

Centers for Disease Control and Prevention (CDC) Emerging Infectious Diseases 2012 Unpasteurized Dairy Products, Disease Outbreaks, United States, 1993 - 2006

Introduction

- Milk-borne infections were relatively common before the advent of pasteurization in the late 19th century. Yet even today in the United States, illnesses related to the consumption of unpasteurized dairy products remain a public health concern.
- Despite the federal ban on the sale of unpasteurized products in interstate commerce, the broad use of pasteurization by the dairy industry and the infrequency with which unpasteurized dairy products are consumed, illnesses and outbreaks associated with consumption of these products continue to occur.
- Between 1993 and 2006, a total of 30 states reported 122 foodborne disease outbreaks caused by contaminated dairy products. In all but one of the outbreaks (121), the pasteurization status of the dairy product was known. Of those involving unpasteurized products (n = 73, 60%), the outbreaks resulted in 1,571 cases, 202 hospitalizations, and 2 deaths.
- The incidence of outbreaks associated with unpasteurized dairy products was higher in states that permitted sale of unpasteurized products. Between 1993 and 2006, 21 states permitted the sale of unpasteurized products, and 75% of the dairy-related outbreaks occurred in those states.
- Ill persons in outbreaks involving unpasteurized dairy products were generally younger than those in outbreaks involving pasteurized dairy products. For the 60 outbreaks involving unpasteurized dairy products for which age of patients was known, 60% of patients were younger than 20 years of age.

Causative Biological Agent

Among all 73 outbreaks involving **unpasteurized dairy products**, the causative biological agent was bacteria.

- One outbreak was caused by Campylobacter and Shiga toxin-producing Escherichia coli
- 39 (54%) were caused by Campylobacter
- 16 (22%) by Salmonella
- 9 (13%) by Shiga toxin-producing E. coli
- 3 (4%) by Brucella
- 3 (4%) by Listeria
- 2 (3%) by Shigella

Among the 30 outbreaks involving **pasteurized dairy products**, the causative agent detected was:

- 13 (44%) were caused by norovirus
- 6 (20%) by Salmonella
- 4 (13%) by Campylobacter

3 (10%) by *Staphylococcus aureus*
1 (3%) by *Clostridium perfringens*
1 (3%) *Bacillus cereus*
1 (3%) *Listeria*
1 (3%) *Shigella*

Probable Source of Contamination

The source of contamination was reported for 7 of the dairy related outbreaks resulting from **pasteurized dairy products**, of which at least 4 (57%) were probably due to post-pasteurization contamination by an infected food handler. Failure of the consumer to store the dairy product at an appropriate temperature probably contributed to 3 other outbreaks. Temperature abuse can enable pathogens (present because they either survived pasteurization in low numbers or were introduced after pasteurization) to multiply to concentrations capable of causing illness.

The source of contamination was reported for 9 of the dairy related outbreaks resulting from **unpasteurized dairy products**, of which 7 (78%) were associated with dairy products obtained directly from the producing dairy farm, 1 was associated with unpasteurized dairy products obtained under a communal program to purchase shares in dairy cows, and 1 was limited to members of a large extended family who consumed unpasteurized milk from their own cow.

All outbreaks involving **unpasteurized dairy products** were associated with bacterial enteric pathogens, most of which have known **animal reservoirs** that could be related to:

- Cow feces coming into direct contact with the milk
- Infection of the cow's udder (mastitis)
- Cow diseases (e.g., bovine tuberculosis)
- Bacteria that live on the skin of cows
- Environment (e.g., feces, dirt, processing equipment)
- Insects, rodents, and other animal vectors
- Humans, for example, by cross-contamination from soiled clothing and boots

In contrast, among outbreaks in which a **pasteurized dairy product** was implicated, the most commonly reported causative agent was norovirus (44% of outbreaks), a pathogen with a **human reservoir**. These results suggest that outbreaks caused by unpasteurized dairy products are probably caused by pathogens in the dairy environment which would be eliminated by proper pasteurization, and that outbreaks caused by pasteurized dairy products are probably caused by contamination of the products at some point after pasteurization. The object of pasteurization is to eliminate from fluid milk those pathogens that originate in the dairy environment. However, pasteurization does not protect against contamination that might occur later, such as during food handling. If pasteurization is not performed at the appropriate time and temperature, pathogens might not be eliminated from the milk. Appropriate post-pasteurization food-handling practices can minimize the risk for reintroduction of pathogens into dairy products after pasteurization. In addition, other precautions such as maintaining the dairy product at an appropriate temperature and disposing expired products, reduce the risk to the consumer should the product become contaminated after pasteurization.

