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Inside this issue:

Norovirus Activity Winter 2012	1
Raw Milk Review	2
Disease Reporting	6

Norovirus in Pennsylvania, September 2011-March 2012

Overview

Norovirus, sometimes incorrectly called "stomach flu," is the most common infectious cause of acute gastroenteritis in the United States. Norovirus infections may occur at any time of year but are most common in the winter, hence another epithet is "winter vomiting disease." The most frequently reported symptoms are vomiting, diarrhea, nausea, abdominal pain, and muscle aches, sometimes with low-grade fever. Incubation ranges from 12-48 hours, and illness duration is 1-5 days but usually only 1-2 days. The CDC estimates norovirus causes 21 million illnesses, 70,000 hospitalizations and 800 deaths each year. There is no treatment for norovirus, but it is important for ill individuals to stay hydrated. For most persons, norovirus is not a serious illness, but it can lead to complications or even death in the very young and very old due to dehydration. food, or from touching contaminated surfaces.

Norovirus is extremely contagious. Viral particles are shed in both stool and vomitus, and viral shedding may continue for two or three weeks after symptoms end. The virus is commonly acquired through person-to-person contact, from eating contaminated Ill individuals can shed billions of virus particles, but another person may become infected after ingesting a mere 18 virus particles. Norovirus is a sturdy virus that survives freezing or heating to 140°F. It can remain viable at room temperature for up to four weeks. Because there are many variations of the virus, it is possible to be repeatedly infected with norovirus.

Outbreaks

Individual cases of norovirus are rarely reported to health departments because clinical testing for norovirus is rarely done and is not widely available. However, some outbreaks are reported. Outbreaks are typically reported by ill persons, hosts for events at which people became ill (such as weddings or conferences), or by health care providers (such as emergency departments who recognize outbreaks when treating multiple ill persons).

Norovirus is able to spread rapidly in closed settings such as long term care facilities, child care centers, schools, hotels and cruise ships due to its low infectious dose, short incubation period and environmental persistence. The number of reported norovirus outbreaks per year in Pennsylvania has been steadily increasing.

Norovirus Characteristics

Transmission: usually fecal-oral route; can be person-to-person, foodborne, or from touching contaminated surfaces

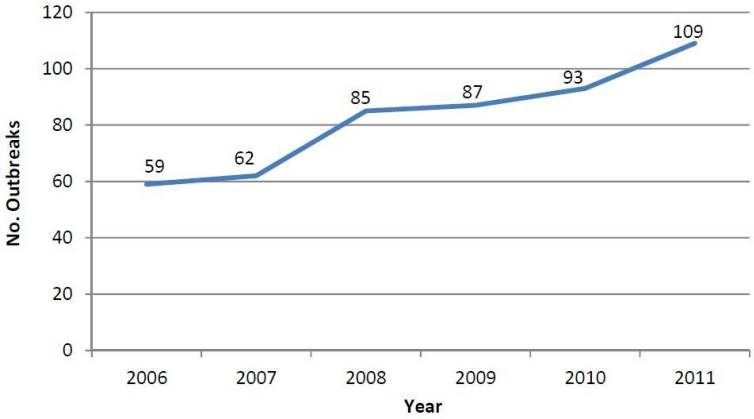
Incubation period: 12-48 hours

Symptoms: vomiting, diarrhea, nausea, abdominal pain, muscle aches; sometimes low-grade fever

Duration of illness: 1-5 days, usually 1-2 days

Period of communicability: during acute stage of illness and possibly up to three weeks after resolution of

Figure 1: Reported Norovirus Outbreaks by Year, Pennsylvania 2006-2011



(Norovirus continued)

Changes in circulating strains can explain some of the increase but, for the most part, the reason for the increase is unknown. Outbreaks of norovirus can be very large. Between Sept. 1, 2011 and March 30, 2012, nine of the 85 norovirus outbreaks reported in Pennsylvania had more than 100 cases. Nearly all of the outbreaks investigated during that time period occurred in long term care facilities.

