National Environmental Health Association

The National Environmental Health Association (NEHA) represents more than 7,000 governmental, private, academic, and uniformed services sector environmental health professionals in the U.S., its territories, and internationally. This workforce represents the second largest constituent of the existing public health workforce, second only to nursing. We are the profession's strongest advocate for excellence in the practice of environmental health as we deliver on our mission to build, sustain, and empower an effective environmental health workforce.

Policy Statement on Raw Milk

Adopted: July 2023
Policy Sunset: July 2028

NEHA recognizes the nutritional value of milk, as well as the scientific evidence that raw milk or products made from raw milk can transmit pathogenic bacteria to the consumer. NEHA further recognizes the scientific and public health evidence that pasteurization of milk is proven to be a sound method of preventing diseases caused by raw milk and raw milk products. Although, cheese that is made from raw milk should not be consumed, the U.S. does allow raw cheese that has been aged for 60 days or more to be sold (Cheeses and Related Cheese Products, 2023).

NEHA specifically recommends the following:

- Implement legislation that requires pasteurization of all milk prior to sale or distribution to the final consumer, regardless of if a fee is charged.
- Adopt current best practices in food safety by state, local, tribal, territorial, and federal government agencies, as well as industry food safety professionals, to identify, eliminate, and mitigate potential food safety hazards inherent to their operations.
- Educate consumers about the dangers inherent in consuming unpasteurized milk or products made from raw milk.
- Prevent arrangements such as cow shares, herd sharing, bartering, exchange, or any other action that would allow the consumer to obtain a portion of the production of raw, unpasteurized milk from a cow, sheep, or goat.
- Require labeling on containers that warns the consumer that the product is raw milk and could cause illness since it has not been pasteurized.

NEHA has long supported preventive measures to protect the safety of food for the public. NEHA acknowledges the importance of milk as a source of nutrition and is concerned about the safety of milk and milk products. The position of NEHA regarding raw milk is consistent with sound, science-based, preventive public health measures.

Analysis

The U.S. Public Health Service (USPHS) milk sanitation program states that no other food surpasses milk as a single source of obtaining essential nutrients needed for optimal health across all life stages. (U.S. Department of Health and Human Services, 2019). Milk is a nutrient-rich food that provides essential nutrients such as protein, calcium, phosphorus, and vitamins A, D, B12, riboflavin (B2), niacin (B3), and pantothenic acid (B5) (National Dairy Council, 2021).

In its raw state, milk contains a diverse bacterial population, some of which might be pathogenic, including but not limited to *Salmonella* spp., *Staphylococcus aureus*, *Listeria* spp., *E. coli*, *Campylobacter* spp., *Brucella* spp., *Yersinia enterocolitica*, *Shigella* spp., and *Cryptosporidium parvum* (Gopfert et al., 2021; Quiqley et al., 2013). These bacteria are present in raw milk from all dairy animals, including cows, goats, and sheep. The process of pasteurization has been used for more than 100 years to destroy pathogenic bacteria that are present in raw milk (Schmidt & Davidson, 2008). The Food and Drug Administration (FDA, 2022), World Health Organization (WHO, 2001), and Centers for Disease Control and Prevention (CDC, 2023a) endorse the process of pasteurizing milk as a public health control measure.

More than 2.8 million antimicrobial-resistant infections occur in the U.S. every year resulting in more than 35,000 deaths (CDC, 2022). Antimicrobial resistance is when bacteria acquire the capacity to withstand the treatments that were created to stop an infection (CDC, 2022). According to WHO (2020), antibiotic resistance leads to higher medical costs, prolonged hospital stays, and increased mortality, which might result in a post-antibiotic era where common infections and minor injuries could be fatal. In addition to containing disease causing bacteria, raw milk contains microbes that are antibiotic resistant and therefore, drinking raw milk introduces these microbes into the gastrointestinal tract of consumers (Liu et al., 2020). Furthermore, Liu et al. (2020) identified raw milk as a clear source of antibiotic-resistant bacteria and antimicrobial resistance genes due to their higher prevalence in raw milk versus pasteurized milk.

