Academy of Nutrition and Dietetics

Nutrition FACT CHECK

Raw Milk

In recent years, the popularity of consuming unpasteurized or raw milk has grown, developing into a nationwide trend despite the well-documented risks of foodborne illness.[1] Supporters and producers of raw milk claim that it can help reduce conditions such as allergies, autism, inflammatory bowel disease and lactose intolerance.[2,3,4] At the same time, this trend has prompted considerable public discussion regarding the true balance of potential benefits and health risks associated with consuming unpasteurized milk.[5] Lando et al. (2022) analyzed nationally representative data from 2016 and 2019 to characterize U.S. adults who consume unpasteurized milk and to estimate consumption frequency. Overall, 4.4% of adults reported drinking raw milk at least once in the previous year. Notably, nearly one-quarter (23.2%) of those who drank raw milk in the past year reported weekly or more frequent intake.[6]

Raw milk refers to milk that has not undergone pasteurization, a process that heats milk to a specific temperature and then cools it quickly.[7] The key purpose of pasteurization is to eliminate harmful microorganisms. This includes the elimination of disease-causing microorganisms; destroying most spoilage microbes; and deactivating enzymes that can shorten shelf life. Because raw milk has not undergone pasteurization, it can contain harmful bacteria, and consuming it can lead to symptoms including nausea, vomiting, diarrhea, fever, abdominal pain, and headaches. In some cases, it can cause severe or life-threatening illnesses. Certain groups, such as children under 5 years of age, adults 65 and older, individuals with compromised immune systems and pregnant people, face a higher risk of severe illness or death if they become infected with enteric pathogens.[8,9]

Before pasteurization became common in the late 1800s, milk from animals was a leading source of foodborne disease.[10] Once its value as a public health intervention was recognized, pasteurization became mandatory in several regions of Canada and the United States during the early 20th century and has been required nationwide in Canada since 1991.[10,11] In 1987, the U.S. Food and Drug Administration (FDA) banned the interstate sale of raw milk intended for direct consumer use. Despite this federal restriction, many states permit the sale of these products within their borders, and outbreaks of illnesses linked to consuming unpasteurized dairy products continue to be reported.[12,13] A foodborne disease outbreak occurs when at least two cases of a similar illness results from ingestion of a common food.[8]

Pasteurization Process

Established Established pasteurization parameters are specifically intended to inactivate *Mycobacterium tuberculosis* and *Coxiella burnetiid*.[14,15] Pasteurization methods are generally categorized by the temperature and duration of heat. High-temperature, short-time (HTST) pasteurization methods are often called 'low pasteurization' and typically heat milk to 162°F (72°C) for 15 seconds. Low-temperature, long-time (LTLT) pasteurization, on the other hand, involves heating milk to 145°F (63°C) for 30 minutes or 154°F (68°C) for 10 minutes.[5,14] Safety precautions do not end with pasteurization. Quickly cooling the milk after heating, maintaining sanitation when handling and storing it in a sealed container at 40°F (4°C) or lower are all key steps in keeping milk safe.

Nutrient Composition of Raw and Pasteurized Milk

The Center for Disease Control and Prevention (CDC) and the FDA report that pasteurized milk provides comparable nutrients to raw milk but without the associated safety risks.[16,17] Research from single studies and meta-analyses consistently show no significant nutritional advantage of raw milk over pasteurized milk.[18,19,20]

Pasteurization does not significantly alter milk protein quality. Although minor denaturation of whey proteins (<7%) may occur, this has no measurable effect on their nutritional value.[21] Pasteurization does not significantly affect mineral content, as minerals are largely heat-stable. Small losses (≤10%) may occur for certain vitamins, including vitamin C, E, B1, B6, B12 and folate;[19,20] however, this has little impact on total dietary intakes, as most of these

vitamins, besides B12, are present in small amounts even before pasteurization. Riboflavin (B2), despite being largely heat stable, has been shown to be lower in pasteurized milk.[20] Despite the statistically significant but small reduction, riboflavin content of milk remains relatively high compared to many foods. Given the modest nutritional changes, many experts and regulatory bodies conclude that the safety benefits of pasteurization generally outweigh the downsides.

Associated Risks and Health Impacts of Raw Milk

Risks Associated with Raw Milk Consumption

By the early 20th century, raw milk was recognized as a major source of infectious diseases, including diphtheria, typhoid, tuberculosis and brucellosis. By 1938, it accounted for approximately 25% of foodborne and waterborne outbreaks in the United States, primarily due to contamination from infected animals and unsanitary handling practices.[15]

While overall dairy-related illnesses have declined since 1938, outbreaks in the past two decades have primarily involved *Salmonella enterica*, *Listeria monocytogenes*, *Campylobacter jejuni*, and *E. coli* O157:H7.[22,23] These pathogens can contaminate milk from healthy cows, often via manure or un-sanitized equipment. Prevalence of pathogens in bulk tank milk ranges from 0.9% to 12.6% and is influenced by farm management, hygiene, herd health, season, region and sampling methods.[10,24]