Prevention and Control

Notably, norovirus is resistant to many common disinfectants. The easiest and most effective method for preventing infection is through hand washing, especially after using the toilet or changing diapers, before preparing food, and before eating. It is critical that food workers not work while ill. Additionally, fruits and vegetables should be washed before eating and food items should be properly cooked and stored prior to consumption.

Cleaning contaminated surfaces with a bleach-based household cleanser immediately after an episode of illness is the best way to prevent further contamination. Any contaminated clothing or linens should be removed promptly and cleaned in hot water and soap to prevent further contamination.

CDC's website provides information and guidelines specific to various settings. See in particular Key Infection Control Recommendations for the Control of Norovirus Outbreaks in Healthcare Settings.

Figure 2: Reported Norovirus Outbreaks by Size, Sep 2011-Mar 2012

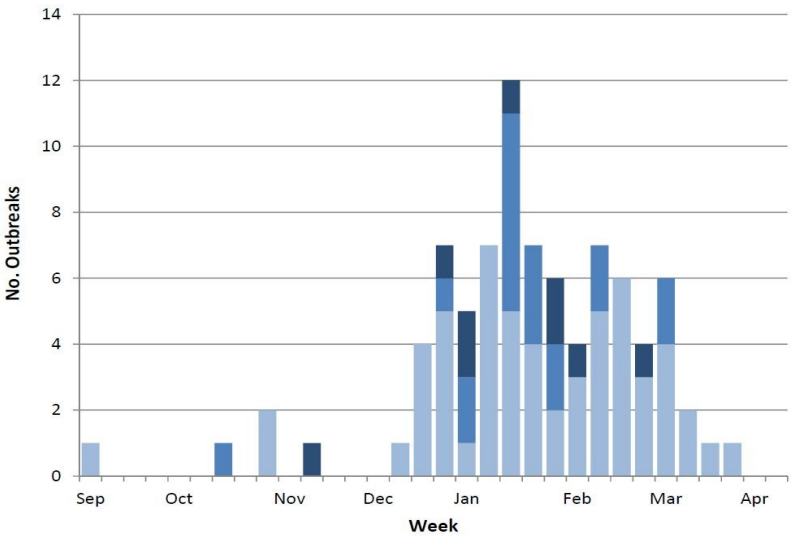


Table 1: Settings of Reported Norovirus Outbreak, Sep 2011—Mar 2012

		No. Cases		
Setting	N	Min	Median	Max
Long term care facility	81	2	35	187
Restaurant	2	9	17	25
School	2	32	65	98
All settings	85	2	34	187

Raw Milk Review

Introduction

Unpasteurized milk, also known as raw milk, is legal to sell and consume in Pennsylvania. However, a January 2012 *Campylobacter* outbreak in southcentral Pennsylvania, with more than 80 confirmed cases associated with raw milk consumption, serves as a reminder of the dangers of raw milk consumption.

History

Prior to pasteurization, milk was known to be major risk for foodborne illness and could cause tyhoid fever, diphtheria, scarlet fever, tuberculosis, anthrax, and foot and mouth disease (1). At the turn of the century, the U.S. infant mortality rate was high, nearly 30 percent in some cities (2), due in part to the regular consumption of cow's milk among infants and children. In fact, mothers at the time were known to boil milk prior to feeding it to their children since this would decrease the risk of illness (3).

Image from Minnesota Department of Health campaign to promote pasteurization, 1925

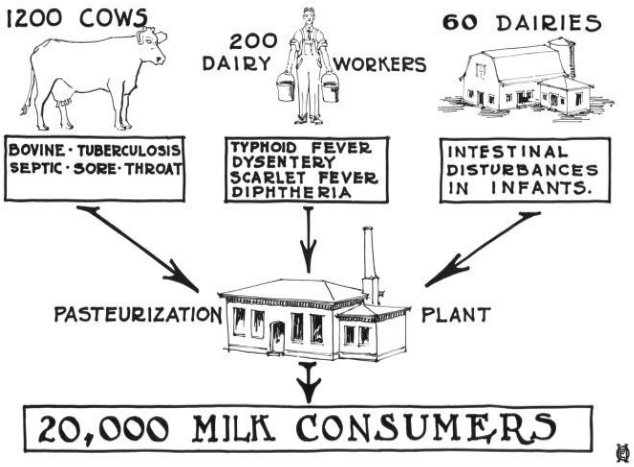


Photo courtesy CDC/Minnesota Department of Health

(Raw Milk continued)