Several regulatory, educational, and public health organizations have issued position papers regarding the dangers associated with the consumption of raw milk. These organizations include:

- American Academy of Pediatrics
- American Medical Association
- American Public Health Association
- American Veterinary Medical Association
- Association of Food and Drug Officials
- Centers for Disease Control and Prevention
- Council of State and Territorial Epidemiologists

- Food and Drug Administration
- International Association for Food Protection
- National Association of State Public Health Veterinarians
- U.S. Animal Health Association

Justification

Milkborne diseases have been reduced greatly through the use of pasteurization. Prior to 1938, milkborne illness represented 25% of all foodborne illness outbreaks (Weisbecker, 2007). As a result of efforts by USPHS and individual states to require the mandatory use of pasteurization, milkborne illness currently represents <1% of all foodborne illness outbreaks (CDC, 2023a). Illnesses and outbreaks caused by the consumption of unpasteurized milk, however, continue to be a public health concern and challenge (Mungai et al. , 2015). From 2011–2021, CDC linked 47 foodborne outbreaks to raw milk where 44 people were hospitalized and 409 reported being ill (CDC, 2023b). Furthermore, 39 outbreaks (83%) occurred in states where the sale of raw milk is legal in some capacity (CDC, 2023b)

Below is a sample of recent outbreaks:

- **May 2014:** A total of 99 people became ill in 7 counties in north Utah who reported cases of *Campylobacter jejuni* from the consumption of raw milk from a licensed dairy. As a result, 10 people were hospitalized and 1 person died. Of the cases, 11 were children <5 years (Davis et al., 2016).
- **June 2014:** Multistate public health officials from California and Florida reported that two people became ill with listeriosis from the consumption of raw milk from a farm. As a result, one person died (Outbreak Database, 2023a).
- **August 2014:** Idaho public health investigators reported that two children became ill with cryptosporidiosis from the consumption of raw goat milk from a licensed diary operation. Samples of raw goat milk yielded positive results for *Cryptosporidium* (Rosenthal et al., 2015).
- **September 2014:** Wisconsin Department of Health Services reported that 38 people became ill with *Campylobacter jejuni* from the consumption of raw milk at a football team potluck dinner. The raw milk consumed at the dinner was obtained from a local farm (Pepin County Health Department & Wisconsin Division of Public Health, 2014).
- **December 2014:** Public health officials in Kentucky reported that five children were infected with *E. coli* O157:H7 from the consumption of raw milk. Of the five children, four developed hemolytic uremic syndrome and some required dialysis (Ungar, 2014).
- **February 2015:** Public health investigators in California reported that eight people became ill with *Campylobacter jejuni* after consuming raw milk from a farm (Outbreak Database, 2023b).

- **May 2015:** The Orange County Health Care Agency reported that three people became ill with campylobacteriosis after consuming raw goat milk from a farm. As a result, one individual was hospitalized (Outbreak Database, 2023c).
- **July 2015:** The Tennessee Department of Health reported that two people became ill with cryptosporidiosis after consuming raw milk from a share program for dairy cows (Outbreak Database, 2023d).
- **March 2016:** State and local public health officials and laboratory and agriculture agencies in Virginia reported that 14 people became ill after consuming raw milk from a herd share program. The vast majority of people that became ill were children. Of the cases, four individuals were confirmed to have had non-O157 Shiga toxin-producing *E. coli* and three individuals developed hemolytic uremic syndrome (Ferrell, 2017).
- **August 2016:** Local and public health officials in Colorado reported that 17 people became ill after consuming raw milk from a herd share program. A total of 12 individuals were confirmed to have had *Campylobacter jejuni*. Two milk samples obtained from the herd share program and from an ill shareholder yielded positive results for the outbreak strain (Burakoff et al., 2018).
- **August 2016:** State and local public health officials and agriculture agencies in Michigan reported that four people became ill with *E. coli* O157:H7 after consuming raw milk from a herd share program. As a result, two individuals were hospitalized. (Outbreak Database, 2023e).
- **December 2016:** Washington health and agriculture agencies reported that three people became ill with *Salmonella* after consuming raw milk from a retail store. All three individuals were hospitalized (Outbreak Database, 2023f).
- **May 2018:** State and local public health officials in Tennessee reported that 15 children people became ill with *E. coli* O157:H7 after consuming raw milk from a local farm. Of the cases, 9 children were hospitalized with 7 children developing hemolytic uremic syndrome (Knox County Health Department, 2018).
- **September 2018:** The Washington Department of Health issued an alert informing consumers of an outbreak of non-O157 Shiga toxin-producing *E. coli* from the consumption of raw milk from a licensed creamery. Laboratory results concluded that one child <5 years and one person in their 70s got ill (Outbreak Database, 2023g).
- **2019–2021:** The National Outbreak Reporting System database reports there were 13 foodborne outbreaks associated with raw milk in the U.S. From these outbreaks, 131 people became ill and 5 people were hospitalized (CDC, 2023b).

Moreover, the occurrence of outbreaks due to raw milk has been found to positively correlate with the legal status of raw milk sales within a state. In a review of raw milk-associated outbreaks reported to CDC during 1972–1992, Headrick et al. (1998) found that the rate of raw milk-associated outbreaks was higher in states in which the sale of raw milk was legal. CDC data support this observation in that 78% of single state outbreaks linked to raw milk

between 2013-2018 were in states where the sale of unpasteurized milk was allowed (CDC, 2023a). This association was validated in an examination of outbreaks occurring between 2007–2012 (Mungai et al., 2015).

