety
- Basic Dairy Chemistry
- Regulations
- OSHA
- Processing Unit Operations & Components

A new dairy extension curriculum

Basic Dairy Sanitation and Safety Certificate
(one 3-day course)

- Fluid Milk Certificate
  - HACCP for Dairy & Juice (2.5 days)
  - HTST Pasteurization (2.5 days) or Vat Pasteurization Course (1.5 days)
  - Fluid Milk Processing for Quality & Safety (1.5 – 2 days)

- Yogurt and other fermented dairy products – Basic Certificate
  - Cornell Basic Cultured Products Workshop (2.5 days)
  - HTST Pasteurization (2.5 days) or Vat Pasteurization Course (1.5 days)
  - Yogurt and other fermented dairy products – Advanced Certificate
  - Advanced Hands-On Cultured Products Workshop (3-days)

- Cheese – Basic Certificate
  - Cornell Basic Cheese Making Workshop (2.5 days)
  - HTST Pasteurization (2.5 days) or Vat Pasteurization Course (1.5 days)

- Cheese – Advanced Certificate
  - Advanced Hands-On Cheese Making Workshop (5 days)

Continuing education requirement
**A new dairy extension curriculum**

### Basic Dairy Sanitation and Safety Certificate (one 3-day course)

| Fluid Milk Certificate - HTST Pasteurization (2.5 days) or Hot Pasteurization Course (1.5 days) | Yogurt and Other Fermented Milk Products - Basic Certificate |
|——|——|
| Course: Cornell Basic Dairy Products Workshop (2.5 days) or HTST Pasteurization Course (1.5 days) | Workshop (2.5 days) or HTST Pasteurization Course (1.5 days) |

**A new dairy extension curriculum**

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**A new dairy extension curriculum**

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**A new dairy extension curriculum**

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**A new dairy extension curriculum**

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FERMENTED & OTHER DAIRY PRODUCTS – BASIC CERTIFICATE

The Fermented & Other Dairy Products Basic Certificate Program is designed for all individuals involved in the dairy/fermented product industry interested in learning or improving skills in the basics of cultured product manufacture and grading.

Core Competencies:
- Dairy Culture Basics
- Dairy Chemistry
- Dairy Microbiology
- Cultured Products Processing & Formulation
- Cultured Product Defects/Sensory
- Cultured Product Safety
- Sensory Evaluation/Grading

FERMENTED & OTHER DAIRY PRODUCTS

Basic Course includes:
- Hands-on Cultured Product Making – Yogurt/Cottage Cheese
- Cultured Product Defects
- Milk Properties (milk properties/appropriate cultured products – milk sources, seasonal variations)
- Product Development
- Legal Plant Design/Equipment Needs

FERMENTED & OTHER DAIRY PRODUCTS

Basic Certificate Requirements:
- MUST HAVE COMPLETED PREREQUISITE BASIC DAIRY SANITATION AND SAFETY PROGRAM (3 days)
- Attendance at Cornell’s Basic Cultured Products Workshop (2.5 days)
- Attendance at Vat Pasteurizer OR HTST Workshop (2.5 days)

FERMENTED & OTHER DAIRY PRODUCTS – ADVANCED CERTIFICATE

The Fermented & Other Dairy Products Advanced Certificate Program is designed for the experienced fermented milk product manufacturer interested in improving and/or advancing manufacturing knowledge and skills to the highest standards of safety and quality.

Core Competencies:
- Advanced Applications in Fermented Milk Processing Technology
- Grading
- Quality Assurance

FERMENTED & OTHER DAIRY PRODUCTS

*Advanced Course to include:

*Advanced Course in Development

FERMENTED & OTHER DAIRY PRODUCTS

Advanced Certificate Requirements:
- MUST HAVE COMPLETED BASIC AND INTERMEDIATE CERTIFICATE REQUIREMENTS
- 2+ Years Experience Working with Agriculture & Markets and/or FDA
- Attendance at Cornell’s Advanced Cultured Products Workshop (3 days)
- Written Test
- Training (Oral Test)
- Proven Track Record*

*To be defined.
A new dairy extension curriculum

Basic Dairy Sanitation and Safety Certificate (one 3-day course)
- HACCP for Dairy & Juice (5.5 days)
- HTST Pasteurization (3.5 days) or Vat Pasteurization Course (1.5 days)
- Final Milk Processing for Quality & Safety (3.5 – 2 days)

Support and other fermented dairy products – Basic Certificate
- Cornell's Advanced Products Workshop (2.5 days)
- HTST Pasteurization (2.5 days) or Vat Pasteurization Course (1.5 days)

Support and other fermented dairy products – Advanced Certificate
- Advanced Methods in Cultured Products Workshop (2 days)

CHEESE MAKING – BASIC CERTIFICATE

Basic Cheese Making Certificate Requirements:
- MUST HAVE COMPLETED PRE-REQUISITE PROGRAM (3 days)
- Attendance at Cornell’s Basic Cheese Making Workshop (2 days)
- HTST or Int Pasteurizer Workshop (2 – 2.5 days)
- Written Examination

CHEESE MAKING – ADVANCED CERTIFICATE

The Advanced Cheese Making Certificate Program is designed for the experienced cheese maker interested in improving/advancing cheese making knowledge and skills to the highest standards of safety and quality.

