QuickTime™ and a
decompressor
are needed to see this picture.

Processing Plant Superintendent Update 2010

Matt Ranieri

Graduate Student

Cornell University

Overview

- Safety of unconventional products
  - Case studies
- Recalls and procedure
  - USDA and FDA
  - Ag. and Markets Policy
- MQIP Report: NYS Fluid Milk Quality
- Brine Solutions for Cheese

Assessing Safety

- When evaluating for safety one should look at the parts as well as the whole
- Risk Management is critical part of food production
- Failure to manage risk (uncertainty) can be costly

Food Producers and Liability

QuickTime™ and a
decompressor
are needed to see this picture.

Recalls: Potential Ramifications

- Direct Losses
  - Product Destroyed
  - Plant Shut Down
  - Workers Diverted
- Indirect Losses
  - Brand Loyalty Impact
  - Lawsuits
  - Lost Contracts
  - Insurance

QuickTime™ and a
decompressor
are needed to see this picture.

Reducing Risk

First Step – What is the Product ?

- Conventional product with “odd” ingredients or way of processing
- Non – conventional product trying to duplicate a conventional product
- Product using conventional product in a non-conventional way

Where Does the Product Fit ?

- Fluid product
  - Like milk
  - Cultured beverage
  - Drink or beverage
- Cultured product
  - Yogurt
  - Sour cream
- Cheese
- Ice Cream or Frozen Dessert
- **OTHER**

What would be Your Expectations IF It Were a Conventional Product ?

- Ingredient requirements
- Process requirements
- Storage requirements
  - Pre and Post Packaging
- Shelf life

Words & Phrases That Should Raise Alarm

- Raw
- Unprocessed
- Hold at room temperature
- Add culture and incubate in cooler
- Heat until skin forms on surface

Specific methods save <u>time</u> and <u>effort</u>

Improve quality– control product consistency

Questions You Should Ask

- What or Who is the source of the ingredients?
- Do you have a certificate of analysis from the manufacturer?
- If using fresh fruits or vegetables – How will you insure safety?
- What are you expecting for shelf life – How will you determine a shelf life that is realistic?

Issues Requiring Attention

- How are ingredients being stored
- What does the equipment look like that will be used to process
- How is equipment being washed – What is the detergent
- How and when is equipment being sanitized – What is the sanitizer

Some Examples and Concerns They Might Raise

Food Science 1101
Adzuki Ice Cream

- Ice cream mix
- Adzuki puree
- Cinnamon spice
- Caramel variegate

What is Adzuki?

- *Paseolus angularis*

Adzuki

- Small, reddish-brown beans
- Rounded in shape with a point at one end
- Strong, nutty, sweet flavor
- Harvested seasonally– November and December
- Imported from China and Thailand

Adzuki Tradition

- In the Orient, cooked to a red soft consistency and served with coconut milk
- Also cooked with rice, their bright color tinting the rice to an attractive pink
- In the East common to find adzuki beans sweetened with sugar and made into cakes and sweetmeats

Make Process

- For Adzuki Bean flavored ice cream the procedure is as follows:

1. Put the adzuki to steam the night before then put in refrigerator
2. On the next day you blend the adzuki paste with the standard mix and sugar
3. Bag them up then set to freeze

Process

- Mix adzuki paste/IC mix/sugar/cinnamon spice
- Freeze in IC freezer
- Add caramel variegate

ISSUES?????

Critical Control Points

- Using properly cleaned/sanitized equipment/utensils
- Cooking/Steaming Time/Temperature of Adzuki paste
- Pasteurization Time/Temperature of Mix
- Care to not contaminate after these steps occur

Another Example

- Lemon Basil Ice Cream
  - Ingredients:
    - Ice Cream Mix
    - Frozen Lemon Concentrate
    - Fresh Basil

  – CONCERNS???

Solution

- Rinse Basil thoroughly in water
- Sanitize by soaking for 1 minute in a 50 ppm Chlorine solution
- Dry
- Process in a food processor sanitized with a 200 ppm Chlorine solution

What are Microbiological Standards for Non-Pasteurized Frozen Desserts ?

- Standard Plate Count (SPC)
  - Not to exceed 100,000/gm
- Coliform Count
  - <20/gm

IMPORTANT

As you prepare to meet with your Inspector

- You know what Adzuki or Lemon Basil Ice Cream are (at least if you're making it we HOPE so)
- Your Inspector may not know
- Prepare an explanation of product or ingredient for your inspector
- HACCP identifying CCP's in the processing

Recalls

- Types of Recalls – relatively the same for FDA and USDA
  - **Class I** – most serious; potential serious injury or death (pathogens, glass, etc).
  - **Class II** – lower chance of causing major injuries or death but still the possibility of serious enough adverse effects to have irreversible consequences.
  - **Class III** – not very likely to cause adverse health consequences, but still a small chance.