In the late 1860's, Louis Pasteur developed what we now call pasteurization, the process whereby a liquid is heated for a short duration of time to kill pathogens. Pasteur first applied this process to beer and wine; others adapted it in the 1880's for practical use in milk, especially to stop scrofula caused by *Mycobacterium bovis*. In 1893, the first commercial milk pasteurization plant was established in the United States, though the practice of pasteurization was heavily debated (1). In 1933, pasteurization standards were added to the United States Health Service Standardization and Code. However, pasteurization was still not fully implemented. The Food and Drug Administration estimated in 1938 that milk-borne outbreaks constituted 25 percent of all disease outbreaks due to contaminated food and water (1). It wasn't until the 1950's that widespread pasteurization began, resulting in a significant decrease in foodborne illnesses (3). Numerous studies were conducted in an attempt to determine the optimal temperature and time duration to achieve ample destruction of pathogens without curdling the milk. Today, current standards are 161° F for 15 seconds. The less commonly used "ultra pasteurization" method, which results in an extended shelf life even at room temperature, can be achieved by heating milk to 280° F for 2 seconds (1).

Today, virtually all of the milk consumed in the United States is pasteurized. It is estimated that just 1 percent of the milk consumed in the United States is unpasteurized or raw (4). In 1994, a survey in California found that 3.2 percent of respondents had ever tried raw milk. In recent years, consumption of raw milk appears to be increasing (5).

Supposed Benefits of Raw Milk

People who consume raw milk have a variety of reasons for doing so.

1. **Convenience.** For a dairy farmer and persons working at a dairy farm, milk directly from the cow is convenient.
2. **Nutrition.** It is claimed that raw milk is more nutritious than pasteurized milk.
3. **Health benefits.** Raw milk has been claimed to improve or prevent illnesses and conditions ranging from lactose intolerance, asthma (6,7), allergies (7), cancer (8,9) and more.
4. **Environmental concerns.** A nationwide trend to consume more foods produced closer to home, foods that have been processed less, and organic foods has also inspired a desire to consume raw milk with the belief that it is more natural, healthier, hasn't been in a factory, and helps to support local agriculture (10).

The Food and Drug Administration (FDA) notes that "pasteurization does not appreciably alter the nutritive value of milk." The scientific data do not support the assertion that the nutritional components of milk are significantly altered by pasteurization (11). Furthermore, the claims that raw milk helps improve certain illnesses and conditions are anecdotal and have not been borne out by scientific studies. The FDA provides extensive rebuttal to the claims that raw milk is healthier, can be used to treat or prevent conditions, and various other claims made by raw milk proponents (http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/MilkSafety/ConsumerInformationAboutMilkSafety/ucm247991.htm).

Risks Associated with Raw Milk

Although most of the purported benefits of raw milk lack scientific support, some research has suggested possible benefits associated with reduced lifetime risk of asthma and allergy. However, these potential benefits must be weighed against the very real risks of consuming an unpasteurized food product that has historically been a significant source of illness in humans. The udders of the cow are at risk for contamination with fecal matter, from the farm environment, from bacteria on the skin of cows and from cows with mastitis (3). Cows are natural reservoirs for a variety of food-borne pathogens such as *E. coli* O157 and *Salmonella*. In fact, *E. coli* O157 outbreaks are frequently linked to beef or beef products. Since cows are a natural reservoir for these pathogens, they do not exhibit the signs and symptoms related to these pathogens as humans would. Pathogens can live in unpasteurized milk, particularly milk that is not refrigerated (3).