Core Competencies:
- Advanced Concepts in Cheese Manufacture
- Cheese Grading
- Quality Assurance
- Bio-Chemical Reactions of Cheese Manufacturing

CHEESE MAKING – ADVANCED CERTIFICATE

Advanced Cheese Making Course includes:
- Complex Chemistry of Cheese Making
- Advanced Cheese Culture Microbiology
- The Six Basic Cheese Styles
- Advanced Cheese Problems
- Standards of identity for Cheese
- HACCP in the Cheese Industry
CHEESE MAKING – ADVANCED CERTIFICATE

Advanced Cheese Making Certificate Requirements:
- MUST HAVE COMPLETED CERTIFICATE REQUIREMENTS
- 2+ Years Experience Working in Cheese Manufacturing
- Attendance at Cornell's Advanced Cheese Making Workshop (3 days)
- Written Test
- Training (Oral Test)
- Proven Track Record*

*To be defined

CERTIFICATION/CONTINUING EDUCATION CREDITS
To retain certification, program participants must complete 20 Continuing Education (CE) hours/year. Activities that qualify for CE credits include:
- Any Cornell Dairy Extension Workshops/Short Courses – i.e.:
  - Regional Laboratory Workshop
  - ‘Ve’ Preservation Workshop
  - NYS Cheese Manufacturers’ Association Annual Meeting
  - NYS Association for Food Protection Annual Meeting
  - Dairy Practices Council Annual Meeting
  - Institute of Food Technologists Annual Meeting
  - American Dairy Science Association Annual Meeting

PROGRAM EVALUATION
- Pre-Requisite Program – Basic Dairy Sanitation Certificate
  - Pre-Test/Post-Test – Must Pass Post Test to Receive Certificate

- Fluid Milk – Pre-Test/Post-Test

- Basic Certificate
  - Fermented & Other Dairy Products – Must pass written examination
  - Cheese Making – Must pass written examination

- Advanced Certificate
  - Fermented & Other Dairy Products – Must pass a written and oral examination
  - Cheese Making – Must pass a written and oral examination

Value Added Dairy Study
- Seeking participants for a study of financial performance of small-scale and value-added dairy operations (< 1 million lbs milk processed per day)
- Business must own and operate both milk production and dairy processing
- Participants will receive:
  - Detailed summary of their financial information
  - Benchmark report that compares and assesses costs and returns to other participating businesses (in NYS, VT, WI, and CA)
  - Final report describing key results of the study
  - Invitation to attend a workshop on value-added dairy
  - $100 stipend
Value Added Dairy Study

- Producers of any type of dairy product made from cow’s milk, sheep’s milk, or goat’s milk are invited to participate.
- All information provided will be held in strictest confidence.
- Participants will be asked to fill out a short, web-based survey.
- For more information, please contact:
  Chuck Nicholson
  E-mail: cfn@cornell.edu
  Phone: 805-756-5012

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>September 2007</td>
<td>Stocking Hall - CALS Department of Food Science</td>
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### Calendar of Activities and Events

Overview of Dairy Foods Training Programs listed below. For a listing of programs offered by Extension Personnel at Cornell University's NYS Agricultural Experiment Station in Geneva, including Good Agriculture Practices (GAPs) and Better Process Control programs, go to the Events Listing page of the station's web site: NYSE Events Listing.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Date Offered/Location</th>
<th>Contact</th>
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<tbody>
<tr>
<td>Laboratory Seminars; NY State Regional in Association with NYS Agriculture &amp; Markets Program Registration Form</td>
<td>March 29, Batavia</td>
<td>Steve Murphy at 607-255-2893</td>
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<td>March 30, Canton</td>
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<td>April 3, Plainview-LI</td>
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<td>April 4, Albany</td>
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<td>April 5, Cortland</td>
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<td>PPS Regional Updates - for Processing Plant Supervendents in Association with NYS Agriculture &amp; Markets Program Information</td>
<td>March 27, Old Bethpage</td>
<td>Janene Lucia at 607-255-2892</td>
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<td>March 28, Jamaica</td>
<td>Chip Lindberg, NYSDAM</td>
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<td>April 4, Morrisville</td>
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<td>April 5, East Aurora</td>
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<td>April 19, Ithaca</td>
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<td>April 20, Canton</td>
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<tr>
<td>Advanced Cheese Making Workshop Course Postponed until October 2012</td>
<td>Originally scheduled for April 10-12 Course Postponed until October 2012</td>
<td>Rob Ralyea at 607-255-7843 Janene Lucia at 607-255-2892</td>
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<tr>
<td>High Temperature Short Time (HTST) Dairy Pasteurizer Operators' Workshop in Association with NYS Agriculture &amp; Markets Sorry -- Course is Full Program Registration Form</td>
<td>April 24-26, 2012 Cornell University Ithaca, NY</td>
<td>Steve Murphy at 607-255-2893 Janene Lucia at 607-255-2892</td>
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