

***International Association of
Food Protection Timely Topic***

**RAW MILK
CONSUMPTION:
EMERGING PUBLIC
HEALTH THREAT?**



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ISSUES REGARDING RAW MILK SALES & CONSUMPTION



- **99% of fluid milk consumed in the U.S. is pasteurized.**
- **Beginning before the 20th century, raw milk's role in the spread of disease was well recognized.**
- **Pasteurization has been credited with the dramatic reduction in foodborne disease outbreaks in the U.S.**



The Search for the "true" story behind Pasteurization



Web [Video](#)

Results 1 - 10 of about **216,000** for [Pasteurization Histo](#)

[Louis Pasteur And the Myth of Pasteurization](#)

And fourth, Pasteur developed "**pasteurization**", a process by which harmful ... (This is covered in depth in our article **The Lost History** of Medicine.) ...

www.mnwelldir.org/docs/history/biographies/louis_pasteur.htm - 17k -

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[Heat Treatments and Pasteurization](#)

This page describes the Purpose of **Pasteurization** and **Pasteurization** Conditions used in milk processing. The **History of Pasteurization** provides background ...

www.milkfacts.info/Milk%20Processing/Heat%20Treatments%20and%20Pasteurization.htm

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[The Forgotten History of Modern Milk](#)

Milk has been so adulterated through **pasteurization**, homogenization, ... This misinformation has deep roots and much of the **history** of milk and the debate ...

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Pasteurization History

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INFANT DEATH RATES - June 9, 1909

SAVING INFANTS' LIVES.

Value of Milk Pasteurization Shown in
Official British Report.

Special Cable to THE NEW YORK TIMES.

LONDON, June 5.—Convincing testimony as to the value of milk pasteurization, as advocated by Nathan Straus, is contained in a Blue Book issued yesterday.

The death rate for children under 5 has been reduced from 67.8 per 1,000 in 1857 to 40.9 per 1,000 in 1907. This decline is attributed to the administrative measures and the greater attention given to the supply of milk. In ten towns depots have been opened for the supply of pasteurized milk for infants. Of all European countries only

THE NECESSITY FOR PASTEURIZATION.

The need for safeguarding the milk supply is amply proved by the numerous epidemics traced to milk. Trask (29) reported 179 epidemics of typhoid fever from 1881 to 1907, of which 107 were in the United States, 51 epidemics of scarlet fever, including 25 in this country, during the same period, and 23 epidemics of diphtheria from 1879 to 1907, including 15 in the United States. These were all traced to milk. He also listed 7 epidemics of sore throat, most of which occurred in England. Since 1907 several epidemics of septic sore throat have been traced to milk. Among these may be mentioned the epidemics at Boston, Chicago, and Baltimore, and others which have occurred in smaller cities.

NY Times - May 23, 1909

Fine Results at Sandhausen.

Prof. Kenwood is watching with the closest attention the experiment, or, rather, the demonstration, which Mr. Straus is carrying out in the little German town of Sandhausen, near Heidelberg, and he receives regular reports on its progress from the municipal authorities there. He regards it as absolutely conclusive proof of the benefits of pasteurization, for Mr. Straus had arranged that the whole milk supply of the town should be pasteurized before beginning the experiment. The infant death rate of Sandhausen was about 47 per cent; that means that nearly one in every two babies born in the town died before reaching the age of 12 months. The average number of deaths per month was six or eight, but during the first two months of the Straus experiment not a single infant died, and at the end of five months there had been only seven deaths, as compared with a record of twenty-four for the corresponding period of the preceding year.

NY Times - May 23, 1909

Infant Death Rate Reduced.

At the same time Dr. Moore instituted a system of immediate notification of births to his office. This was carried out very thoroughly by the aid of doctors and midwives of the town. A corps of women health visitors was organized, and as soon as the birth of a baby was notified to Dr. Moore, he dispatched one of his visitors to advise the mother on how to bring up her infant. Natural feeding was insisted on whenever possible, of course, but where that was impossible pasteurized milk was recommended. The result was that in the first thirty-nine weeks' working of the system the infant death rate of Huddersfield was reduced from 138 per 1,000 to 85.

NY Times - May 23, 1909

Surprising Decrease in Deaths.