Zero Tolerance for Listeria (FDA)

- This means that the detection of any *Listeria monocytogenes* in either of two 25-gram samples of a food renders the food adulterated as defined by the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. 342(a)(1) (Shank *et al*., 1996)
- Policy affirmed in the 1995 United States District court decision, *United States v. Union Cheese Co.* (Anonymous, 1995).

Zero Tolerance for Listeria (USDA)

- FSIS's "zero-tolerance" policy applies to the detection of *Listeria monocytogenes* in ready-to-eat products
- If meat or poultry products are contaminated with *Listeria monocytogenes*, the products are adulterated under the provisions of the Federal Meat Inspection Act and the Poultry Inspection Act, 21 U.S.C. 601(m) or 453 (g)

Zero Tolerance Pathogens

- *Listeria monocytogenes*
- *Escherichia coli* O157:H7
- *Salmonella* spp.
- *Vibrio* spp.
- *Shigella*
- Clostridia
- *Campylobacter*
- All pathogens transmitted through food to humans

Recent Examples

- Class I-
  - Castonella Chicken Soup Base (*Salmonella*)
  - Estrella Family Creamery (Old Apple Tree Tomme Cheese possibly contaminated with *Listeria monoctyogenes*
  - Randolph Packing Co
    - 96,000 lbs of beef (*E. coli* 0157:H7)
  - Heartland Foods Black Pepper (*Salmonella*)
  - Queseria Bendita (Yakima, WA) recalling 3 types of cheeses because of possible *Listeria monocytogenes* contamination

Cheese Balls/Logs

- Wisconsin Cheeseman® – *Listeria monocytogenes*

Ice Cream

- Undeclared nuts – Turkey Hill Chocolate Marshmallow Ice Cream – limited to PA (fewer than 150 pkgs)

NYS Ag. and Markets Recall Procedure

- Section 6302 Recall Procedures
- Please add title to the table of contents page in your manual.
- <u>Recall checklist</u>:
  - ✓Notification producer/processor
  - ✓Press Release – *if needed*
  - ✓Customer/Distribution List
  - ✓Photos of labeling
  - ✓Notification of proper Regulatory agencies

Recall Procedures

- <u>Checklist (Cont'd)</u>
  - Report Of Investigation (ROI) of Incident
  - Tracking and Follow up to product recall
  - Seizure / Destruction of product
  - ROI of follow up
- <u>Notification</u> - two types:

1. Preliminary
2. Confirmed/Evident

Recall Procedure

- Preliminary Notification- This is when the agency is notified, usually regarding lab results of an issue awaiting confirmation (phosphatase test, pathogen, etc)
- Our agency will not issue a press release on preliminary results
- DPS must notify the producer/processor and request that the product no longer be offered for sale; producer processor is strongly encouraged to comply as this point

Recall Procedure

- Confirmed / Evident – This would be when the pathogen/hazard has been confirmed

  Example: metal fragments in ice cream

- AG/MKTS determines what classification the matter falls under

Recall Procedure

- Classifications
  - Class I -The most serious and is defined as a strong likelihood that the use of, or exposure to a violative product will cause serious harm. A press release will always be issued on a Class I recall.

    Examples: any pathogens except E.coli, glass shards in product, undeclared nuts, undeclared soy or undeclared eggs.

  - Class II – Has the ability to cause harm. This classification has some flexibility on the issuance of the press release.

    Examples: E.coli, undeclared FD & C colors.

Recall Procedure

- Classifications
  - Class III – Unlikely to cause harm, in many cases a press release will not be issued.

    Examples: mold contamination, labeling issues, weight violations, filth, and decomposition

Press Release

- **The release will be issued from the Central Office (Albany). The Central Office will work with the Public Information Officer to review and accept the written release and submit to the media market in which we decide it will be circulated.**
- ***If the producer / processor declines the option to create their own press release, the Department will issue one on their behalf.***

Press Release

- **The producer / processor will have 24 hours or, in the case of a weekend, the firm will have until 3 pm on the Friday before the weekend to contact the Department**
- **Failure to respond to the timeline will initialize Ag and Markets to issue immediate press release**

QuickTime™ and a
decompressor
are needed to see this picture.

