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The Independent Regulatory Review Commission
333 Market Street, 14th Floor
Harrisburg, PA 17101
October 25, 2010

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IRRC

2010 OCT 27 P 2:52

Dear IRRC Committee Members,

First, I want to state I am writing this letter as a concerned life long citizen of Pennsylvania. Secondly, as a person who has worked in the milk industry most of my adult working career and I am 61 years of age.

It was extremely disappointing to get the word that the IRRC Committee voted down (3-2) the PDA Milk Division request to update the Milk Regulation Titled Chapter 59a. The PDA Milk Regulation has always been a Public Health Document. This means to me that it is in place to protect the public health of Pennsylvania citizens and in fact any citizen, wherever they may reside, that consumes products made from milk produced by Pennsylvania Milk Producers and Processors.

Hearsay has it that much of the testimony presented to the IRRC Committee was from Raw Milk Advocates that stated their constitutional right to sell raw milk to the general public and the economic hardship that the new PDA Chapter 59a Public Health Milk Regulation would require them to do for their part in protecting the public health. In other words it would seem that the hearing and information presented turned more toward an economical consideration and away from protecting the public health of Pennsylvania citizens. You might even say it also turned toward Political Correctness and "away" from protecting the public health of Pennsylvania citizens.

I am confident that PDA presented sound scientific facts to support their reasoning for wanting to regulate this part of the milk industry in Pennsylvania. It appears an economic concern and public correctness trumped sound scientific facts. Dr. Bhushan Jayarao, Director of the Animal Diagnostic Laboratory, Penn State University – State College, Pennsylvania presented a talk regarding raw milk at the 2006 Pennsylvania Association of Milk Food and Environmental Sanitarians (PAMFES) Annual Conference. A copy of this presentation is included with this letter for your reference. I am also a member of this association. His presentation referenced the path of why pasteurization was mandated by the Federal Government for Grade A milk products moving across state lines. The National Conference of

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud.

Accounting Principles

Accounting is a systematic process of recording, summarizing, and reporting in monetary terms the transactions and events which are in part at least of financial character, and interpreting the results thereof.

The primary objective of accounting is to provide information that is useful in making economic decisions. This information is derived from the accounting system and is presented in the form of financial statements. The accounting system is designed to ensure that the information is reliable and relevant.

The accounting system is based on a set of principles and assumptions. These principles are designed to ensure that the accounting information is consistent and comparable. The assumptions are designed to ensure that the accounting information is relevant and reliable. The accounting system is designed to ensure that the information is presented in a clear and concise manner.

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Interstate Milk Shippers (NCIMS) was formed out of the necessity for nationwide uniform public health regulation as it was related to milk. The NCIMS is a federal (FDA), State (all 50 States) cooperative program. Under this MOU (Memorandum Of Understanding) the FDA is obligated to perform a periodical State Evaluation. Pennsylvania got put on warning at the last FDA State Evaluation that it must update it's current milk regulation. PDA was attempting to comply by presenting Milk Regulation Chapter 59a for the committee's approval. The Grade A and Manufacturing segments of the Pennsylvania Dairy Industry are fully supportive of the new regulation 59a.

If the new proposed regulation does not get implemented by the April 2011 NCIMS Conference Meeting (the NCIMS meets every other year) the FDA could recommend that Pennsylvania be Black Starred. If the NCIMS Conference agrees Pennsylvania would lose its right to participate in the Conference. This would not go good for the State's largest food industry lose its voice where national regulations are crafted.

Getting back to 59a, there are three main parts to the proposed regulation. One is milk for pasteurization or the Grade A program (NCIMS). Two is the milk for manufacturing (USDA national program). Three is the intrastate raw milk program. The first two parts have a federal document umbrella that the state can adopt as their regulation. This is what PDA was attempting to do by presenting Chapter 59a for approval. There are many years of public health policy in those two federal documents. After all, protection of the general public health is the charge of these federal and state departments. You might say it is their mission statement.

The Child Safety and Booster Seat law mandated at the federal level and enforced at the state level is a very good example of how federal regulation is used to protect the safety and well being of our children. Implementing the Raw Milk section of 59a is just as important to ensure the health and well being of our Pennsylvania children. My point for this comparison is that it was an extra expense and some families struggled and even opposed this law, statistics have proven that this law has saved countless children's lives. I understand that there is an expense related to proposed new Raw Milk Regulations that 59a would require and this plays a big part of the opposition to this regulation, but what price can we put on a child's life?

In the early 1900's about 23% of all reported food borne illnesses were attributed to drinking raw milk. Today due to NCIMS adoption of pasteurizing milk for human consumption and use in interstate commerce less than a small fraction of 1% is affected. It is also a proven fact that children, pregnant women, elderly and immunocompromised individuals are at far greater risk of illness if they consume raw milk. Does not Pennsylvania owe it to the children of our great state to have the most public health safe guards in place for raw milk that we can possibly have. 59a, economic burden or not does just that. It does it's utmost to protect the pubic health of Pennsylvania's children and citizens.