The result was astonishing. When Dr. Priestley began the distribution the infant mortality in the whole borough was 134 per 1,000. In the Marsh Ward and Bishop's Ward, the parts which were served by the depot, it was 187 and 272 per 1,000, respectively. During the first six months the death rate among the infants fed on milk from the depot was only 58, and Dr. Priestley points out that the depot-fed infants were selected from the worst lives in the district. Their parents brought them to the depot only when everything else had failed, and in many cases they were practically moribund when brought in.

they are readily destroyed by proper pasteurization. Thus Hamburger (17), who studied the epidemic of septic sore throat in Baltimore in 1912, traced this epidemic to a certain milk supply. Advice was given to boil all milk, and the dairy connected with the epidemic raised the temperature of its flash pasteurization to 160° F.; then it changed to the holder process by which the milk was heated to 145° F. and held for a period of 30 minutes. The cases of sore throat that followed were neither so severe nor so numerous and did not follow the milk supply, but appeared to have been transmitted from individual to individual. Hamburger (18) also found that a streptococcus isolated from a patient having a case of sore throat was killed by heating in milk at 145° F. for 30 minutes.

Again, Capps and Miller (12) who studied the Chicago epidemic of septic sore throat, traced it to a dairy where the milk was pasteurized by the flash process at 160° F. On certain dates they found that there was a pronounced failure to pasteurize and following these dates there were outbreaks of septic sore throat. These authors believed that the final responsibility for the epidemic rested on the inadequate and unreliable pasteurization. They state that the absolute protection of the children of the Michael Reese Hospital from infection by efficient pasteurization demonstrates this point. Bray (11), who studied an epidemic of tonsillitis of tuberculous patients, traced the epidemic to a milk supply of one farm where a carrier presumably infected the milk. Forty cases of tonsillitis resulted among 400 people. As soon as the epidemic broke out the milk was pasteurized, and from that time only 1 case appeared.

Epidemics of scarlet fever have been traced to milk supplies, and in such cases pasteurization has been resorted to, with apparently satisfactory results, as a means of safeguarding the public health.

As practiced at the present time, commercial pasteurization, with reasonable care, destroys about 99 per cent of the bacteria (this percentage varies, depending upon the proportion of heat-resistant bacteria in the milk), and while it does not prevent the ultimate souring of milk, it does delay the process. At the present time pasteurization is the best process for the destruction of bacteria in milk on a commercial scale.

First Mandated Use of Pasteurization for Disease Control



- 1912, Kaiser Wilhelm II, Germany mandated pasteurization in order to control foot and mouth disease
- Required that milk from the farm be shipped to a pasteurization plant, then shipped back to the farm for further use, consumption or animal feeding.

Today's US Infant Mortality Rates



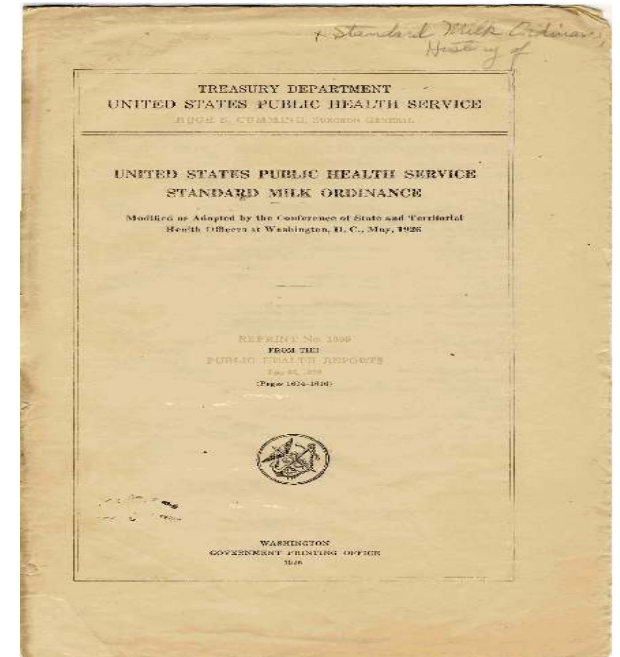
- In 2004, the U.S. infant mortality rate in 2004 was 6.78 infant deaths per 1,000 live births. That's the lowest infant mortality rate ever reported by the CDC.
- Infant mortality rates dropped 10% from 1995 to 2004.

Milk Heating History

- Commercial pasteurization of milk began in the late 1800s in Europe and in the early 1900s in the United States.
- Commercial pasteurization machines were first introduced in 1895,
- Pasteurization became mandatory for all milk sold within the city of Chicago in 1908.
- In 1947, Michigan became the first state to require that all milk for sale within the state be pasteurized.
- Ultra-high temperature (UHT) pasteurization was introduced in 1948.