When outbreaks occur from contaminated dairy products that are marketed as pasteurized, the source of contamination is typically traced to:

- Improper pasteurization
- Improper storage
- Improper handling of the products after marketing
- All of the above

In a recent study conducted by the Centers for Disease Control and Prevention (CDC), all outbreaks associated with pasteurized products for which information on the source of contamination was available were attributed to post-pasteurization mishandling.

Of the 73 outbreaks involving unpasteurized dairy products, two were excluded from analysis because they occurred in multiple states with differing laws. Of the 71 outbreaks analyzed:

- 55 (77%) occurred in states where sales of unpasteurized dairy products produced in that state were legal.
- 1,526 persons became ill and 1,112 (73%) of these illnesses occurred in states where it was legal to sell unpasteurized dairy products.
- 15 occurred in states where sales of unpasteurized dairy products were illegal.
- 1 outbreak occurred in a state that had changed the status from illegal to legal.

In states where it was legal to sell unpasteurized dairy products, the rate of outbreaks caused by unpasteurized fluid milk was more than twice as high (2.20, 95% CI 1.14–4.25) as in states where it was illegal to sell unpasteurized dairy products. Additionally, in states where it was legal to sell unpasteurized dairy products, there were more than five times the rate of outbreaks caused by cheese made from unpasteurized milk (5.70, 95% CI 1.71–19.05).

Discussion and Summary

According to the CDC report, between 1993 and 2006, the incidence of outbreaks caused by unpasteurized dairy products was higher in states that permitted the sale of unpasteurized dairy products than in states that prohibited such sale. This association was evident for unpasteurized fluid milk and cheese made from unpasteurized milk.

Because consumption of unpasteurized dairy products is uncommon in the United States, the high incidence of outbreaks and outbreak-associated illness involving unpasteurized dairy products is remarkable and greatly disproportionate to the incidence involving dairy products that were pasteurized.

In a population-based survey conducted in 1996-1997, only 1.5% of respondents reported having consumed unpasteurized dairy products in the 7 days before being interviewed. In the 2003-2004 and 2005-2006 National Health and Nutrition Examination Surveys, less than 1% of respondents who drank milk reported that they usually drank unpasteurized milk. Because many of these respondents also reported consuming pasteurized dairy products, **the proportion of dairy products consumed unpasteurized by volume or weight is probably less than 1%.**

CDC reports that the incidence of reported outbreaks involving unpasteurized dairy products was about 150 times greater, per unit of dairy product consumed, than the incidence involving

pasteurized products. Further, among outbreak-associated cases involving unpasteurized dairy products, 60% involved persons younger than 20 years of age.

Public health and regulatory authorities are obligated to protect persons who cannot make fully informed decisions (e.g., children) from potential health hazards. Dietary decisions for younger children, in particular, are often made by caregivers. The American Academy of Pediatrics advises against giving unpasteurized dairy products to children and recommends that pediatricians counsel caregivers against use of these products.

Proportionately more persons were hospitalized during outbreaks caused by unpasteurized (13%) than by pasteurized dairy products (1%). This observation suggests that infections associated with unpasteurized dairy products might be more severe, and this is consistent with the more frequent identification of bacterial, rather than viral or toxic, causative agents and with the larger proportion of illnesses affecting children.

In summary, foodborne outbreaks involving dairy products continue to be a public health problem in the United States, and this problem is disproportionately attributable to unpasteurized dairy products.

Since 1987, when the US Food and Drug Administration (FDA) prohibited distribution of unpasteurized dairy products in interstate commerce for sale to consumers, all legal sale and distribution has occurred within states that permit the sale of unpasteurized dairy products that originated in that state. However the extent of illegal distribution in interstate commerce continues to be unknown.

According to CDC studies, credible evidence is lacking for health benefits of unpasteurized dairy products beyond the benefits of otherwise equivalent pasteurized products.

A recent CDC analysis shows that legal intrastate sale of unpasteurized dairy products is associated with a higher risk for dairy-related outbreaks, and implies that restricting sale of unpasteurized dairy products reduces the risk for dairy-related outbreaks within that state.

Although warning labels and signs or government-issued permits are prudent where the sale of unpasteurized dairy products is legal, they have not been shown to be effective. Further, based on a recent CDC analysis, such measures do not reduce the incidence of outbreaks involving unpasteurized dairy products to the degree that pasteurization does.

CDC recommends that consumption of unpasteurized dairy products cannot be considered safe under any circumstances. Public health officials at all levels should continue to develop innovative methods to educate consumers and caregivers about the dangers associated with unpasteurized dairy products. State officials should consider further restricting or prohibiting the sale or distribution of unpasteurized dairy products within their states. Pasteurization is the most reliable and feasible way to render dairy products safe for consumption.

Source: CDC Emerging Infectious Diseases 2012