Milk's nutritional and functional power is supplied by nature. While it's safety is provided by the producers conscientious effort to implement best production practices. Chapter 59a is designed to help validate that best production practices are in place and will help protect Pennsylvania's children and citizens.

While I support 59a as written and fully encourage IRRC to reconsider and pass 59a for adoption. Should the raw milk intrastate part of 59a still be an issue, I fully support and encourage IRRC to pass the two parts of 59a that relate to interstate commerce and direct PDA to break out the raw milk regulation. Once broken out of 59a the raw milk regulation can be absolved or the raw milk can be rewritten to go through the approval process on it's own. The conventional mainstream milk industry in Pennsylvania that needs to be able to operate in the interstate and world markets urgently needs 59a passed to remain solvent and competitive.

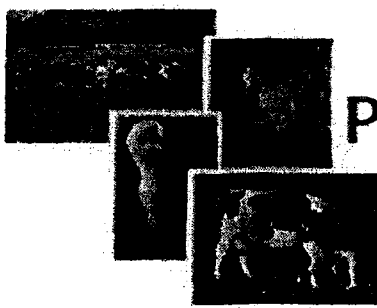
Thank you for you attention and considerations,



Tom Angstadt

CC: Secretary Russell C. Redding

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Raw Milk Consumption

BHUSHAN JAYARAO

Department of Veterinary and Biomedical Sciences
111 Henning Bldg. Pennsylvania State University,
University Park, PA 16802
Tel 814-863-2160

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PENNSTATE College of Agricultural Sciences
Veterinary Science Outreach
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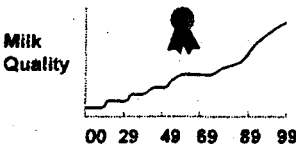
Raw Milk Consumption

Bhushan Jayarao, MSVC, PhD, MPH
Extension Veterinarian


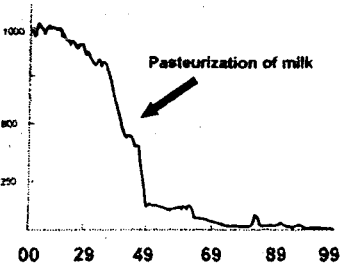
Department of Veterinary and Biomedical Science
The Pennsylvania State University
University Park

Introduction


- Milk and other dairy products are of superior quality and safety




Milkborne diseases




Historical perspective



- 1900 -1940s: Tuberculosis, Bang's disease, Diphtheria, Typhoid fever highly prevalent
- 1930s: Pasteurization of milk
- 1940-1960s: Eradication of animal diseases (Brucellosis, Tuberculosis)
- 1970s: Few human cases reported
- 1990s: Few human cases still reported



APRIL 1998/58 2005





Improved farm hygiene and milking practices

Improved milk handling and processing technology

Educated consumers and higher consumer awareness on food safety

Still.....

Newspapers inform public about outbreaks!

Milk makes kids sick

SALMONELLA OUTBREAK TRACED TO DAIRY FARM

Milk contains bugs that makes people sick





Scientists say *Dairy farming*

Dairy cows All infected with dangerous bugs

Killer bug on the loose dairy cows responsible

Why do milkborne illnesses occur ?

- **Faulty pasteurization of fluid milk**
Defective pasteurizer - less likely
- **Post-pasteurization contamination of milk and milk products - likely**
- **Raw milk consumption**
Rural communities with access to raw milk
Nannies / raw age / best to nature - city folks ?
Visitors on farms
raw milk products

www.fda.gov/cfsan/ohrt/2002/020102a.htm

How prevalent is consumption of raw milk ?

- **Highly prevalent in the rural communities**
- **Rohrbach & others:**
1981, Eastern Tennessee - 34.9%
- **Jayarao & Henning**
1997, South Dakota & Minnesota - 60%
- **Jayarao & others:**
2002, Pennsylvania - 42%

www.fda.gov/cfsan/ohrt/2002/020102a.htm

"Legal" or "Not Legal" ?

Got raw milk?
'Cow sharers' find the legal loopholes
By AMANDA PENNELLY Issue date: Fri, Jul 8, 2005
The Tribune

- Cow-sharing agreements, labeling unpasteurized milk for animal use, have received media attention. This allows by passing unpasteurized milk laws by allowing consumers to purchase a share of a cow.
- Many local residents have found legal loopholes to the retail ban on unpasteurized milk by buying cow shares to purchase and transport raw milk to their neighbors

www.pamfes.org/2005

THE WALL STREET JOURNAL

November 21, 2004

Get Raw MILK? Not Unless You Own Your Own Cow
Farmers Offer Herds to Share
To Bypass Health Rules
Wisconsin Nears to Plan

By KATY MCLAUGHLIN
Staff Reporter of THE WALL STREET JOURNAL

- o Cow share programs have operated in Indiana, Virginia, Michigan, Ohio, Virginia, Utah, Florida, and Wisconsin
- o Despite steps taken by lawmakers in Indiana and Wisconsin to ban this practice, cow share operations continue to operate.
- o The Weston A. Price Foundation leads the movement in raw milk use and has 50 chapters in the U.S. and 3,500 members.
- o There is a growing consumer demand for raw milk.