It has been suggested that pathogens are unable to survive in raw milk; this is not true. Studies in which raw milk has been inoculated with microbes such as *E. coli* have demonstrated that pathogens can remain in milk after days and weeks of refrigeration (12).

Table 1: Pathogens Associated with Raw Milk (3)

Bacteria	Parasite	Virus
Brucella	*Giardia*	Norovirus
Campyolbacter		
Listeria		
Mycobacterium bovis		
Salmonella		
E. coli		
Shigella		
Yersinia		

(Raw Milk continued)

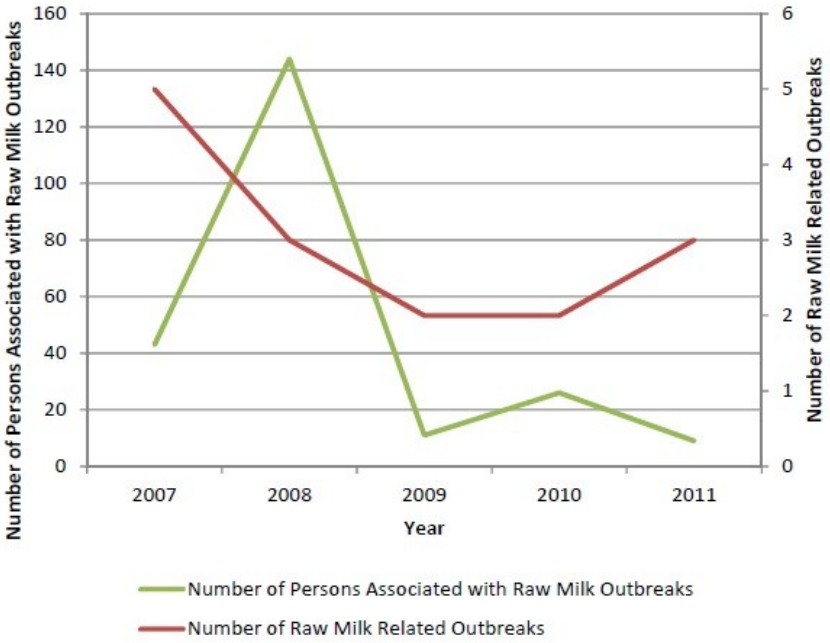
A survey of raw milk bulk tanks, which are large tanks containing raw milk on the dairy farm prior to either sale as raw milk or pasteurization, was performed to determine if bacteria were present in the milk. The raw milk bulk tanks were surveyed for *Campylobacter jejuni*, *Listeria monocyutogenes*, *Salmonella*, STEC (shiga-toxin producing *E. coli*) and *Yersinia enterocolitica*. All of these bacteria were found in raw milk bulk tanks with varying frequencies (13). The results can be found in Table 2.

Table 2: Raw Milk Bulk Tank Surveys for Pathogens (13)

Bacteria	Frequency Found in Raw Milk Bulk Tanks
Campyolbacter jejuni	<1% - 12.3%
Listeria monocytogenes	2.7% - 6.5%
Salmonella	<1% - 8.9%
STEC	<1% - 3.8%
Yersinia enterocolitca	1.2% - 6.1%

It has also been suggested that raw milk is as safe as, or safer than, pasteurized milk since there are fewer people sickened by raw milk than by pasteurized milk each year. While this is true using raw numbers, it is important to keep in mind that the vast majority of milk is pasteurized, thus many fewer people are exposing themselves to the risks of unpasteurized milk. Using relatively recent data from the Centers for Disease Control and Prevention (CDC) on dairy product outbreaks, and taking into account the much smaller denominator, researchers found that persons consuming raw milk have a 150-fold greater risk of developing food-borne illness compared to persons who consume pasteurized milk (4).

