Pasteurized Milk Ordinance

Governs the sale of milk in the US as dictated by the National Council of Interstate Milk Shippers and FDA

PMO

- Designed to insure that the supply of milk is wholesome (as delivered from the cow, unadulterated)
- Is free of residues (chemical, antibiotic....)
- Free of disease agents and other potentially deleterious biologics.
- Handled properly

Quality Milk

- Organoleptic appeal
- Slightly sweet
- Pleasant in the mouth
- Essential nutrients from the ration
- Proper blood flow
- Good secretory cell health

PMO

- Designed to insure quality milk
- See assignment
Factors affecting Milk Quality

Contamination from Outside

- “Chemicals”
  - Disinfectants
- Bacteria
- Dirt and debris
- Water

Contamination from Outside

- “Chemicals”
- Bacteria
- Dirt and debris
- Water

Std Plate Count
Raw Sample Count

PMO official

48 Hours

37°C

Coliforms (lactose and gram neg rods)
Psychrotrophic Bacteria
Preliminary Incubation Count - PI

Raw Sample

(Shortcut: Hold sample for 18 h, 13 C, then plate on agar)

LPC - Lab. Pasteurized Count
Thermotolerant Bacteria

7º C
10 Days

62.8ºC For 30 min

37º C
48 Hours

Coliform Count

PMO official

48 Hours

37º C

Standard Plate Count
• Total Bacterial Count in Raw Milk
• Bacterial origin:
  – Inside the gland…hold this thought
  – Outside the gland:
    • Unclean udders - wet udders
    • Contamination of the milking system
    • Poor cleaning of the milking system (time, temperature, concentration of disinfectant)
Standard Plate Count

• Milk Cooling problem
• Counts should be less than 10,000* bacteria (CFU)/ml, but......
• Many farms can maintain counts less than 1000 bacteria/ml of milk.

• *ten fold less than PMO

Preliminary Incubation Count

• Good milk cooling can keep the PI count organisms (psychrotrophs) low.....but.....
• Some psychrotrophs will live through pasteurization and then will multiply in milk on the supermarket shelf.
• Will reduce the shelf life of milk considerably.

Preliminary Incubation Counts-Psychrotrophs

• Poor udder prep (poor cleaning and drying of the udder)
• Inadequate post-dipping
• Poor cleaning of the milking system
• Cracked rubber surfaces (liners, o-rings,etc.)
• Not sanitizing milking system before each milking
• PI counts < 50K but best if < 10K

Lab- Pasteurized Count

• Bacteria that will survive pasteurization
• Very good cooling will keep counts down on the farm.....but.....these will grow up on the shelf in milk cartons!
Lab Pasteurized Count

Less likely to be a cow-cleaning problem and more likely to be a milking system cleaning problem!

LPC < 200 bacteria/ml, but excellent herds: <100.

Coliform Count

- Sources
  - Poor milking preparation and very dirty cows
  - Water contamination
  - Severe milking equipment problems

- < coliforms/ml of milk <100

<table>
<thead>
<tr>
<th>Differential</th>
<th>Low Coliform &lt;100</th>
<th>High Coliform &gt;750</th>
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<tbody>
<tr>
<td>Low LPC &lt;300</td>
<td>No problem</td>
<td>Teat Contam Cow Env</td>
</tr>
<tr>
<td>High LPC &gt;500</td>
<td>Machine Cleaning</td>
<td>All</td>
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</table>

Other Tests of Quality

“Added Water”

- Addition of water dilutes salts and lactose
- Tested for using a cryoscope
- Freezing pt. Of >-.530 Hortvet indicates that milk composition is abnormal
- Intentional addition of water, poor system drainage, use of excessive water during prep, backflushing units with the vacuum on, rinsing top of bulk tank, freezing bulk tank milk

Cook, Univ. WI
Ruegg, Univ. WI
Other Tests of Quality

“Rancidity”

- Result of hydrolysis of fatty acids
  - Violent agitation, air leaks or excessive pumping
- Causes objectionable flavors
- Psychrotrophic organism in milking equipment can produce lipases
  - Pseudomonas, aerobacter & bacillus
- Expressed as acid degree value (ADV)
  - Ml of 1 N base required to neutralize acids in 100 g of fat
- Normal value of milk: .25 to .40
  - Not considered abnormal until ADV >1.0

Ruegg, Univ. WI

“Sediment”

- Required test but frequency of testing is undefined
- Sediment scores on filters
- Excessive udder hair + sand bedding + poor premilking premilking hygiene

Ruegg, Univ. WI

Other Tests of Quality

Contamination from Inside

- “Chemicals”
  - Antibiotic residues
- Bacteria
- Change in physiology due to infection

Contamination from Inside

- Disinfectants
- Antibiotics-
  - Assume zero tolerance
  - Systemic or intramammary
  - “Do not put anything into the cow that you can not test for (with a kit).”
Contamination from the Inside

- Antibiotics-
  - Systemic therapy
  - Intramammary therapy
- Follow labeled withhold and withdrawal
  - Therefore, ensure all treatment vials are labeled, commercially or with vet instructions
- Keep records of treatments: dates, doses and animals.
- Restrict access to therapies

Contamination from the Inside

- Bacteria- Mastitis
  - Pathogens-
    - Streptococci-
      - agalactiae
      - Environmental streps. (uberis, dysgalactiae, enterococci)

Contamination from the Inside

- Milk Somatic Cells
- Mostly neutrophils in response to IMI
- Neutrophils contain enzymes and oxidants that will affect milk quality

Contamination from the Inside

- Result:
  - shelf life reduced
  - rancidity increased
  - cheese yield ↓
- Neutrophilic enzymes:
  - Lipases
  - Proteases
  - Nucleases
  - Oxidants
Review

- Suggested Bacterial Test Stds for Quality Milk:

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<th>Suggested</th>
<th>Reg</th>
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<tr>
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<td>LPC</td>
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<tr>
<td>PI</td>
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<tr>
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