# Public Health Risks of Consuming Raw Milk Products - Surveillance and Prevention Efforts in the United States

#### Casey Barton Behravesh, DVM, DrPH, DACVPM

LCDR, US Public Health Service Enteric Diseases Epidemiology Branch National Center for Zoonotic, Vectorborne, and Enteric Diseases

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention

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# got milk?







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#### **Some Diseases Acquired** from Raw Milk



Campylobacteriosis  $\bullet$ 

Tuberculosis

- Salmonellosis •
- **Brucellosis**

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- *E. coli* O157:H7 infections ullet
- Listeriosis  $\bullet$

- Streptococcal infections
- Yersiniosis



# **Clinical Picture**

- Acute gastroenteritis: fever, diarrhea, abdominal cramps, vomiting, often bloody stools
- Serious illness: HUS, meningitis, blood stream infections, joint infections, Guillain-Barre syndrome, death
- Very young, immunocompromised, and elderly especially vulnerable



## **Questions for Discussion**

- How do public health officials learn about illnesses caused by enteric pathogens?
- What have we learned from scientific food safety research to help guide prevention efforts?



# Cycle of Foodborne Disease Control & Prevention

Surveillance

 Immediate control of outbreak and prevention of illnesses
Provide opportunities to identify gaps in food safety systems

> Applied Research



# What is PulseNet USA?



- National network of >75 public health & regulatory laboratories
- Perform molecular typing of foodborne disease-causing bacteria
  - Current method is pulsed-field gel electrophoresis (PFGE)
  - Creates DNA "fingerprints"
- Share DNA "fingerprints" electronically
- DNA "fingerprints" kept in dynamic database at CDC
- PulseNet team looks for clusters and notifies OutbreakNet team



Cluster of indistinguishable patterns



# **Foodborne Outbreak Surveillance**

- Most outbreaks detected, investigated and controlled by local and state health departments
- CDC collects the reports of outbreaks investigated
  - Reporting is voluntary and incomplete
  - Data collected: # of cases, implicated food, etiology
- NORS: Electronic reporting system for foodborne, waterborne, animal contact associated enteric outbreaks, and enteric 'person-toperson' outbreaks





# Dairy-Product Associated Outbreaks, 1993-2006



74 Unpasteurized 1,600 Cases 202 Hospitalizations 2 Deaths <u>48 Pasteurized</u> 1,223 Cases 30 Hospitalizations 1 Death







# **Effect of Pasteurization**

- 1938: Milk-borne outbreaks constituted ~25% of all disease outbreaks
- Mandatory pasteurization introduced
- Present: <1% of outbreaks



# **Review of Scientific Literature**

- More outbreaks caused by unpasteurized than pasteurized products
- Unpasteurized products consumed by dairy producers, farm employees, families, neighbors, raw milk advocates
- Several types of cheeses made from unpasteurized milk
- Entry of foodborne pathogens via contaminated raw milk into dairy food processing plants
  - Lead to persistence of pathogens in biofilms
  - Subsequent contamination of processed milk products
  - Exposure of consumers to pathogens



# **Review of Scientific Literature**

- Pasteurization improves safety and lengthens shelf life, does not "sterilize" milk
- Inadequate or faulty pasteurization will not destroy pathogens
- Risks to consumers are due to
  - Direct exposure to pathogens in unpasteurized products
  - Exposure to pasteurized products recontaminated post-pasteurization
  - Exposure of consumers to pathogens



# What influences prevalence of foodborne pathogens in milk?

- Farm size
- Number of animals on farm
- Hygiene
- Farm management practices
- Variation in sampling and types of samples evaluated
- Differences in detection methodologies, lab tests
- Geographic location
- Season
- Others?