Regulatory History

- In 1924 the U.S. Public Health Service developed the Standard Milk Ordinance to assist states with voluntary pasteurization programs. The [Grade A Pasteurized Milk Ordinance \(PMO\)](#), is administered by the U.S. Departments of Health and Human Services and Public Health, and the Food and Drug Administration and defines practices relating to milk barn and processing plant design, milking practices, sanitation, and pasteurization of Grade A milk products.

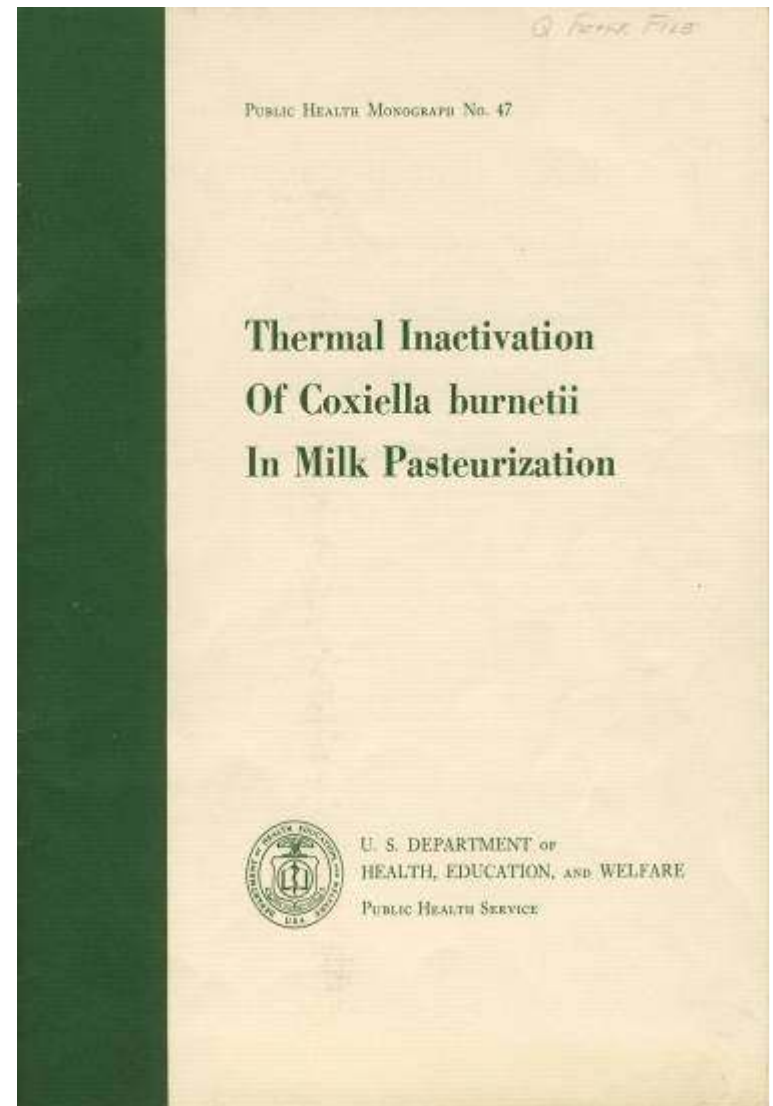


UPDATED US PASTEURIZATION REQUIREMENTS

Best Available Science

In **1957** The U.S. Public health Service published *Thermal Inactivation Of Coxiella burnetii In Milk Pasteurization* (John B. Enright et. al.)

This document identified *Coxiella burnetii* as a milk born pathogen and recommended raising the critical milk pasteurization limits to 145°F for 30 minutes and 161°F for 15 Seconds (the previous temperature standard was 160°F).



Today's Status - US

- The CDC reports that from 1998 to present there were 39 outbreaks in which unpasteurized milk or cheese made from unpasteurized milk were implicated.
- These outbreaks occurred in 22 states and two of them were multi-state outbreaks. An estimated 831 illnesses, 66 hospitalizations and 1 death were associated with these outbreaks.
- Not all outbreaks are recognized.
- Even when they are, not all are reported to CDC.
- Virtually impossible to capture all of the incidents of individual illness which might occur

Today's Status - US

Table 1: Morbidity, Mortality and Etiology of Raw Milk-Associated Events.