Between 2000 and 2006, 40 outbreaks linked to raw milk consumption were reported in the U.S., resulting in approximately 600 illnesses, primarily caused by *Campylobacter* (33 outbreaks) and *E. coli* O157:H7 (six outbreaks).[25,26] Notable pediatric cases included severe hemolytic urea syndrome (HUS) following consumption from cow-leasing programs in Washington (2005)[27] and California (2006)[28], prompting hospitalization and legal action. The largest *Campylobacter* outbreak occurred in Wisconsin in 2001 (75 cases),[29] and a multi-state *Salmonella* outbreak (62 cases) led the implicated Ohio dairy to relinquish its license.[30] In 2007–2008, raw milk outbreaks continued, including *Salmonella* in Pennsylvania (29 cases)[31]; *Campylobacter* in Kansas, Utah, and California (16–26 cases, one case with Guillain-Barré Syndrome); and *E. coli* O157:H7 in Connecticut and Missouri, with several pediatric HUS cases reported.[32,33,34]

Since 2000, raw milk cheese has also been linked to several outbreaks. Notable events include a 2007 *Campylobacter* outbreak in Kansas (67 cases)[35], *Salmonella* outbreaks in Illinois (85 cases, 2006–2007)[36], and a 2017 outbreak of *Listeria monocytogenes* in four states (8 cases).[37] Additionally, 35 cases of *Mycobacterium bovis* were reported in New York City, primarily linked to imported fresh cheese.[38]

According to Koski et al 2022, from 2013–2018, 75 outbreaks and 675 illnesses were linked to unpasteurized milk in the U.S., with nearly half affecting children and adolescents. Most outbreaks occurred in states permitting sales. Jurisdictions allowing retail sales experienced significantly more outbreaks than those prohibiting or restricting sales to on-farm sales only. These results indicate that greater legal availability of unpasteurized milk is associated with increased outbreak risk.[39]

In October 2023, an outbreak of 171 *Salmonella* Typhimurium cases was linked to raw milk, primarily affecting children under 18. Whole-genome sequencing confirmed the outbreak strain in raw milk, aged cheese and environmental samples. The farm that produced this milk voluntarily recalled products within a week. This outbreak highlights the potential for commercially distributed raw dairy to cause widespread illness and underscores the importance of public awareness of associated risks, especially vulnerable populations.[40]

In November 2025, Illinois Department of Public Health identified an outbreak of eleven cases of *Campylobacter* infection that appear to be linked to consumption of raw milk from a common source.[41]

While raw milk consumption is associated with a higher number of outbreaks, pasteurized milk is not exempt from causing foodborne illness. However, between 2009 and 2014, unpasteurized dairy products were found to cause 840 times more illnesses and 45 times more hospitalizations than pasteurized products.[9] From 2009-2015, 80% of foodborne disease outbreaks caused by dairy were linked to unpasteurized dairy.[42] The higher number of reported raw milk outbreaks may be partly due to detection bias.[43] Raw milk use is often easier to recognize within a small consumer group, whereas linking illness to pasteurized milk can be more difficult, as it is more widely consumed and may not immediately be considered as a culprit.[43] Despite this, raw milk still presents a significant risk, with some

surveys of bulk tank milk and milk filters finding *Salmonella* contamination in 18% of dairy operations in the U.S.[44] As farm management, hygiene, herd health, season and region can influence the prevalence of pathogens in bulk tank milk awaiting pasteurization, these same factors influence the safety of raw milk, highlighting the critical importance of high standards of safe handling practices in the production of milk.

Health Claims About Raw Milk Consumption

Although several health benefits are commonly claimed by proponents of raw milk, available scientific evidence is sparse, largely observational and confounded by environmental and lifestyle factors. These claims generally fall into two broad categories: digestive health and allergy and immune-related outcomes.

Digestive Health

According to the FDA, raw milk does not treat lactose intolerance.[16] Lactose, a disaccharide naturally present in milk at approximately 4.8% in bovine milk,[16] requires the enzyme lactase (β-galactosidase) for digestion. Individuals with lactose intolerance lack sufficient lactase and consumption of any milk, raw or pasteurized, can trigger symptoms. Milk does not naturally contain lactase.

A randomized trial of 16 adults indicated that raw milk did not improve lactose malabsorption or lessen lactose-intolerance symptoms compared with pasteurized milk in adults with confirmed lactose malabsorption.[4] These findings do not substantiate common anecdotal claims that raw milk alleviates lactose-intolerance symptoms.

