

Presented by Julie Smith, DVM, PhD, Research Associate Professor, Department of Animal & Veterinary Sciences, University of Vermont

March 25, 2021

A common illness from raw milk prior to the implementation of the pasteurized milk ordinance was tuberculosis. Control programs for tuberculosis and brucellosis in cattle have significantly reduced the risk of these diseases being spread in milk, and pasteurization ensures that is the case. Despite these diseases being well controlled in this country, other pathogens or disease-causing microorganisms, particularly those which cause foodborne illness, remain a concern. Those carrying antimicrobial resistance are of increasing concern. Here are some of the milk-borne pathogens of concern today: *Campylobacter* spp., *Salmonella* spp., Shiga toxin-producing *E. coli* (STEC), *Listeria monocytogenes*, *Brucella* spp., *Cryptosporidium* spp. (which is a protozoan parasite – 10 oocytes or eggs can make you sick), and *Coxiella burnetii* (which is also listed as a select agent).

I would like to share the following statistics from a 2017 article in the journal *Emerging Infectious Diseases* and 2020 data from the Centers for Disease Control and Prevention or CDC. From 2009 to 2014, unpasteurized milk and cheese were found to be responsible for 96% of illnesses caused by the consumption of contaminated dairy products. Such products were consumed by only 3.2% and 1.6% of the population consuming milk and cheese, respectively. On the basis of exposure risk, consumers of unpasteurized dairy products were therefore over 800 times more likely to experience an illness and 45 times more likely to be hospitalized than consumers of pasteurized dairy products.¹ Such outbreaks are highly correlated geographically with the legality of raw milk sales. Slightly over 80% of milk-borne disease outbreaks occurred in states where it was legal to sell raw milk.²

Some argue that foodborne illness occurs from pasteurized products, too. This is true. But from an exposure risk perspective, the likelihood of foodborne illness from pasteurized dairy products is much lower. For instance, in the six years from 2009 – 2014, there were 53 outbreaks of campylobacteriosis linked to unpasteurized milk products. These outbreaks resulted in 465 illnesses and 56 hospitalizations, compared to only one outbreak with two illnesses linked to pasteurized milk.¹ In the same time period, there were eight outbreaks of salmonellosis with 83 illnesses and 29 hospitalizations linked to raw dairy product consumption and no salmonellosis related to consumption of pasteurized dairy

products.¹ Thus, in this timeframe, not only were 96% of illnesses linked to dairy products from unpasteurized products, but more than 95% of the illnesses linked to raw dairy products were caused by campylobacter or salmonella.¹

What about brucellosis? This is one of the diseases all cattle in the herd must be tested for. A recent case exemplifies the challenges brucellosis can cause to human health and for the human and animal health authorities. Three unrelated cases of brucellosis investigated by the CDC between July, 2017 and November, 2018 were attributed to the consumption of raw milk containing vaccine-strain *Brucella* RB51.^{3,4,5} This strain of the bacteria, RB51, was specifically developed to allow vaccinated cattle to be differentiated from infected cattle because it does not cause the typical antibody response in animals. It is also resistant to two antibiotics, rifampin and penicillin, which are commonly used to treat brucellosis. Because of the difficulty in treating human infections with the RB51 strain, the CDC issued official health advisories in two of the cases.^{6,7} The milk associated with these cases was also consumed by other people in several states. In response, the CDC updated their letter to public health personnel, "The Ongoing Public Health Hazard of Consuming Raw (Unpasteurized) Milk," which recommended "further restricting or prohibiting the sale and distribution of raw milk and other unpasteurized dairy products..."⁸

Will the routine testing required of certain raw milk producers assure safety? Unfortunately tests indicative of fecal contamination or sanitation issues (total bacteria counts and coliform counts) do not reveal whether or not any specific pathogens are present in the milk. Microbial contamination of raw milk can occur at multiple stages throughout the production process. Dirt does not have to be visible to be deadly. Properly maintaining cold chain especially when transporting products can be difficult. Thus, regardless of the legality of selling or purchasing raw milk, it is recommended that those purchasing raw milk avail themselves of a method to safely and easily pasteurize the milk at home.

Risk management by education (the health warning sign) and limiting volumes sold are imperfect protections. Most insurance companies will not provide liability coverage for producers selling raw milk for this reason.

References

- ¹Costard S, Espejo L, Groenendaal H, Zgmutt FJ. Outbreak-related disease burden associated with consumption of unpasteurized cow's milk and cheese, United States, 2009–2014. *Emerg Infect Dis*. 2017;23(6):957-964. doi:10.3201/eid2306.151603
- ²Centers for Disease Control and Prevention (CDC). Raw Milk: Know The Raw Facts. <https://www.cdc.gov/foodsafety/pdfs/raw-milk-infographic2-508c.pdf>. Published 2017. Accessed April 6, 2020.
- ³Cossaboom, Caitlin M. Kharod GA, Salzer JS, Tiller R V., et al. Brucella abortus Vaccine Strain RB51 Infection and Exposures Associated with Raw Milk Consumption — Wise County, Texas, 2017. *Morb Mortal Wkly Rep - Notes from F*. 2019;67(9):286. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5844281/pdf/mm6709a4.pdf>.
- ⁴CDC. People in Four States May Be Drinking Contaminated Raw Milk. 2017. <https://www.cdc.gov/media/releases/2017/p1121-contaminated-raw-milk.html>.
- ⁵CDC. Brucellosis exposures from raw milk | CDC Online Newsroom. CDC Food Safety Alert. <https://www.cdc.gov/media/releases/2019/s0211-brucellosis-raw-milk.html>. Published 2019. Accessed March 31, 2020.
- ⁶CDC. Rifampin/Penicillin-Resistant Strain of RB51 Brucella Contracted from Consumption of Raw Milk. Health Alert Network. <https://emergency.cdc.gov/han/han00407.asp>. Published 2017.
- ⁷CDC. Third Case of Rifampin/Penicillin-Resistant Strain of RB51 Brucella from Consuming Raw Milk. Health Alert Network. <https://emergency.cdc.gov/han/han00417.asp>. Published 2019.
- ⁸Tauxe R, McQuiston J, Kersh G. The Ongoing Public Health Hazard of Consuming Raw (Unpasteurized) Milk. https://www.michigan.gov/documents/mdhhs/Raw_Milk_Letter_644581_7.pdf. Published 2019. Accessed April 3, 2020.