<u>Pathogen</u>	<u># Events</u>	<u># Persons Affected</u>	<u># Hospitalized</u>	<u># Deaths</u>	<u>State(s) Involved</u>
<i>Salmonella</i> (including Multi drug-resistant <i>S. newport</i> and <i>S.</i> <i>typhimurium</i> ,)	5	193	21		CA, IL, IN, OH, TN, CT
<i>Campylobacter</i>	4	123			IL, WI, CT, CO
Rabies virus	1	62			OK
<i>Mycobacterium bovis</i>	2	40		2	NY, MD
<i>Listeria</i> <i>monocytogenes</i>	5	36	12	5	TX, NY, NH, NC
<i>Escherichia coli</i> O157:H7	2	19	7		OR, WA
Total	19	473	40	7	16



Some Cons from Marler-Clark Website

- Commercial raw milk for human consumption - \$12/gallon vs. \$4 for pasteurized
 - Medical expenses for acute care and long-term health problems
 - Lost productivity and other indirect costs
 - Costs to public health for investigation and control of outbreaks
 - Losses to the dairy industry as a whole due to reduced consumer confidence following publicized outbreaks and recalls
- ### I. Historical Perspective

Raw Milk Movement

- More American consumers want wholesome, fresh dairy products which they perceive are more healthful.
- Raw milk diets appear to be an extension of the health-food and organic food movements that began in the 1960s, but they also appeal to physical fitness enthusiasts.
- Additionally, there is a religious element, based on "The Makers Diet" stating the Bible instructs followers to eat unprocessed foods.

Raw Milk Movement

- **"Joyful milk production" and raw milk is the "Queen" of all dairy products.**
- **Raw milk sales to consumers amount to 5 - 10 times the typical wholesale price available for dairy farmers.**
- **Raw milk tastes better and is more easily digested.**

Raw Milk Claims/Myths

1. Raw milk kills pathogens
2. Lactoferrin (bLf) is an enzyme-based pathogen killer and pasteurization inactivates lactoferrin.
3. Pasteurization inactivates enzymes that kill pathogens, Pasteurization inactivates enzymes that kill pathogens, including including lactoferrin lactoferrin xanthineoxidase, lactoperoxidase, lysozyme and nisin.
4. Pasteurized milk causes lactose intolerance by destroying lactase and thus causes lactose intolerance.
5. Pasteurized milk causes allergic reactions and is the number one allergic food in this country.
6. Pasteurized milk has been associated with arthritis.

Raw Milk Claims/Myths

7. The pasteurization process turns casein into a very dangerous molecule that can further precipitate the brain injury molecule that can cause brain injury (referring to autism).
8. Raw milk makes asthma go away.
9. Pasteurization makes insoluble the major part of the calcium contained in raw milk. This frequently leads to rickets, bad teeth or nervous troubles.
10. Pasteurization destroys Vitamins A, C, D, E and F, sometimes by as much as 60%, and other water-soluble vitamins by as much as 38 -80%.

➤ Unfortunately, raw milk is oftentimes marketed as being a “health food” and some raw milk vendors, when comparing their product to a pasteurized milk, ascribe to it all sorts of curative properties, which are as yet largely unsubstantiated in the scientific literature.

The Weston A. Price Foundation[®]

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IN FOOD, FARMING, AND THE HEALING ARTS

Lowered Nutrient Availability in Pasteurized Milk

Vitamin C	Raw milk but not pasteurized can resolve scurvy. “. . . Without doubt. . . the explosive increase in infantile scurvy during the latter part of the 19 th century coincided with the advent of use of heated milks. . .”
Calcium	Longer and denser bones on raw milk.
Folate	Carrier protein inactivated during pasteurization.
Vitamin B12	Binding protein inactivated by pasteurization.
Vitamin B6	Animal studies indicate B6 poorly absorbed from pasteurized milk
Vitamin A	Beta-lactoglobulin, a heat-sensitive protein in milk, increases intestinal absorption of vitamin A. Heat degrades vitamin A.
Vitamin D	Present in milk in protein-bound form, assimilation possibly affected by pasteurization.
Iron	Lactoferrin, which contributes to iron assimilation, destroyed during pasteurization.
Iodine	Lower in pasteurized milk
Minerals	Lactobacilli, destroyed by pasteurization, enhance mineral absorption

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Some Pros from the Westin Price Website

- 1. Raw Milk Is Uniquely Safe**
- 2. Built-In Protective Systems in Raw Milk: Lactoperoxidase**
- 3. Built-In Protective Systems in Raw Milk: Other Bioactive Components I – Components of Blood**
- 4. Built-In Protective Systems in Raw Milk: Other Bioactive Components II – Fats and Carbohydrates**
- 5. Built-In Protective Systems in Raw Milk: Other Bioactive Components III - Enzymes, e.g. Complement & Lysozyme, Hormones & Growth Factors, Mucins, Fibronectin, Glycomacropeptide**
- 6. Built-In Protective Systems in Raw Milk: Other Bioactive Components IV - B12 Binding Protein, Bifidus Factor, Beneficial Bacteria**
- 7. Coliforms in raw milk inhibit pathogen growth**

