

Subject: Health Implications of Raw Milk

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Introduction: Human Health Implications of Raw Milk Consumption

Due to the significant public health risks associated with the consumption of raw milk, the Vermont Department of Health opposes any changes that would loosen the regulations surrounding the sale of raw milk to the public. The role of raw milk and other unpasteurized dairy products in the transmission of pathogens is well-documented. As described below, the consumption of raw milk poses a significant risk for illness, paralysis and even death.

The pasteurization of milk to prevent harmful infections is one of the great public health triumphs of the 20th century. In 1938, before milk pasteurization was widespread, an estimated 25% of all foodborne outbreaks were associated with milk. By 2001, this decreased to <1% (Center for Food Safety and Applied Nutrition).

Disease-causing pathogens such as *Brucella abortus*, *Campylobacter jejuni*, *Coxiella burnetii*, Cryptosporidium, Shiga toxin-producing *Escherichia coli*, *Listeria monocytogenes*, and *Salmonella* species can contaminate milk during the milking process because they are shed in the feces or milk of healthy animals, including cows and goats. The Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), American Academy of Pediatrics, American Academy of Family Practitioners, American Veterinary Medical Association, National Association of State Public Health Veterinarians, and many other medical and scientific organizations recommend pasteurization for all animal milk intended for consumption by people. In addition, CDC, FDA, and the American Veterinary Medical Association (AVMA) do not recommend raw animal products, including milk, for pet diets because of the risk for bacterial or parasitic contamination that can affect pets and their owners.

Human infection with some of these pathogens can cause severe illness with long-term consequences, such as hemolytic uremic syndrome, which can result in kidney failure, and Guillain-Barré syndrome, which can cause paralysis. Children aged less than 5 years old, adults aged 65 years or older, pregnant women, and people with weakened immune systems, such as people with cancer, an organ transplant, or HIV are at particular risk for severe health outcomes or death.

Consumers of raw milk expect that the milk they are receiving is safe and free of pathogens. Adherence to good hygienic practices during the milking process can reduce, but not eliminate, the risk of milk contamination. Pasteurization is the only way to ensure that fluid milk and products made from it do not contain harmful pathogens. Milk contamination can occur multiple ways including, animal feces coming into direct contact with milk, infection of the udder (mastitis), through the environment (e.g. feces, dirt, and processing equipment), and cross-contamination from dairy workers, such as contact with dirty hands, clothing, or boots. Pasteurization is the only way to kill pathogens in milk that can make people very sick.

Infectious Diseases Associated with Raw Milk Consumption

Campylobacteriosis is caused by infection with *Campylobacter* sp. bacteria. People with *Campylobacter* infection usually have diarrhea (often bloody), fever, and abdominal cramps. In people with weakened immune systems, *Campylobacter* occasionally spreads to the bloodstream and causes a life-threatening

infection. Some studies estimate that 5–20% of people with *Campylobacter* infection develop irritable bowel syndrome for a limited time and 1–5% develop arthritis.

Approximately 1 in every 1,000 reported *Campylobacter* illnesses lead to Guillain-Barré syndrome (GBS). GBS occurs when a person's immune system is triggered by an earlier infection. GBS can lead to muscle weakness and sometimes paralysis that can last for a few weeks to several years, and often requires intensive medical care. While most people recover fully, some have permanent nerve damage or die of GBS. As many as 40% of GBS cases in the United States may be triggered by *Campylobacter* infection. During 2010–2019, 159 of 1,978 (8%) Vermonters with campylobacter infection reported consuming raw milk.

Raw milk can carry, *Escherichia coli* (*E. coli*) bacteria that are pathogenic, meaning they can cause illness and some cause disease by making a toxin called Shiga toxin. The bacteria that make these toxins are called Shiga toxin-producing *E. coli* or STEC. The symptoms of STEC infections vary for each person but often include severe stomach cramps, diarrhea, and vomiting. Approximately 5–10% of people diagnosed with STEC infection develop a potentially life-threatening complication called hemolytic uremic syndrome (HUS). Persons with HUS are hospitalized because they develop kidney failure or other serious problems. Most persons with HUS recover within a few weeks, but some suffer permanent kidney damage or death.