### Do restrictions on state raw milk sales reduce raw milk outbreaks?

- Increased risk of unpasteurized dairy product enteric disease outbreaks in states that permit the sale of unpasteurized dairy products, 1993–2006
- Unpasteurized product outbreaks are more common and cause more severe illness than pasteurized product outbreaks

## Recommendations

- States should further restrict or prohibit distribution of unpasteurized dairy products
- Educate consumers about health risks of consuming unpasteurized products
  - Local, state, and federal public health partners
  - Clinicians
  - Consumer and advocacy groups



# Who should be educated on the risks of unpasteurized product consumption?





# **Dairy producers**

- Many are unaware of the zoonotic potential of pathogens associated with raw milk
- Ohio survey: 461 dairy farms surveyed, % did not think pathogen caused disease in humans
  - 36% Salmonella
  - 81% Listeria
  - 88% Cryptosporidium
  - 91% Campylobacter



# One example of illness in dairy farmers...

- Campylobacter jejuni outbreak, 5 month duration in farming family
- Members drank 2-5 glasses of raw milk daily
- 52 cows on farm
- Well and municipal water tested negative
- Outbreak strain identified in:
  - Humans
  - Cow feces (15/52)
  - Bulk milk tank samples over 3 weeks
- Likely source: incompletely sealed rubber liners fitted into milking machine
  - Allowed cow feces to contaminate milk over time



# Age

- ~60% of outbreak-associated cases involving unpasteurized dairy products are in persons <20 years
- American Academy of Pediatrics advises against providing unpasteurized dairy products to children and recommends that pediatricians counsel caregivers against these products



# **Educational Level**

- People with less than a high school education were more likely to consume raw milk than those who completed high school
- Suggests that educational level may influence persons choice to consume unpasteurized products



# **Traditional Unpasteurized Products**

- Outbreaks identified, especially in recent years
- Products marketed to Hispanic community in U.S.
- Hispanic persons 3 times more likely to report consuming unpasteurized products in the past 7 days compared to non-Hispanic persons\*



# Who should be educated on the risks of unpasteurized product consumption?

- Persons who consume raw milk products
- Persons more likely to consume raw milk products but are not yet regular consumers
- Persons of Hispanic and other ethnicities who include unpasteurized dairy products as part of traditional diets
- Dairy farmers
- Others?



# **Abuela Project**

- 1997 outbreak of Salmonella Typhimurium DT104
  89 cases
- Safe cheese workshops to reduce the incidence of Salmonella Typhimurium from consumption of raw milk queso fresco in Yakima County, Washington
- Methods: Developed pasteurized milk recipe for queso fresco acceptable to Hispanic community; trained hispanic volunteers to conduct safe cheese workshops; >225 attendees; pre and post intervention surveys



# **Abuela Project**

- Results:
  - Pre-intervention survey: < half used pasteurized milk</p>
  - Post-intervention survey: 100% used pasteurized milk in queso fresco, maintained for >6 months
    - 94% believed others in community would eat queso fresco made from pasteurized milk
- Conclusions: Educational interventions in Hispanic community in Yakima County reduced foodborne pathogens associated with eating raw milk queso fresco

Bell, et al. 1999





#### FDA and CDC Remind Consumers of the Dangers of Drinking Raw Milk

The U.S. Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention the dangers of drinking milk that has not been pasteurized, known as raw milk. Raw milk potentia harmful bacteria – including Salmonella, E. coli 0157:H7. Listeria. Campylobacter and Brucella – including Salmonella.

# Position papers on dangers associated with consumption of raw milk

- Association of Food & Drug Officials (AFDO)
- American Public Health Association (APHA)
- American Medical Association (AMA)
- American Veterinary Medical Association (AVMA)
- American Academy of Pediatrics (AAP)
- U.S. Animal Health Association (USAHA)
- National Association of State Public Health Veterinarians (NASPHV)
- National Environmental Health Association (NEHA)
- International Association for Food Protection (IAFP)



# **AVMA**

 Because apparently healthy cows and goats can shed in their milk organisms which are pathogenic to human beings and may cause diseases such as brucellosis, campylobacteriosis, salmonellosis, and tuberculosis; and, inasmuch as milk handlers may introduce pathogenic agents during the handling of unpasteurized milk (including certified and raw milk), only pasteurized milk and milk products should be sold for human consumption. In those states where the sale of unpasteurized milk is authorized, those products should be labeled "Not Pasteurized and May Contain Organisms that cause Human Disease."



# Final Considerations...

- Considerable demand and expectation for food safety
- Challenges of producing and maintaining safe food supply
- Food safety research and educational projects



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