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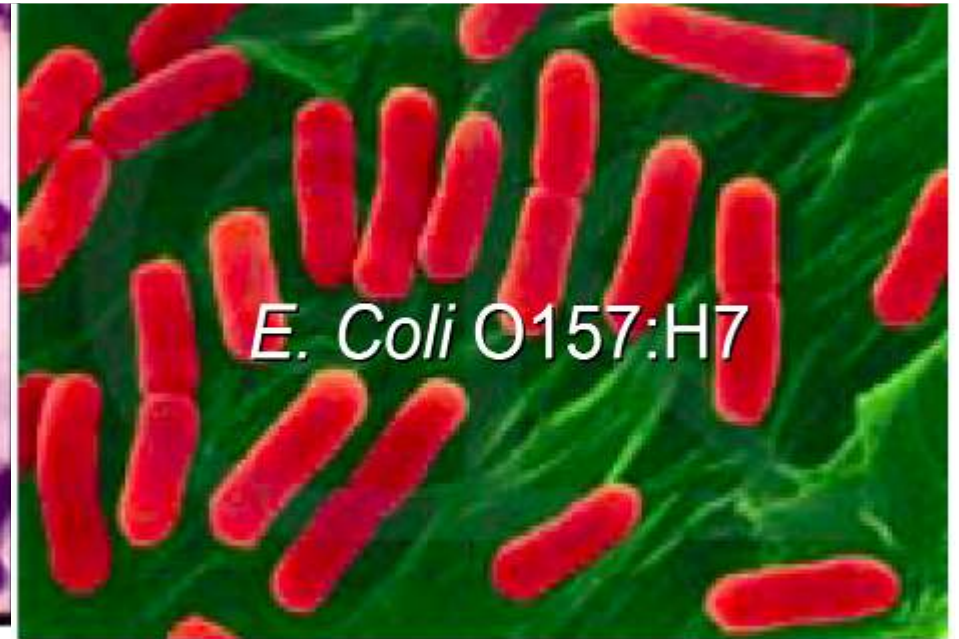
IN FOOD, FARMING, AND THE HEALING ARTS

Some Pros from the Westin Price Website

8. Pathogens Can Multiply in Pasteurized Milk and Other Foods but Not in Raw Milk
9. Raw Milk Production Today Contribute to Safe Product
10. Raw Milk Is More Nutritious than Pasteurized Milk
11. Pasteurized Milk = Increasing Health Problems in Children:
 - Allergies
 - Frequent Ear Infections
 - Gastro-Intestinal Problems
 - Attention Deficit Disorder
 - Asthma
 - Diabetes
 - Constipation
 - Auto-Immune Disease
12. Pasteurization Laws have destroyed rural life
13. Raw Milk has longer shelf life than Pasteurized Milk

Destruction of Built-In Safety Systems by Pasteurization

Component	Breast Milk	Raw Milk	Pasteurized Milk	UHT Milk	Infant Formula
B-lymphocytes	active	active	inactivated	inactivated	inactivated
Macrophages	active	active	inactivated	inactivated	inactivated
Neutrophils	active	active	inactivated	inactivated	inactivated
Lymphocytes	active	active	inactivated	inactivated	inactivated
IgA/IgG Antibodies	active	active	inactivated	inactivated	inactivated
B ₁₂ Binding Protein	active	active	inactivated	inactivated	inactivated
Bifidus Factor	active	active	inactivated	inactivated	inactivated
Medium-Chain Fatty Acids	active	active	reduced	reduced	reduced
Fibronectin	active	active	inactivated	inactivated	inactivated
Gamma-Interferon	active	active	inactivated	inactivated	inactivated
Lactoferrin	active	active	reduced	inactivated	inactivated
Lactoperoxidase	active	active	reduced	inactivated	inactivated
Lysozyme	active	active	reduced	Inactivated	inactivated
Mucin A/Oligosaccharides	active	active	reduced	reduced	inactivated
Hormones & Growth Factors	active	active	reduced	reduced	Inactivated

