

## Editorial on Pasteurization

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### EDITORIAL

Pasteurization and heat-treatment process that destroys pathogenic microorganisms in certain foods and beverages, it is named for the French scientist Louis Pasteur, who in the 1860s demonstrated that abnormal fermentation of wine and beer could be prevented by heating the beverages to about 57°C (135°F) for a few minutes. Pasteurization of milk, widely practiced in several countries, notably the United States, requires temperatures of about 63°C (145°F) maintained for 30 minutes or, alternatively, heating to a higher temperature, 72°C (162°F), and holding for 15 seconds (and yet higher temperatures for shorter periods of time). The times and temperatures are those determined to be necessary to destroy the *Mycobacterium tuberculosis* and other more heat-resistant of the non-spore-forming, disease-causing microorganisms found in milk. The treatment also destroys most of the microorganisms that cause spoilage and so prolongs the storage time of food.

Ultra-high-temperature (UHT) pasteurization involves heating milk or cream to 138°C to 150°C (280° to 302°F) for one or two seconds. Packaged in sterile, hermetically sealed containers, UHT milk may be stored without refrigeration for months. Ultra pasteurized milk and cream are heated to at least 138° C for at least two seconds, but because of less stringent packaging they must be refrigerated. Shelf life is extended to 60–90 days. After opening, spoilage times for both UHT and ultra-pasteurized products are similar to those of conventionally pasteurized products. Pasteurization of some solid foods involves a mild heat treatment, the exact definition of which depends on the food. Radiation pasteurization refers to the application of small amounts of beta or gamma rays to foods to increase their storage time.

Milk is an excellent medium for microbial growth, and when

stored at ambient temperature bacteria and other pathogens soon proliferate. The US Centers for Disease Control (CDC) says improperly handled raw milk is responsible for nearly three times more hospitalizations than any other food-borne disease source, making it one of the world's most dangerous food products. Diseases prevented by pasteurization can include tuberculosis, brucellosis, diphtheria, scarlet fever, and Q-fever; it also kills the harmful bacteria *Salmonella*, *Listeria*, *Yersinia*, *Campylobacter*, *Staphylococcus aureus*, and *Escherichia coli* O157:H7, among others. Pasteurization is the reason for milk's extended shelf life. High-temperature, short-time (HTST) pasteurized milk typically has a refrigerated shelf life of two to three weeks, whereas ultra-pasteurized milk can last much longer, sometimes two to three months. When ultra-heat treatment (UHT) is combined with sterile handling and container technology (such as aseptic packaging), it can even be stored unrefrigerated for up to 9 months.

Before the widespread urban growth caused by industrialization, people kept dairy cows even in urban areas and the short time period between production and consumption minimized the disease risk of drinking raw milk. As urban densities increased and supply chains lengthened to the distance from country to city, raw milk (often days old) became recognized as a source of disease. For example, between 1912 and 1937 some 65,000 people died of tuberculosis contracted from consuming milk in England and Wales alone. In the early 1900s, in Arizona, Jane H. Rider "publicized the link between infant mortality and contaminated milk, and finally convinced the dairy industry to pasteurize milk." Developed countries adopted milk pasteurization to prevent such disease and loss of life, and as a result milk is now widely considered one of the safest foods.

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