Customer/Distribution List

- The producer / processor must provide information to the Department regarding the customers and distributors and the amount of product which was delivered to each
- In the case that no list can be provided (Raw milk sales/Retail outlet), the Division must investigate and verify that the producer/processor is not being misleading
- DPS shall make clear to the producer/processor that the Department has the right to their records for product recovery purposes

Photo’s

- **FDA has requested that all recalls include photo’s of the recalled labeling**
- **In the case of raw milk there may not be any labeling, but if there is labeling, a high quality photo is needed**

Pasteurize

- If pasteurization is not an option (and for raw milk cheese, it wouldn't be raw anymore would it??) then:
  - A thermal treatment
  - Wash hands after using restrooms
  - Enforce good employee hygiene
  - Wash everything thoroughly and with effort
  - Sanitize, sanitize, sanitize and sanitize again
  - ***Coliforms are easily killed by heat and sanitizing agents***

NYS Raw Milk Statistics

- **In 2005, there were 10 raw milk permit holders in NYS**
- **In 2007, there were 23 raw milk permit holders**
- **In 2010, there are now 28 raw milk permit holders and counting**
- **In 2007, AG/MKTS responded to 5 cases of confirmed pathogens in routine sampling, which required a press release and recall of product**

NYS Raw Milk Statistics

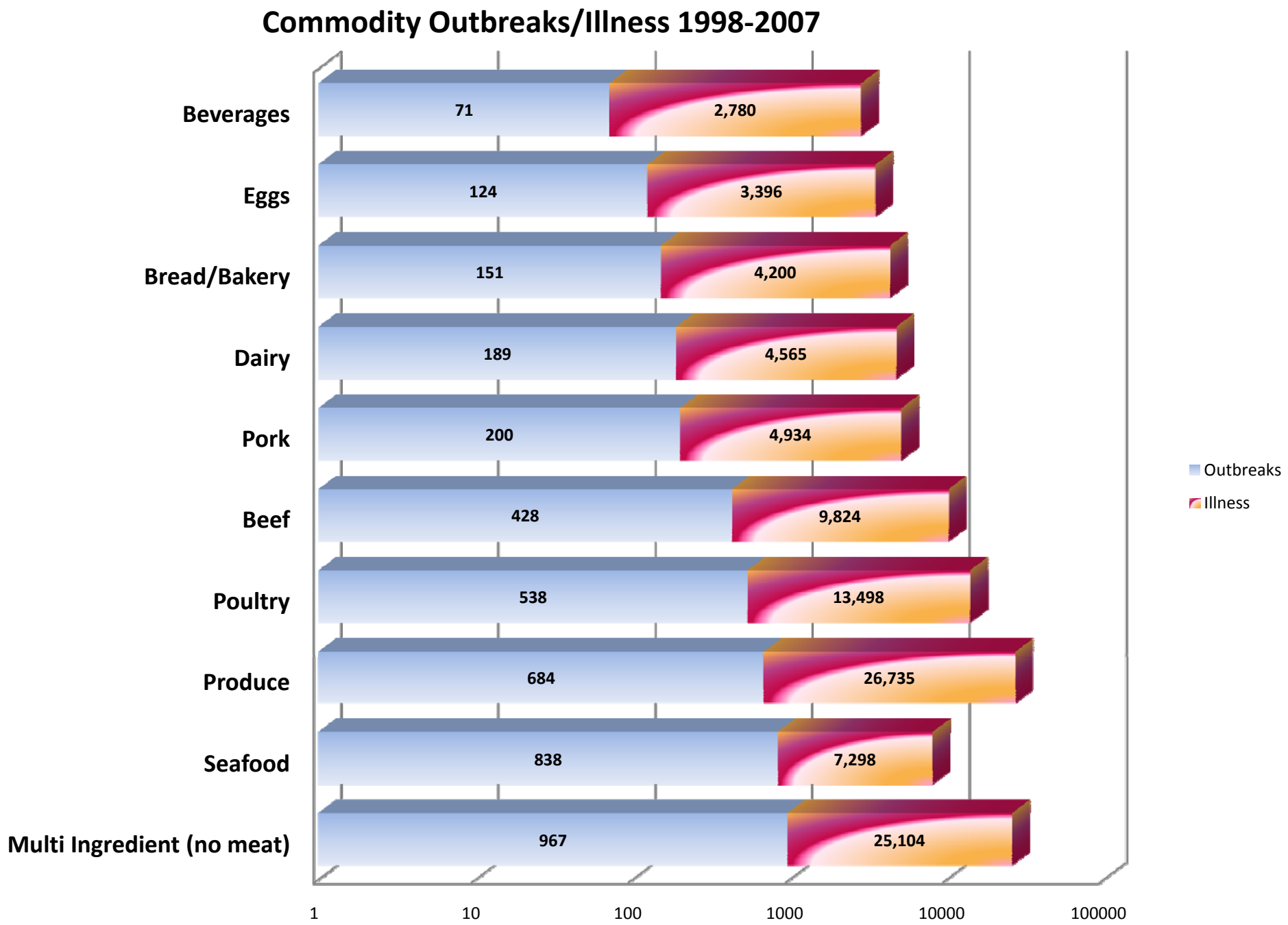
- **The five confirmed cases have been broken down by pathogen.**
  - **Four cases of *Listeria monocytogenes***
  - **One case of *Campylobacter***
- **In 2010, there have been 2 confirmed outbreaks from dairy products in NY– both from *Campylobacter* and both from raw milk**
- **Pathogen Testing (2009): 275 samples from milk farms: 2 positive for *Listeria monocytogenes* (same farm), 1 for *Salmonella* and 1 for *E. coli* O157:H7**