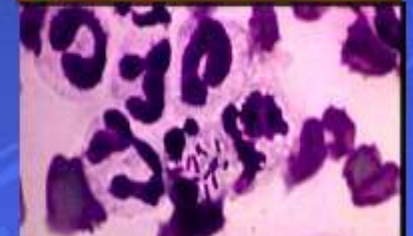
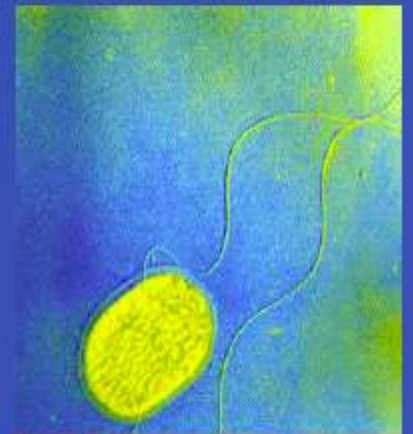


FDA Website: On the Safety of Raw Milk
www.cfsan.fda.gov/~ear/milksafe.html

Is raw milk safe to consume?

➤ No. Raw milk is *inherently* dangerous. Raw milk may contain a whole host of pathogens, including :

- *Enterotoxigenic Staphylococcus aureus*
- *Campylobacter jejuni*
- *Salmonella species*
- *E. coli (EHEC) (ETEC)*
- *Listeria monocytogenes*
- *Mycobacterium tuberculosis*
- *Mycobacterium bovis*
- *Brucella species (abortus –cattle) (melitensis-goats)*
- *Coxiella burnetii*
- *Yersinia enterocolitica*



OUTBREAKS

- The CDC reports that from 1998 to present there were 39 outbreaks in which unpasteurized milk or cheese made from unpasteurized milk were implicated.
- These outbreaks occurred in 22 states and two of them were multi-state outbreaks. An estimated 831 illnesses, 66 hospitalizations and 1 death were associated with these outbreaks.
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SALMONELLA OUTBREAK

- Between 2002-2003 there was a multistate outbreak of *Salmonella typhimurium* infections which were ultimately associated with the consumption of raw milk.
- 62 people were infected, including 40 customers. Patients were from Illinois, Indiana, Ohio and Tennessee.
- Of 32 food samples tested, five were positive for *S. typhimurium*, including three raw skim milk samples, one raw milk butter sample and one raw cream sample.

The authors concluded that without restrictions on distribution, restrictions on distribution, *E. coli* *E. coli* O157:H7 outbreaks caused by raw O157:H7 outbreaks caused by raw milk consumption can continue indefinitely, with infections occurring indefinitely, with infections occurring intermittently and unpredictably. intermittently and unpredictably.

Keene et al. J. Infect. Dis. 1997 Sep. Keene et al. J. Infect. Dis. 1997 Sep. 176 (3) 815-88





U.S. Law U.S.
Code of
Federal
Regulations
Title 21
Section
1240.61

UPDATED US PASTEURIZATION REQUIREMENTS

FDA promulgation of 21 CFR 1240.61 was prompted by a court case, Public Citizen v. Heckler, 653 F. Supp. 1229 (D.D.C. 1986).

In promulgating this regulation, FDA made a number of findings relative to raw milk, including the following: "Raw milk, no matter how carefully produced, may be unsafe" (52 FR 29514, Aug. 10, 1987).



UPDATED US PASTEURIZATION REQUIREMENTS

U.S. Law U.S. Code of Federal Regulations Title 21
Section 1240.61

UNDER THIS LAW:

Pasteurization is required for all milk and milk products in final package form intended for direct human consumption which move in interstate commerce. (21 CFR 1240.61). The only exceptions to this requirement are for certain aged cheeses.

Dairy Product Regulations - Federal Regulations

- Sale Of Raw Milk For Direct Consumption Banned In Interstate Commerce – FDA 1987 (21 CFR 1240.61)
- Pasteurized Milk Required For All Cheese Not Considered "Hard" Or "Dry" (21 CFR 133)
- Pasteurized Milk Required for all ice cream & Frozen Dairy Deserts (21 CFR 135)
- Pasteurized Milk Required for Butter