Claims that raw milk is tolerated because it contains lactase from probiotic bacteria are unfounded, as raw milk does not harbor significant populations of probiotic organisms. Some lactic acid bacteria are considered probiotics, but key strains like *Bifidobacteria* and *Lactobacillus acidophilus* occur at very low levels in raw bovine milk. *Bifidobacteria* in raw milk may indicate fecal contamination and incidental presence through contamination does not meet the requirements for effective probiotic use in commercial products.[5,21]

A recent study examined fecal samples of 24 adults before and after a 12-week on-site farm program consisting of cooking classes and consuming a diet rich in fresh, local produce and unpasteurized dairy.[45] There was a significant increase in *Lactobacillus* abundance in stool samples after the 12-week intervention, which the authors associated with higher intake of unpasteurized dairy.[45] However, the small sample size, lack of a control group and numerous dietary and environmental changes inherent to the farm setting, limit causal interpretation. The study further relied on a food frequency questionnaire to measure intake, and the intensive cooking classes may have improved participant reporting accuracy. Moreover, the food frequency questionnaire does not capture differences in food quality; for instance, fresh seasonal vegetables from the farm can differ nutritionally and microbiologically from canned or mass-produced options participants may have consumed previously, which could influence the gut microbiome independently of raw milk. These findings should therefore be considered preliminary. Importantly, any potential microbiome effects of unpasteurized dairy must be weighed against the well-established public health risks associated with raw milk consumption.

Allergy and Immune-Related Outcomes

Evidence from Brick et al (2019) showed that children who consume raw farm milk have lower rates of asthma, allergies and respiratory infections.[46] These findings were hypothesized to be related to the beneficial effects of some bioactive components that are lost during pasteurization. However, this meta-analysis was based on observational studies, thus limited by range of exposure, confounding factors and information bias. Because raw milk carries infection risks, the authors emphasize that it cannot be recommended as is. Instead, they describe the development of the Milk Against Respiratory Tract Infections and Asthma (MARTHA) clinical trial, which plans on testing whether safe, minimally processed milk that preserves these protective components can offer similar health benefits without the dangers of raw milk.

Several epidemiological studies suggest that early-life exposure to farm environments, including the consumption of unpasteurized milk, is associated with lower rates of asthma, allergies and atopic sensitization in children.[47-51] Raw milk consumption in particular has repeatedly been linked to protective effects, especially when introduced during infancy or even prenatally. However, these findings are largely observational, often rely on self-reported milk handling practices and do not outweigh the well-documented microbiological risks of consuming raw milk. Further, the CDC does not recommend introducing any cow's milk to infants until 12 months of age.[52] Consequently, despite potential associations with reduced allergic disease, public health agencies continue to advise against the consumption of raw milk.

The Prevention of Allergy Risk Factors for Sensitization in Children Related to Farming and Anthroposophic Lifestyle (PARSIFAL) study reported an inverse association between farm milk consumption and asthma or allergy but did not distinguish between raw or pasteurized milk.[51] Approximately half of the farm milk was boiled, and the study could not verify raw milk status. The authors cautioned that raw milk may contain pathogens such as *Salmonella* and should not be recommended as a preventive measure.

Studies also indicate that raw and pasteurized milk have similar allergenic potential. Animal and human studies demonstrate that pasteurization causes minimal changes to casein and limited whey protein denaturation, resulting in comparable allergic responses. In a clinical study of five children with confirmed cow's milk allergy, consumption of raw, pasteurized and homogenized/pasteurized milk all triggered significant and similar allergic reactions, indicating that pasteurization does not reduce milk allergenicity.[53-55]

Likewise, proposed immune-related differences, such as those involving immunoglobulins, also lack evidence. Bovine milk contains low levels of immunoglobulins (0.6–1.0 mg/mL), which are physiologically negligible in humans when consumed directly.[56,57] Immunoglobulin G (IgG) comprises 85–90% of milk immunoglobulins and is largely heat-stable; LTLT pasteurization (145°F/63°C, 30 min) does not alter IgG levels, while HTST (162°F/72°C, 15 s) causes only ~1% denaturation.[58] To date, no controlled studies demonstrate improved immune outcomes from consuming these components from raw milk.

Recommendations from National and International Organizations

Nearly all major national and international health organizations strongly recommend consuming only pasteurized milk and dairy products. These organizations include the American Medical Association, American Academy of Pediatrics, American Veterinary Medical Association, International Association for Food Protection, National Environmental Health Association, American Public Health Association and the U.S. Food and Drug Administration.[16,59-64] In 2012, the U.S. federal government rejected a petition seeking nationwide legalization of raw milk sales, citing scientific evidence supporting the public-health benefits of pasteurization.[65]

Conclusion

Although raw milk is often promoted for its perceived nutritional, immunological or probiotic advantages, there are no controlled human studies to substantiate these claims. Pasteurization does not meaningfully alter the bioavailability of key nutrients, nor does it increase the allergenicity of milk proteins. Likewise, bacteria present in raw milk are not probiotic and frequently originate from the farm environment, infected udder tissues or fecal contamination rather than from human-associated beneficial strains. Evidence indicates raw milk continues to pose well-documented microbiological risks, with repeated outbreaks involving *E. coli* O157:H7, *Campylobacter*, *Salmonella* and *Listeria*, often resulting in severe illness particularly among children. Given the absence of proven health benefits and the persistence of preventable pathogen exposure, pasteurized milk remains the safer and more reliable option for public consumption.

Note from the Academy of Nutrition and Dietetics:

This summary reflects findings from evidence-based research and is a high-level overview of raw milk; this summary is not a comprehensive deep-dive on the topic. The information shared in this summary is up to date as of December 2025.

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