US Outbreaks 1998 - 2007

- 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.**
  - **http://www.cspinet.org/foodsafety/outbreak/pathogen.php**

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 represent the most significant hazards *(all are killed by pasteurization)***


Commodity Outbreaks/Illness 1998-2007
Beverages
71
2,780
Eggs
124
3,396
Bread/Bakery
151
4,200
Dairy
189
4,565
Pork
200
4,934
Beef
428
9,824
Poultry
538
13,498
Produce
684
26,735
Seafood
838
7,298
Multi Ingredient (no meat)
967
25,104
1
10
100
1000
10000
100000
Outbreaks
Illness

HTST Milk: Quality in the Northeast

MQIP Analysis of Samples - Spore Project

Microbiological Analysis

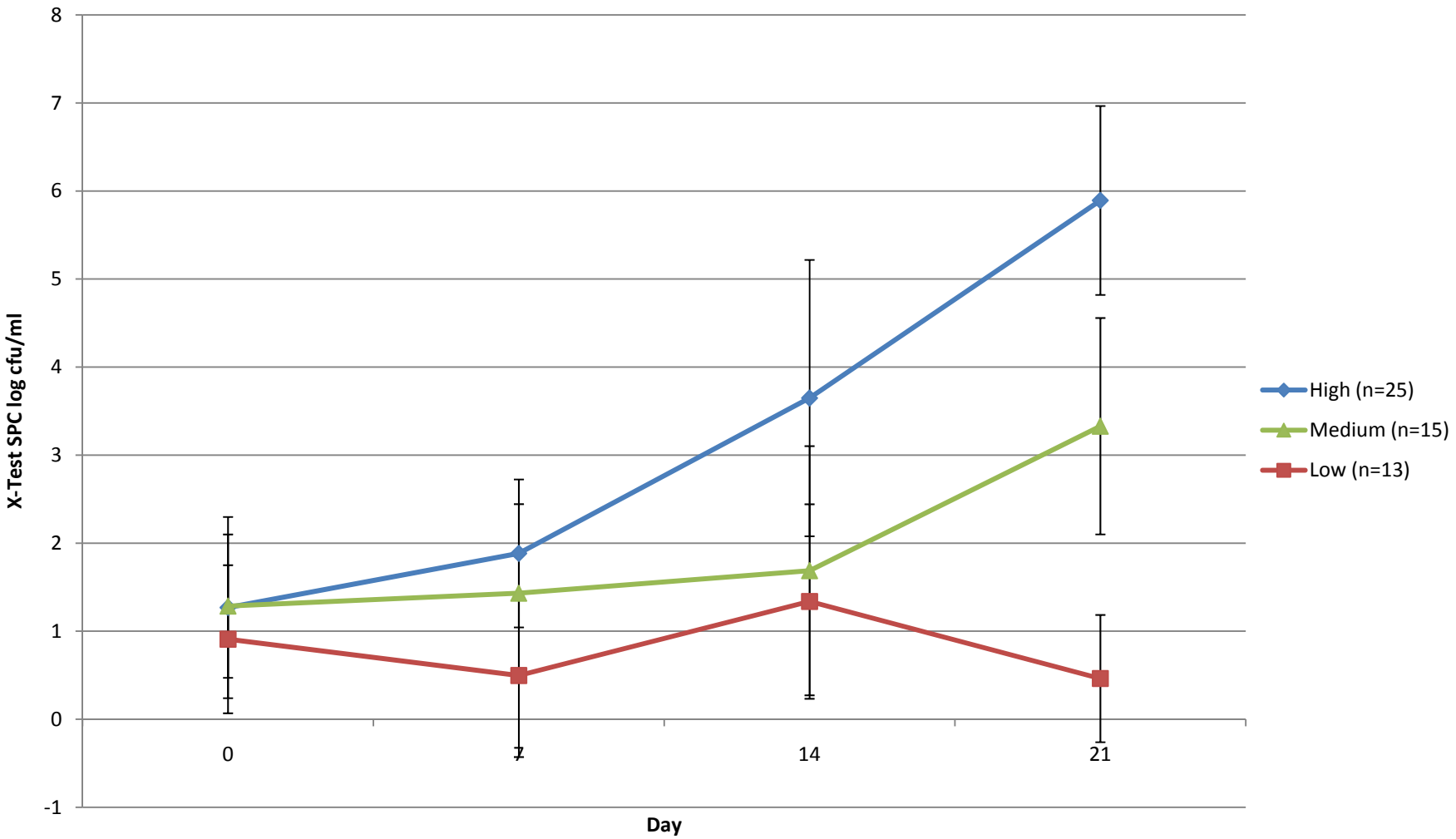
- Standard Plate Count of Spore Pasteurized (80° C/12min) Samples held at 6° C on Days I,7,14,21
- Most Probable Number Test of Spore Pasteurized Samples
- Standard Plate Count of Raw Samples
- Preliminary Incubation Count (13° C/18hrs)
- Psychrotrophic Bacteria Count (7° C/10days)