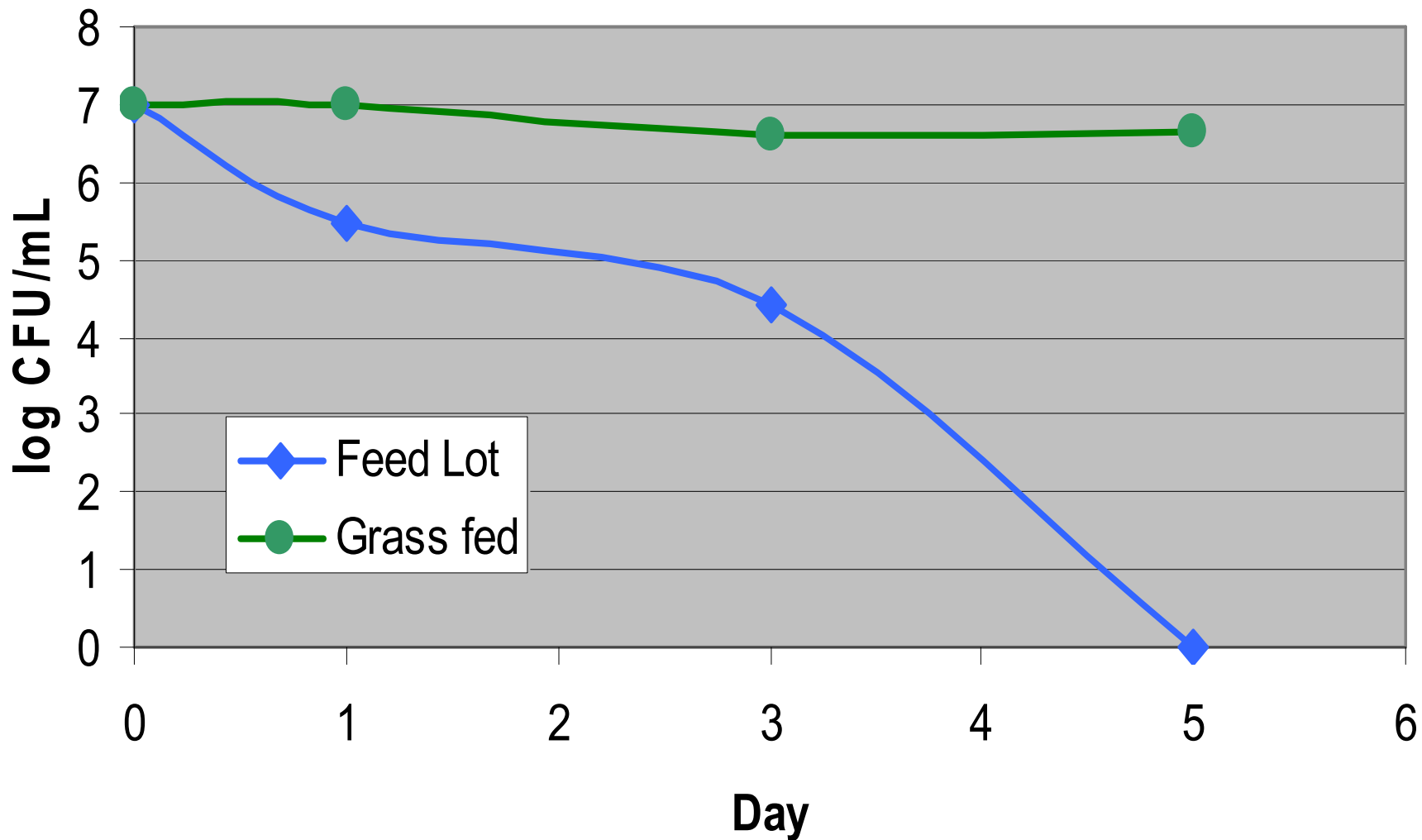
Regulatory Requirements for Pasteurization