Recently, advocates for the consumption of natural foods have approached legislators to allow the sale of raw milk to consumers. They have contended that the pasteurization process destroys the nutritional benefits of milk. In some instances, these advocates are encouraging the adoption of legislation that would allow individuals to purchase a portion of the production of a milk cow through an arrangement known as a cow or herd share. Related policies differ from state to state on herd shares as it applies to raw milk.

John Sheehan, former director of the FDA Division of Plant and Dairy Food Safety, stated that research shows that there is no significant difference in the nutritional value of pasteurized and unpasteurized milk (Sheehan, 2007). He indicated that casein—the major family of milk proteins—is largely unaffected by pasteurization and any modification in whey protein that might occur is barely perceptible (Bren, 2004).

Furthermore, Sheehan (2007) stated the following:

> Raw milk is inherently dangerous and should not be consumed. Raw milk continues to be a source of foodborne illness and even a cause of death within the United States. Pasteurization destroys pathogens and most other vegetative microbes which might be expected and have been shown to be present in milk.

References

Bren, L. (2004). Got milk? Make sure it's pasteurized. *FDA Consumer*, *38*(5), 29–31. https://foodsafety.wisc.edu/assets/pdf_Files/milk_pasteurized.pdf

Burakoff, A., Brown, K., Knutsen, J., Hopewell, C., Rowe, S., Bennett, C., & Cronquist, A. (2018). Outbreak of fluoroquinolone-resistant Campylobacter jejuni infections associated with raw milk consumption from a herdshare dairy—Colorado, 2016. *Morbidity and Mortality Weekly Report*, *67*(5), 146–148. http://doi.org/10.15585/mmwr.mm6705a2

Centers for Disease Control and Prevention. (2022). *About antimicrobial resistance*. https://www.cdc.gov/drugresistance/about.html

Centers for Disease Control and Prevention. (2023a). *Raw milk questions and answers*. https://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html

Centers for Disease Control and Prevention. (2023b). *National Outbreak Reporting System (NORS): NORS Dashboard*. https://wwwn.cdc.gov/norsdashboard/

Cheeses and Related Cheese Products, 21 C.F.R. § 133 (2023). https://www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-133

Davis, K.R., Dunn, A.C., Burnett, C., McCullough, L., Dimond, M., Wagner, J., Smith, L., Carter, A., Willardson, S., & Nakashima, A.K. (2016). *Campylobacter jejuni* infections associated with raw

milk consumption—Utah, 2014. *Morbidity and Mortality Weekly Report*, *65*(12), 301–305. http://doi.org/10.15585/mmwr.mm6512a1

Ferrell, D. (2017, June 2). *Breakfast of champions—An udderly horrific outbreak of* E.coli *associated with raw milk consumption* [Seminar session]. Virginia Department of Health Field Epidemiology Seminar, Fredericksburg, VA, United States. https://www.vdh.virginia.gov/content/uploads/sites/8/2017/02/2017-FES-Booklet-Final_5_24_17_v5.pdf

Food and Drug Administration. (2022). *Food safety and raw milk*. https://www.fda.gov/food/buy-store-serve-safe-food/food-safety-and-raw-milk

Gopfert, A., Chalmers, R.M., Whittingham, S., Wilson, L., van Hove, M., Ferraro, C.F., Robinson, G., Young, N., & Nozad, B. (2022). An outbreak of *Cryptosporidium parvum* linked to pasteurised milk from a vending machine in England: A descriptive study, March 2021. *Epidemiology & Infection*, *150*, e185. https://doi.org/10.1017/S0950268822001613

Headrick, M.L., Korangy, S., Bean, N.H., Angulo, F.J., Altekruse, S.F., Potter, M.E., & Klontz, K.C. (1998). The epidemiology of raw milk-associated foodborne disease outbreaks reported in the United States, 1973 through 1992. *American Journal of Public Health*, *88*(8), 1219–1221. https://doi.org/10.2105/ajph.88.8.1219

Knox County Health Department. (2018, July 6). *Evidence links* E. coli illnesses *to two sources* [Media release]. https://knoxcounty.org/health/pdfs/mediarelease/E_coli_update_July_06_2018.pdf

Liu, J., Zhu, Y., Jay-Russell, M., Lemay, D.G., & Mills, D.A. (2020). Reservoirs of antimicrobial resistance genes in retail raw milk. *Microbiome*, *8*, Article 99. https://doi.org/10.1186/s40168-020-00861-6