* 62 Samples completed and in process to date

Molecular Analysis

- Future characterization of Spore Pasteurized Isolates using rpoB PCR sequencing
- >600 Isolates collected to date

Average SPC of Spore Pasteurized Samples

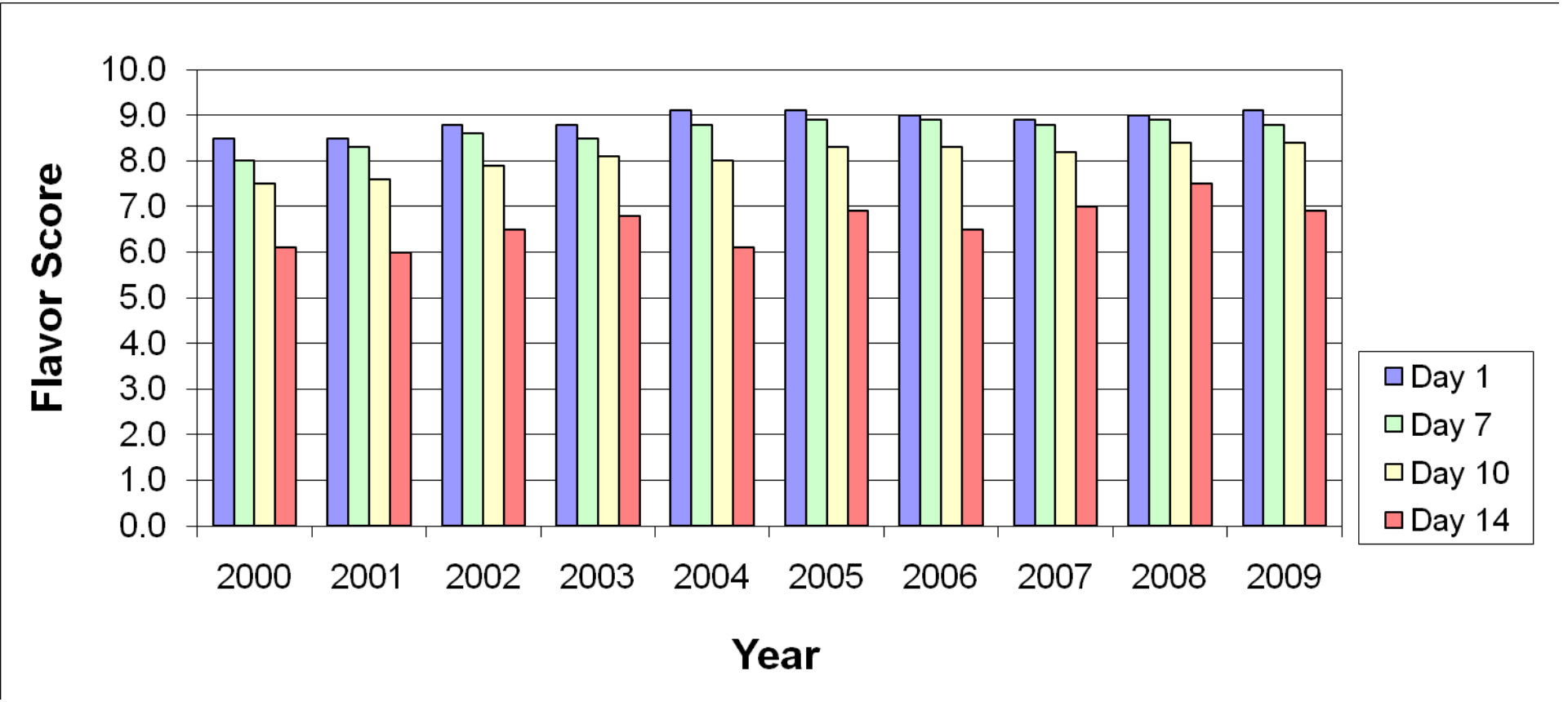


Voluntary Shelf Life Program - Plant Status & Update

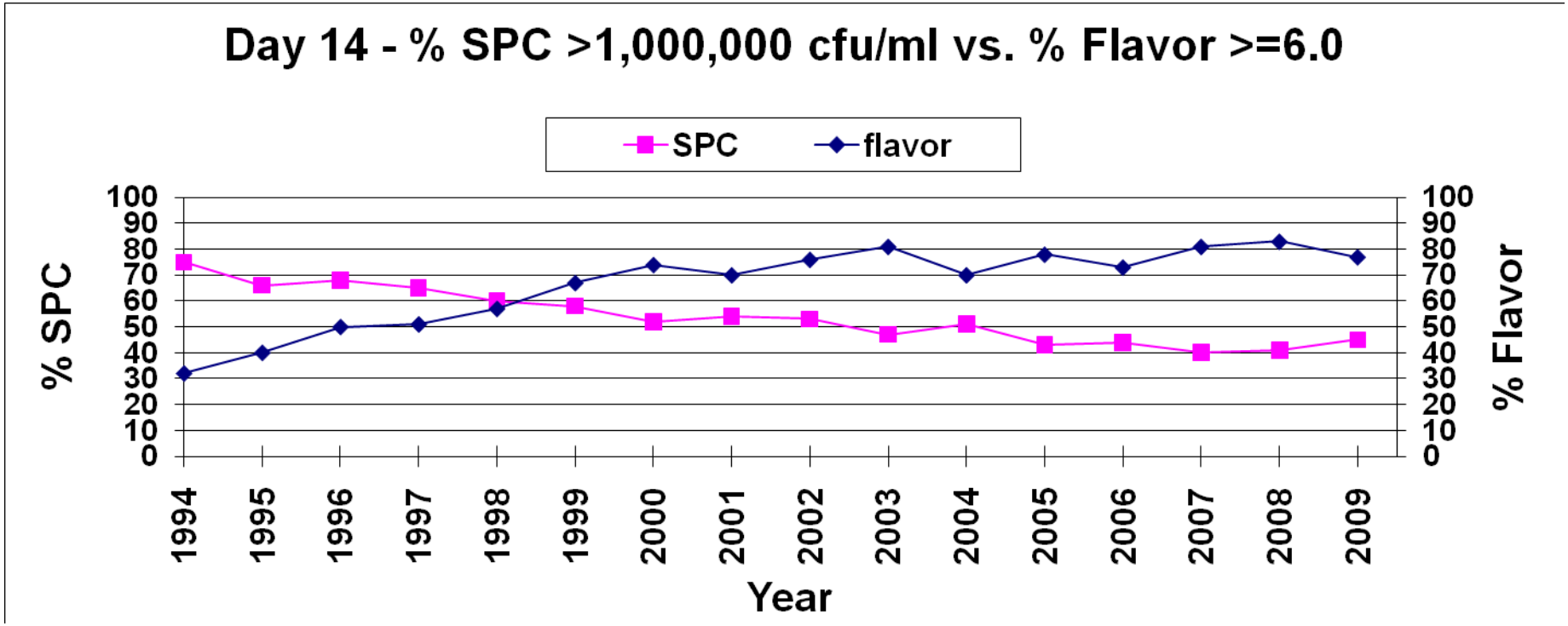
	1980	1990	2000	2003	2009
# of Plants	96	49	27 (24 NY, 2 NJ, 1 PA)	24 (22 NY, 1 NJ, 1 PA)	30 (23 NY, 1 EA in MA, ME, NH, PA & VT, 2 in NJ)
Sell-By	< 12.0 d	12.5 d	13.9 d (NYC 9-day mandated code not included)	15.0 d	17.0 d
< 20,000 Day 10	-- 15% (day 12)	25%	50%	56%	53%
< 20,000 Day 14	--	17%	32%	32%	35%
< 20,000 Day 17*	--	--	--	33%	42%

* Day 17 results apply to only 17 plants

Average Processed Milk Flavor Scores



NYS Dairy Product Quality – 1994-2009



% SPC >1,000,000:

