

Dairy foods involved with few disease outbreaks

Our track record has improved greatly, but we can't let our guard down. Avoid drinking raw milk.

by Kathryn J. Boor and Ruth N. Zadoks

MORE than a century ago, anecdotal observations that linked milk consumption with certain diseases spurred scientists and physicians around the world to investigate milk's role in foodborne diseases. The Public Health Service in 1925, reported that unpasteurized milk was associated with many serious diseases, including diphtheria, typhoid, tuberculosis, and brucellosis.

The PHS reports provided evidence that control of milkborne diseases would require sanitation measures all along the food system. The early reports also highlighted need for research to determine the effectiveness of food processing. This technical research led to development of specific pasteurization strategies. Currently, the public health objective of pasteurization, defined in the 2001 "Grade A Pasteurized Milk Ordinance" (PMO), is to eliminate all nonspore-forming pathogens commonly associated with milk.

The PMO serves as the basis for state and local laws regulating milk producers, processors, distributors, and retailers. It is recognized by public health agencies and the dairy industry as the national standard.

In the 1930s and '40s, *Mycobacterium tuberculosis* was considered to be the most heat-resistant pathogen associated with milk. There was extensive research to determine the heat treatment required. In the 1940s and '50s, a significant number of Q-fever cases were attributed to milk. *Coxiella burnetii*, the causative agent of Q-fever, was found to be more heat resistant than *M. tuberculosis*. Thus, there was new research to define new processing conditions. In 1956, our current minimum pasteurization time and temperature combinations (161°F for 15 seconds or 145°F for 30 minutes) were established.

Some microbes that may be present in raw milk can survive pasteurization. Spore-forming bacteria, including those of the *Bacillus* and *Clostridium* genera, are among the heat resistant. *Bacillus* species can cause milk spoilage; some also can cause foodborne illness.

The public health risk associated with these organisms in processed products is not considered significant under the current PMO. However, it is important to recognize that pasteurization is not intended to sterilize raw milk.

The Johne's/Crohn's question . . .

The ability of current pasteurization conditions to kill *Mycobacterium avium* subsp. *paratuberculosis* (MAP), the bacterium that causes Johne's in cattle, is uncertain. MAP has been associated with — but not proven to cause — Crohn's disease in humans. Live *Mycobacteria* have been isolated from pasteurized retail milk in England. Further, current pasteurization conditions will not ensure the complete destruction of some toxins, such as the enterotoxins that may be produced by *Staphylococcus aureus*, present in tank milk on many farms.

On April 12, 2002, the FDA alerted health care professionals about an emerging pathogen, *Enterobacter sakazakii*. *E. sakazakii* can cause sepsis, meningitis, or necrotizing enterocolitis in newborns, and particularly in premature infants, or others with weakened immune systems.

The FDA has not reported *E. sakazakii* infections among healthy full-term infants in home settings; nor have illnesses been associated with liquid infant formulas. But emergence of newly

Outbreaks of foodborne disease associated with dairy products				
Year	Product and/or source	Organism	Illnesses	Location
1. 1985	Mexican-style white cheese, environment and equipment grossly contaminated	<i>Listeria monocytogenes</i>	145	CA
2. 1985	Mexican-style soft cheese, illegally imported, raw milk suspected	<i>Brucella melitensis</i>	9	TX
3. 1985	Pasteurized 2% milk; postpasteurization contamination	<i>Salmonella</i> Typhimurium	16,000 confirmed; 160,000-plus cases estimated	IL
4. 1992	Imported Irish soft unpasteurized cows' milk cheese	<i>Salmonella</i> Dublin	42	UK
5. 1994	Unpasteurized soft cheese cross-contaminated in plant	<i>Salmonella</i> Berta	82	Ont., Can.
6. 1994	Chocolate milk, poor equipment and sanitation	<i>Listeria monocytogenes</i>	45	IL
7. 1994	Ice cream premix trailers that had previously carried nonpasteurized liquid eggs	<i>Salmonella</i> Enteritidis	224,000 (estimate)	MN
8. 1996	Formula dried milk for infants	<i>Salmonella</i> Anatum	19	France, UK
9. 1997	Mexican-style soft cheese (raw milk)	<i>Salmonella</i> Typhimurium DT104	54	WA
10. 1997	Raw milk, contaminated by cows	<i>E. coli</i> O157:H7	6	OR
11. 1998	Fresh cheese curds, unpasteurized	<i>E. coli</i> O157:H7	55	WI
12. 2000	Low-fat milk and powdered skim milk; milk past code date	Staphylococcal enterotoxin A, produced by <i>S. aureus</i>	14,700	Japan
13. 2000	Bottled pasteurized milk, possibly post-pasteurization contamination	<i>Yersinia enterocolitica</i>	10	VT, NH
14. 2000	Morbier cheese (unpasteurized)	<i>Salmonella</i> Typhimurium	113	France
15. 2002	Raw milk obtained through cow-lease program	<i>Campylobacter jejuni</i>	5	WI
16. 2002	Visit to dairy farm with <i>E. coli</i> infected cows and calves	<i>E. coli</i> O157:H7	51	PA
17. 2003	Farmstead Gouda cheese	<i>E. coli</i> O157:H7	11	Alb., Can.

recognized agents such as *E. sakazakii* highlights the fact there is a great deal more to be learned about microbes that may be associated with dairy products and other animal-based foods.

Dairy foods appear to be responsible for a relatively small proportion of U.S. foodborne illness outbreaks. See table.

Most outbreaks were associated with consumption of raw milk products or products contaminated by raw milk. Human disease also can result from close contact with cattle. These outbreaks illustrate the possibility of microbiological hazards in unpasteurized milk, as well as the need to develop effective interventions to control pathogens on the farm. Several outbreaks (including some of those associated with raw milk product consumption) were associated with post-processing contamination.

The low number of milkborne disease outbreaks is directly credited to application of regulations in the PMO. To illustrate, the 2001 revision of the PMO states that 25 percent of all disease outbreaks due to contaminated food and water were a consequence of consumption of milk products in 1938. Currently, consumption of contaminated dairy foods is associated with less than 1 percent of reported outbreaks. This reduction primarily is possible due to near universal implementation of pasteurization for fluid milk products in the U.S. It also reflects the improved health status of our dairy herds.

What you can do . . .

Here are some main points to reduce risks of dairy-borne disease:

- To control the spread of dangerous microbes, segregate animals with diarrhea or obvious illness, including clinical mastitis.
- Use good udder prep practices such as hair removal, washing, drying, and predipping. Keep the milking units clean during use.
- Presence of hair, dirt, and foreign objects on your in-line filters means that you have unwanted bacteria in your milk as well. Be sure to change filters every milking and keep milking equipment sanitized between milkings.
- Replace gaskets and rubber parts, including inflations, regularly, **before** they show visible wear. Bacteria can grow in microscopic cracks.
- Be certain to wash hands before eating and drinking, especially if you've been in the barn. Make sure that children wash hands after visiting the barn or after working with cattle, and keep them away from sick pens.
- Pasteurize milk, or buy store milk.

Despite the clear link that has been established between raw milk consumption and foodborne illnesses, some consumers, including many milk producers, continue to drink raw milk. Drinking raw milk is risky behavior that can lead to serious illness. People are free to make choices, but they should avoid consuming raw milk or do so based on informed consent.

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