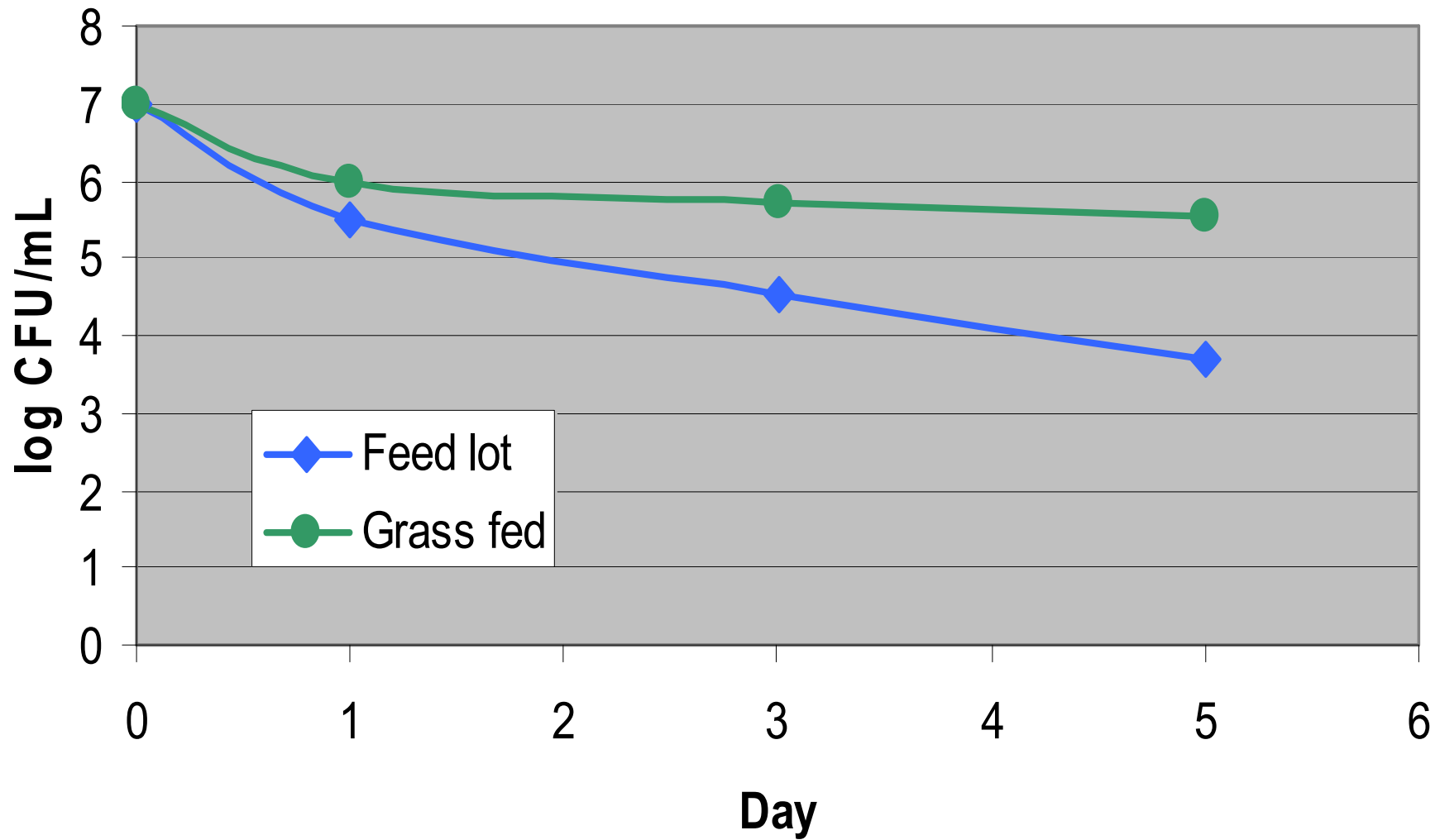
About 35 states allow farmers to sell raw milk on the farm and 15 have made illegal all sales anywhere.

THE LYNDSEY WELLS STUDY (UF)

Mean Listeria counts over 5 days in feed lot milk vs. grass fed milk



Mean Salmonella counts over 5 days in feed lot milk vs. grass fed milk



Pasteurized Milk More Hazardous Than Raw Milk (WAPF)

- RAW MILK: Incidence of food-borne illness from raw milk – 1.9 cases per 100,000 people, 1973-1992.
- PASTEURIZED MILK: Incidence of food-borne illness from all foods (including pasteurized milk) – 4.7 cases per 100,000 people, 1993-1997.

Other foods more dangerous than raw milk (WAPF)

- OTHER FOODS: incidence of reported food-borne illness from other foods – 6.4 cases per 100,000 people, per year from 1993-1997.
- THEREFORE, the incidence of food-borne illness from consuming raw milk is 2.5 times lower than the incidence of food-borne illness from consuming pasteurized milk; and 3.5 times lower than the incidence of food-borne illness from consuming other foods.

REMINDS ME OF A 4-H PROJECT I REMEMBER

- EXPERIMENT
 - FEED CONSUMPTION COMPARED BETWEEN BLACK COWS AND WHITE COWS
- CONCLUSION
 - BLACK COWS EAT MORE THAN WHITE COWS
 - WHY?
- MISSING INFORMATION
 - 50 BLACK COWS/25 WHITE COWS



“A market is the combined behavior of thousands of people responding to information, misinformation and whim.”

[Kenneth Chang quotes](#)

To Pasteurize or Not to Pasteurize - That is the Question



QUESTIONS ??