Mungai, E.A., Behravesh, C.B., & Gould, L.H. (2015). Increased outbreaks associated with nonpasteurized milk, United States, 2007–2012. *Emerging Infectious Diseases*, *21*(1), 119–122. https://doi.org/10.3201/eid2101.140447

National Dairy Council. (2021). *Science summary: Milk & health*. https://www.usdairy.com/getmedia/4693350a-1842-4eef-a052-3450eabf2dca/Science-Summary-Milk-Health-2021.pdf?ext=.pdf

Outbreak Database. (2023a). *2014 multistate outbreak of listeriosis linked to Miller's Organic Farm raw milk*. https://outbreakdatabase.com/outbreaks/2014-multistate-oubreak-of-listeriosis-linked-to-millers-organic-farm-raw-milk

Outbreak Database. (2023b). *2015 outbreak of* Campylobacter jejuni *infections linked to Claravale Farm brand raw milk, California*. https://outbreakdatabase.com/outbreaks/2015-outbreak-of-campylobacter-jejuni-linked-to-claravale-farm-brand-raw-milk-california

Outbreak Database. (2023c). *2015 outbreak of* Campylobacter *infections associated with consumption of raw goat milk produced by Claravale Farm, California*.

https://outbreakdatabase.com/outbreaks/2015-campylobacter-associated-with-consumption-of-raw-goat-milk-produced-by-claravale-farm-california

Outbreak Database. (2023d). *2015 outbreak of cryptosporidiosis linked to raw milk, Tennessee*. https://outbreakdatabase.com/outbreaks/2015-cryptosporidiosis-linked-to-raw-milk-tennessee

Outbreak Database. (2023e). *2016 outbreak of* E. coli *O157:H7 linked to raw milk, Michigan*. https://outbreakdatabase.com/outbreaks/2016-outbreak-of-e-coli-o157h7-linked-to-raw-milk-michigan

Outbreak Database. (2023f). *2016–2017 outbreak of* Salmonella *Dublin linked to Pride & Joy Dairy, Washington*. https://outbreakdatabase.com/outbreaks/2016-2017-outbreak-of-salmonella-dublin-linked-to-pride-joy-dairy-washington

Outbreak Database. (2023g). *2018 outbreak of Shiga toxin E. coli linked to Dungeness Valley Creamery raw milk, Washington*. https://outbreakdatabase.com/outbreaks/2018-outbreak-of-shiga-toxin-e-coli-linked-to-dungeness-valley-creamery-raw-milk-washington

Pepin County Health Department, & Wisconsin Division of Public Health. (2014). *An outbreak of* Campylobacter jejuni *infections associated with consumption of unpasteurized milk.* https://foodpoisoningbulletin.com/wp-content/uploads/Pepin-Durand-Campylobacter-Outbreak-Report-FINAL-12-18-141.pdf

Quigley, L., O'Sullivan, O., Stanton, C., Beresford, T.P., Ross, R.P., Fitzgerald, G.F., & Cotter, P.D. (2013). The complex microbiota of raw milk. *FEMS Microbiology Reviews*, *37*(5), 664–698. https://doi.org/10.1111/1574-6976.12030

Rosenthal, M., Pedersen, R., Leibsle, S., Hill, V., Carter, K., & Roellig. D.M. (2015). Notes from the field: Cryptosporidiosis associated with consumption of unpasteurized goat milk—Idaho, 2014. *Morbidity and Mortality Weekly Report*, *64*(7), 194–195. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6407a9.htm

Schmidt, R.H., & Davidson, P.M. (2008). International Association for Food Protection position paper: Milk pasteurization and the consumption of raw milk in the United States. *Food Protection Trends*, *28*(1), 45–47.

Sheehan, J.F. (2007). *Testimony of John F. Sheehan, BSc (Dy), JD, director, Division of Plant and Dairy Food Safety, Office of Food Safety, Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration before the Health and Government Operations Committee, Maryland House of Delegates, March 15, 2007*.

Ungar, L. (2014, October 1). Kids' *E.coli* came from raw milk, state says. *Courier Journal*. https://www.courier-journal.com/story/life/wellness/health/2014/10/01/kids-e-coli-came-raw-milk- state-says/16529069/

U.S. Department of Health and Human Services, Public Health Service, Food and Drug Administration. (2019). *Grade "A" pasteurized milk ordinance* (2019 revision).

https://www.fda.gov/media/140394/download

Weisbecker, A. (2007). A legal history of raw milk in the United States. *Journal of Environmental Health*, *69*(8), 62–63.

World Health Organization. (2001). *WHO recommended strategies for the prevention and control of communicable diseases* (WHO/CDS/CPE/SMT/2001.13). https://apps.who.int/iris/handle/10665/67088

World Health Organization. (2020). *Antibiotic resistance*. https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance

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