The consumption of raw milk carries with it the possibility of a serious infection caused by the bacteria *Listeria monocytogenes*. The disease primarily affects pregnant women, newborns, older adults, and people with weakened immune systems. Listeriosis is usually a mild illness for pregnant women, but it causes severe disease in the fetus or newborn baby, with each newborn/fetal case costing an estimated \$48,000 in hospitalization and health care costs. When listeriosis occurs during pregnancy, it can cause miscarriage, stillbirth, or newborn death. Listeriosis during pregnancy results in fetal loss in ~20% and newborn death in ~3% of cases. Some people with Listeriosis, most commonly adults 65 years and older and people with weakened immune systems, develop severe infections of the bloodstream (causing sepsis) or brain (causing meningitis or encephalitis). Most people with invasive listeriosis require hospital care, and about one in five people with the infection die.

Outbreaks Associated with Raw Milk Consumption

The risk of an outbreak caused by raw milk is at least 150 times higher than the risk of an outbreak from pasteurized milk (Langer *et al.* 2012). Raw milk is available for sale in many states, and CDC data show that the rate of raw milk-associated outbreaks is 2.2 times higher in states where the sale of raw milk is legal compared with states where sale of raw milk is illegal. During 2007–2012, 81% of outbreaks were reported in states where the sale of raw milk was legal; 59% of outbreaks involved at least one child younger than 5 (Mungai *et al.* 2015).

Reported outbreaks represent only the tip of the iceberg. For every outbreak and illness that is reported, many others occur that are not reported. The actual number of illnesses associated with raw milk and raw milk products is likely much greater. Based on a CDC report, during 1993–2006, unpasteurized dairy products resulted in 73 known outbreaks – causing 1,571 cases of foodborne illness, 202 hospitalizations, and 2 deaths (Langer *et al.* 2012).

The legal status of nonpasteurized milk sales in one state can lead to outbreaks in neighboring states. In February 2021, Maine and New Hampshire public health officials identified multiple cases of

campylobacteriosis in residents of both states, including 30 cases of campylobacteriosis among Maine residents. At least two Maine residents have been hospitalized. Individuals reported recent purchases of unpasteurized/raw milk from a New Hampshire farm.

In late October 2018, a New York resident became ill after drinking raw milk originating from a farm in Pennsylvania. The CDC confirmed the illness was due to *Brucella abortus* RB51, a live attenuated strain of *Brucella* used in veterinary vaccines. Human *Brucella abortus* RB51 infections is undetectable by routine diagnostics and resistant to a first-line antibiotic used to treat human brucellosis.

In early 2017, CDC, Vermont Department of Health, other state public health agencies, and the FDA investigated a multistate outbreak of *Listeria monocytogenes* infections. Eight people infected with the outbreak strain of *Listeria* were reported from four states. All eight people were hospitalized, including two people who died; one was a Vermonter. One illness was reported in a newborn. Cases were traced to a common source of raw milk cheese from one creamery in New York, which has permanently closed as a result of the outbreak.

In 2010, the Vermont Department of Health investigated 3 outbreaks of *Campylobacter* infection associated with raw milk consumption:

1. The first outbreak occurred in June among guests of a bed and breakfast and included two farm workers who worked on the dairy farm where the bed and breakfast was located. A total of ten cases were identified. Two of the cases were young children visiting from Connecticut who experienced febrile seizures and had to be taken to the Emergency Department. All patients in this outbreak reported drinking raw milk. The bed and breakfast owner did not sell raw milk but incorrectly assumed that the current law allowed her to serve raw milk to her guests.
2. The second outbreak occurred in August and involved inmates at a work camp associated with a correctional facility. While painting fences at a nearby dairy farm, the work crew was offered raw milk to drink by the owner of the farm. Five of the ten inmates and the Crew Officer developed a diarrheal illness within a few days of drinking the raw milk. Three of the cases submitted stool samples which tested positive for *Campylobacter* sp. All of the ill people drank the raw milk.
3. The third outbreak occurred in December and involved students on a field trip to a local dairy farm. Ten students and one teacher became ill with diarrheal illness after visiting the farm. Two people visited the Emergency Departments and submitted stool samples which tested positive for *Campylobacter* sp. Cases were ill for an average of 6 days, and 80% missed at least one day of school. All ill persons drank raw milk which was offered during the field trip at the end of the farm tour.

Conclusions

To protect the health of Vermonters, the Vermont Department of Health continues to support pasteurization of dairy products to protect the health of Vermonters. To summarize:

- Consumption of raw milk can cause dangerous infections and has caused many illnesses in Vermonters.

- These illnesses can be very serious and life-threatening, especially for people who are older, younger, pregnant, or with weakened immune systems.
- There are economic burdens associated with these outbreaks that are borne by the state, healthcare systems, and farmers.
- Pasteurization of milk has led to dramatic reductions in human illnesses and infections and is considered one of a public health's most effective food safety interventions.

Sources

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