Figure 1: Raw Milk Outbreaks, Pennsylvania, 2007-2011



Raw Milk Outbreaks in Pennsylvania

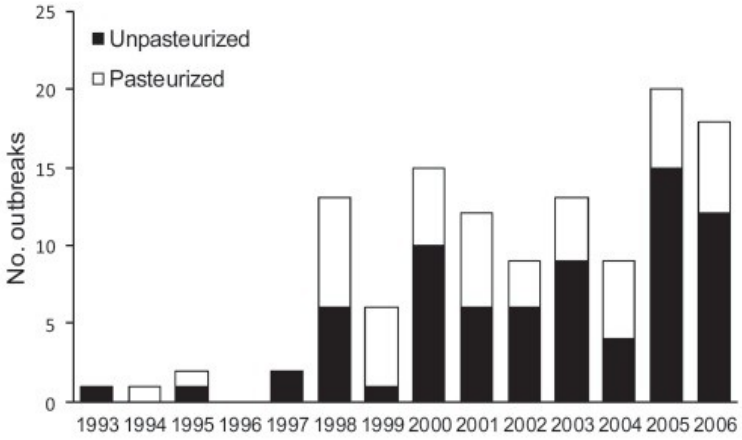
Although raw milk and aged, hard cheese made from raw milk are legal for purchase and consumption in Pennsylvania, outbreaks do occur. As noted above, a *Campylobacter* outbreak associated with raw milk in southcentral Pennsylvania included 81 culture-confirmed cases in four states, plus many more "probable" cases in persons whose illness was not confirmed by culture. This was the largest raw milk outbreak in Pennsylvania in recent history.

In the years 2007 to 2011, 15 raw milk-related outbreaks were reported in Pennsylvania; 233 persons were confirmed with illness as a result of these outbreaks and 11 were hospitalized. There were 12 *Campylobacter* outbreaks and three *Salmonella* outbreaks. During this time, only one outbreak associated with pasteurized milk was reported; 16 persons with confirmed illness were identified.

Forty-five percent of the persons associated with the raw milk outbreaks were under 18 years of age and 17 percent were under five years of age. This is very important because children rely on adults for their food choices.

It should be noted that for the majority of food-borne illnesses, the source is never determined. Many cases of food-borne illness are never identified as not all persons see the doctor or are tested for food-borne illness. Given that, it is likely that the number of illnesses resulting from raw milk consumption is underestimated.

Figure 2: Number of dairy product–associated outbreaks, by year and pasteurization status of product, United States, 1993–2006



Reprinted from Langer et al (4). Used by permission.

(Raw Milk continued)

Pennsylvania Raw Milk Laws

The Department of Agriculture (PDA) regulates raw milk in Pennsylvania. The document outlining the raw milk laws in Pennsylvania can be found here (http://www.agriculture.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_24476_10297_0_43/agwebsite/Files/Publications/Draft_-_Revision_of_Raw_Milk_Guidance_Doc_Final.pdf). In Pennsylvania, dairies intending to sell raw milk must have a permit to do so. Permits are provided on an annual basis. The following are required for a new permit:

1. An inspection of the dairy by PDA is required.
2. The dairy must provide documentation that the herd is brucellosis and tuberculosis free.
3. A licensed veterinarian must inspect the herd and provide documentation to PDA that the herd is in overall good health.
4. The water supply for the dairy must be tested and shown to be free of bacteria.
5. Milk samples must be provided to a lab approved by PDA for safety testing (14).

While dairies are operating under their permits they are required to submit milk for testing twice a month for bacterial, coliform and somatic cell counts, and presence of drugs. However, testing for pathogens (*Salmonella*, *Campylobacter*, *E. coli* O157:H7 and *Listeria monocytogenes)* is only required every six months (14).

For dairies requesting renewals of their permits, a PDA inspection is required and the dairy must fulfill the herd health-related and water testing requirements as for a new permit.

Cows in Pennsylvania

Photo courtesy Allison Longenberger/CDC EIS Officer for Pennsylvania

A permit to sell aged cheese made with raw milk may also be obtained. However, it is not legal to sell soft cheeses made from raw milk in Pennsylvania (14).

Raw Milk in Recent Years

Although PDA is taking steps to regulate the raw milk industry to make it as safe as possible, outbreaks associated with raw milk continue to occur. The only absolute way to eliminate the risk of illness from raw milk is to avoid its consumption. This is especially important for those at highest risk of complications of foodborne illness, including infants, young children, pregnant women and older adults.