1994 = 75%

2009 = 45%

30% decrease

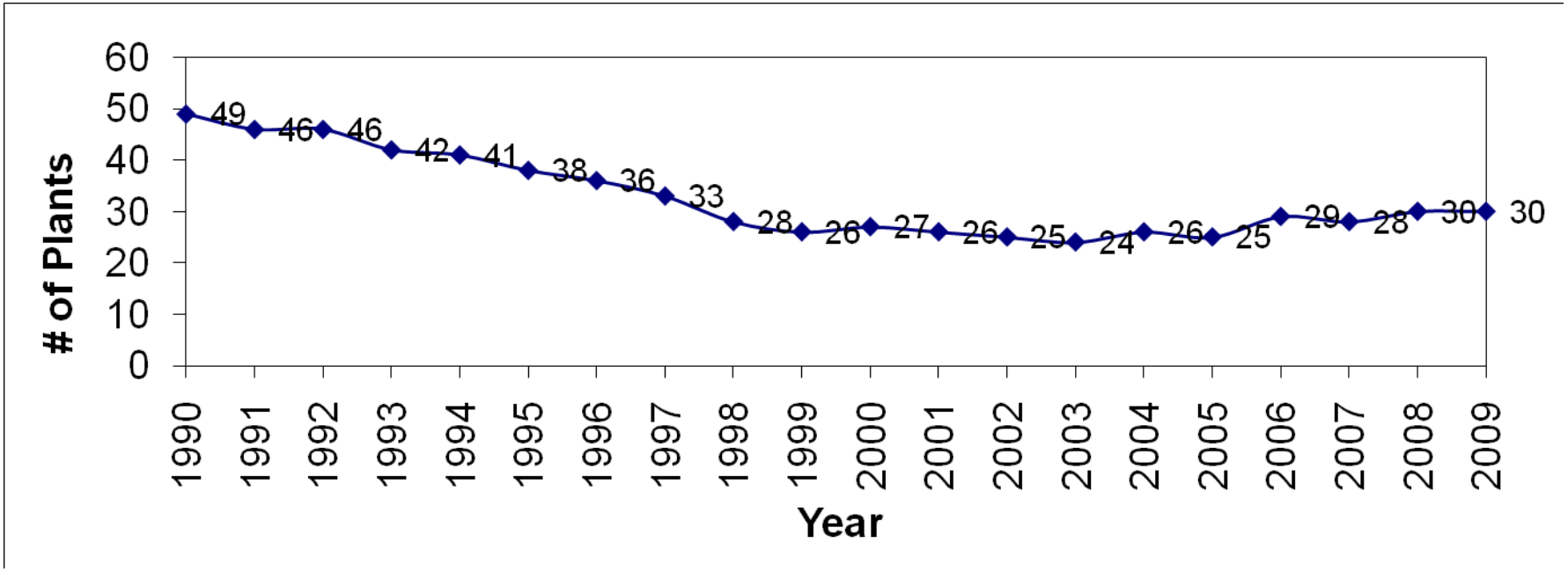
% Flavor >=6.0:

1994 = 32%

2009 = 77%

45% increase

Processing Plant Numbers (update)

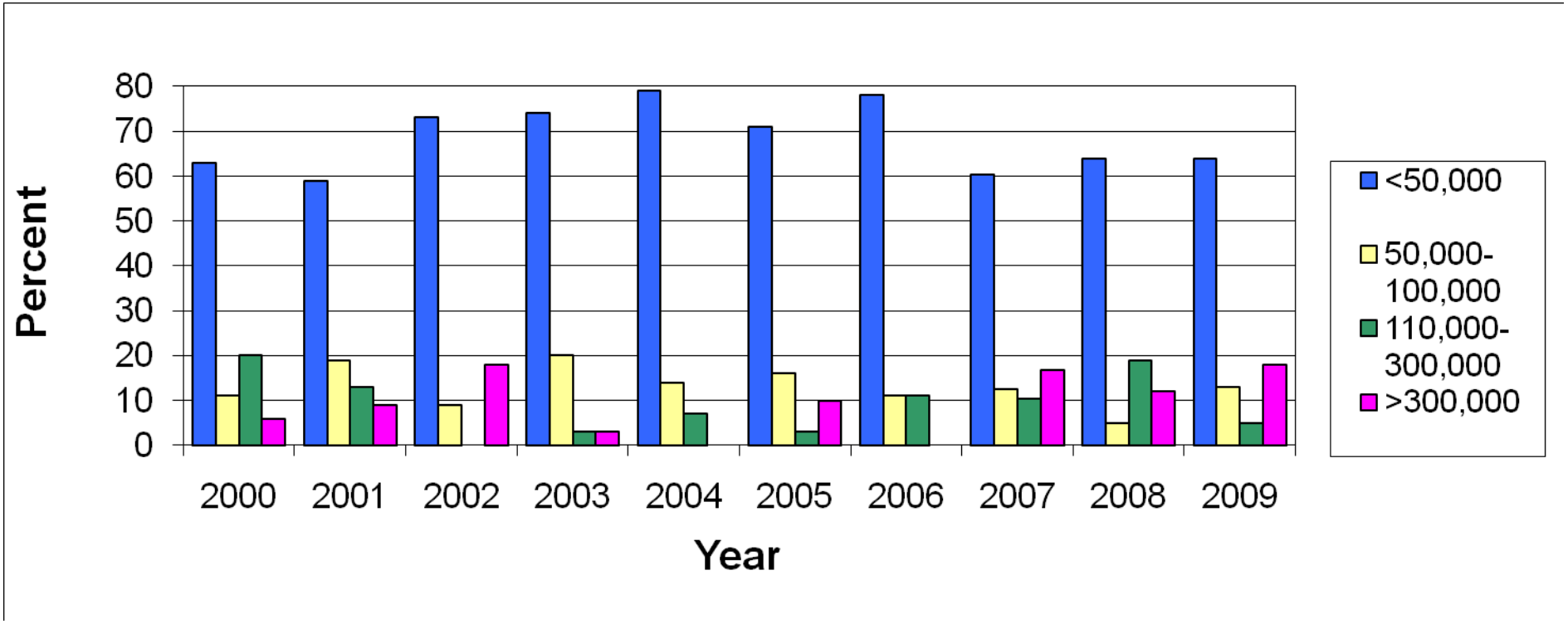


30 plants at beginning, same at end of 2009.

Lost Meadowbrook Instant Whip

Gained Milk Thistle Farm

Distribution of Commingled Raw Milk by SPC



Coliforms in Raw Milk Cheese

Brine

- Essentially a SATURATED solution of Salt
- Promotes syneresis, slows acid development, checks spoilage bacteria, promote ripening, adds flavor
- Critical Factors:
  - Temperature
  - Salinity
  - Control of bacteria/yeasts/molds
  - pH
  - Balance of minerals (mainly calcium)

Temperature

- Profound effect on amount of salt a solution can hold
  - @ 53°F, a fully saturated brine holds about 21% salt by weight
  - @ 40°F, about 5 lbs of salt will fall out of the same solution
- Too WARM???
  - Cheese will sink because brine no longer saturated
  - Cheese will lose shape and invite more rapid salt uptake (more than desired)
  - Encourage growth of undesirable bacteria

Salinity

- Use a high quality Salt
  - Table salt or Kosher salt or Sea salt
  - Cheese will float in a saturated brine
- Use a salinimeter or salt hydrometer!!!!!
  - Salt taken up by cheese
  - 1000 lbs brine (21%) + 100 lbs cheese in for 24 hours and removed at 2% salt = 2 lbs salt taken up by cheese
    - Drop in salinity due to salt uptake by cheese
    - Add salt equivalent to what will be removed by brining of cheese

Time

- Generally speaking, cheese will take up ~80% of the salt it will absorb in the first couple hrs
- Osmotic pressure slows the process (equilibrium being reached)

Bacteria/Yeast/Mold

- Halophilic – survive in salt environment
- Yeast/mold have little aversion to salt
  - Whey good food source for microorganisms
- Brine tanks are NOT sterile
- Should clean/sanitize periodically (filtration and/or UV sterilization)
- Use tanks that are designed for food contact
- Should check them periodically for bacteria/yeast and mold counts

pH and Mineral Balance

- Cheese in = mineral exchange
  - Salt enters cheese expelling water (whey) which goes into brine
- Much more sodium (Na) in brine than cheese
  - To reach equilibrium Na enters cheese
  - Prevent formation of sodium caseinate, high water holding capacity = soft, slimy cheese
    - ADD Calcium to brine to keep this from occurring (~.1% $CaCl_2$)
- pH of brine should be adjusted (typically 5.2-5.6)
  - Low pH encourages sodium caseinate
  - High pH results in coarse, hard cheese

Brine Maintenance

- Concentration should be checked every day
- Brining should be done at 'low' temperatures (typically in the 5-10°C range)
- With use, a build-up of cheese solids occurs
  - Remove them at regular intervals
    - Yeasts/bacteria can grow if allowed to build up
    - Skimming or filtering/pasteurizing brine
- Also with use, salt loss occurs
  - Absorbed by the cheese
- pH should be checked often

QuickTime™ and a decompressor are needed to see this picture.

Questions?

- Contact: MLR38@cornell.edu

Milk Quality Improvement Program

Cornell University

Department of Food Science

RDR10@cornell.edu

QuickTime™ and a
decompressor
are needed to see this picture.