REFERENCES

1. Holsinger, V.H., et al. "Milk Pasteurization and safety: A Brief History and Update." *Rev. Sci. Tech. OIE*, 1997, 16(2), 441-451.
2. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4838a2.htm
3. http://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html
4. Langer, A, et al. "Nonpasteurized Dairy Products, Disease Outbreaks, and State Laws – United States, 1993-2006." *Emerging Infectious Diseases*, 2012, 18(3), 385-391.
5. Headrick ML, et al. "Profile of raw milk drinkers in California." *Public Health Rep,* 1997, 112, 418-22.
6. http://naturalsociety.com/raw-milk-reduces-asthma-by-41-percent/
7. http://www.rawmilktruth.com/Raw-Milk-and-Allergies.html
8. http://www.huffingtonpost.com/2009/06/05/10-things-you-should-know_n_211715.html
9. http://thebovine.wordpress.com/2009/06/02/raw-milk-seen-as-important-component-in-natural-cancer-therapy-protocol/
10. http://www.cdc.gov/foodsafety/rawmilk/raw-milk-index.html
11. http://www.fda.gov/downloads/Food/FoodSafety/Product-SpecificInformation/MilkSafety/ConsumerInformationAboutMilkSafety/UCM185696.pdf
12. Massa, S, et al. "Fate of Escherichia coli O157:H7 in unpasteurized milk stored at 8 degrees C." *Letters in Applied Microbiology*, 1999, 28:89-92.
13. LeJeune, J, et al. "Unpasteurized Milk: A Continued Public Health Threat." *Clinical Infectious Diseases*, 2009, 48, 93-100.
14. http://www.agriculture.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_24476_10297_0_43/agwebsite/Files/Publications/Draft_-_Revision_of_Raw_Milk_Guidance_Doc_Final.pdf

Cases of select notifiable diseases in Pennsylvania (as of 06/16/2012)*

Disease	Total cases reported for previous 5 years				
	2012 †	2011	2010	2009	2008
Chlamydia	25,608	52,884	47,518	43,068	42,233
Gonorrhea	7,234	13,770	12,883	10,138	11,071
Campylobacter	641	1,762	1,622	1,542	1,554
Pertussis (whooping cough)	590	547	762	468	368
Salmonella	480	1,844	1,802	1,701	1,721
Giardia	239	792	783	837	873
Varicella (chicken pox)	155	337	403	461	853
Cryptosporidiosis	109	457	484	465	326
Legionella	92	502	324	383	408
Shigella	54	121	634	1,201	248

* Confirmed cases only

† Case counts for 2012 are provisional and subject to change. Counts for earlier years are for complete years.

Disease Reporting

Health care practitioners, health care facilities and clinical laboratories are required to report certain diseases to the Pennsylvania Department of Health. In addition to the diseases on the list, all disease outbreaks and/or unusual occurrences of disease are reportable within the commonwealth. In most cases, reporting must be done electronically via Pennsylvania's version of the National Electronic Disease Surveillance System (PA-NEDSS). To request a PA-NEDSS account, health care providers may email PA-NEDSS@pa.gov; please include your contact information and the name and address of the facility for which you will be reporting.

Employment Opportunities

The Pennsylvania Department of Health is currently accepting applications for the following positions:

- Epidemiologist
- Epidemiology Program Specialist
- Epidemiology Research Associate
- Public Health Physician

To apply, click on the links above or visit the Pennsylvania State Civil Service Commission website and click on Job Seekers.

Complete a civil service application for employment for each test announcement for which you are interested. The commission will send you the results of your examination or rating. If you meet the minimum requirements and pass the test, your name is placed on the list of eligible candidates (eligible list) for that job title according to your score. Positions in the merit system are filled from this pool of eligible candidates. When a job vacancy occurs, the hiring agency requests an eligible list from which to interview for that job title. If you are ranked high enough on the eligible list, you will be contacted for a job interview.

See How to Get a Civil Service Job for more information.

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