Rise seen in sale of raw milk

Sale of unhomogenized, unpasteurized milk lawful in Pa., some other states

Sunday, December 05, 2004

By Jennifer Gish, The Associated Press

NEW SALEM, Pa. — Glendora Stump keeps watch over the small York County store as customers file in with empty glass and plastic bottles. It's around 4 p.m. on a Tuesday, and her husband, Joseph, is busy milking the family's herd of Holsteins in the milking parlor at their York New Salem farm.

The customers all know to set their bottles down on the stainless steel counter and wait for Glendora Stump to open the valve on the pipeline. They walk away with fresh containers of the creamy white milk that has become so controversial that some states have banned its sale, insisting it's unsafe for human consumption.

Yet natural food subscribers and those longing for a taste of their childhood seek it out at the nearly 40 farms licensed in Pennsylvania to sell the raw milk, which has not been homogenized or pasteurized and is pretty much straight out of the udder.

CDC

Outbreak of Listeriosis Associated With Homemade Mexican-Style Cheese --- North Carolina, October 2000--January 2001

- o On November 13, 2000, health-care providers at a hospital in Winston-Salem, North Carolina, contacted the local health department about three cases of listeriosis within a 2-week period in recent Mexican immigrants.
- o Noncommercial, homemade, Mexican-style fresh soft cheese produced from contaminated raw milk sold by a local dairy farm as the causative agent.
- o Culturally appropriate education efforts are important to reduce the risk for *L. monocytogenes* transmission through Mexican-style fresh soft cheese.

MMWR 49(45):1026

The Epidemiology of Raw Milk - Associated Foodborne Disease Reported in the United States 1973-1992
 [Heardrick and others, Am. J. Pub. Hlth. 81, 1218-1221; 1991]

Legal to sell raw milk
 WA, CA, OR, MO, ID, NV, AR, NM, TX, UT, SD, NE, KS, OK, MN, MO, AR, OH, PA, NY, ME, VT, NH, CONN, MA, SC, IL, RI, WI

Illegal to sell raw milk
 ND, WY, CO, IA, MI, IN, KY, TN, LA, AL, GA, FL, NC, AL, PR, WV, VA, MD, NJ, HA, DE, MD

- o **Results of the study**
 - * 46 raw milk associated outbreaks reported were during the study period
 - * 40 outbreaks (87%) occurred in states where the intrastate sale of raw milk was legal
- o **Conclusions of the study**
 - * Consumption of raw milk remains a preventable cause of foodborne disease outbreaks

Pathogens of concern

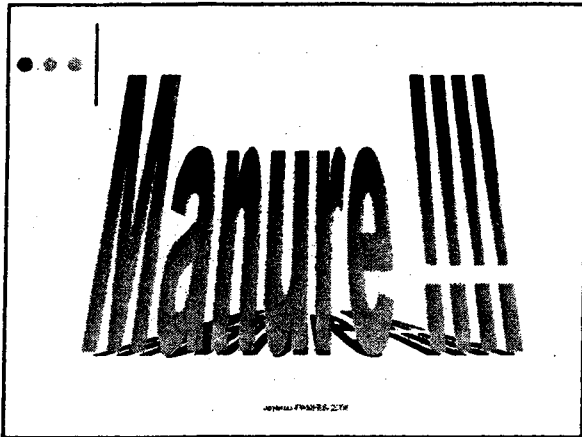
- o More than 150 pathogens can cause zoonotic infections (animals to humans)
- o Concern of animal and human health:
 - * Salmonella
 - * E. coli
 - * Bacillus anthracis
 - * Mycobacterium spp.
 - * Brucella spp.
 - * Leptospira spp.
 - * Chlamydia spp.
 - * Listeria monocytogenes
 - * Y. enterocolitica
 - * Clostridium perfringens
 - * Klebsiella spp.
 - * Cryptosporidia
 - * Cyclospora
 - * Giardia

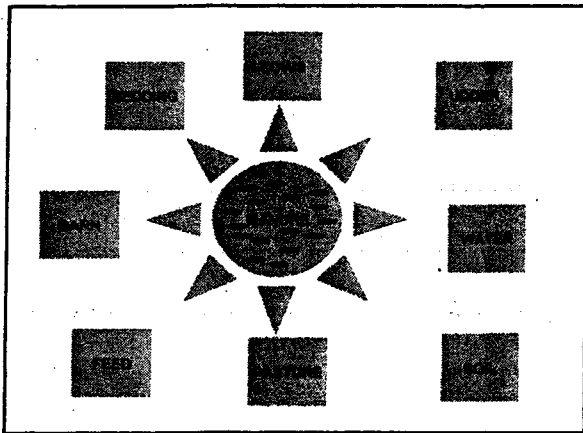
Source: PAMFES-2006

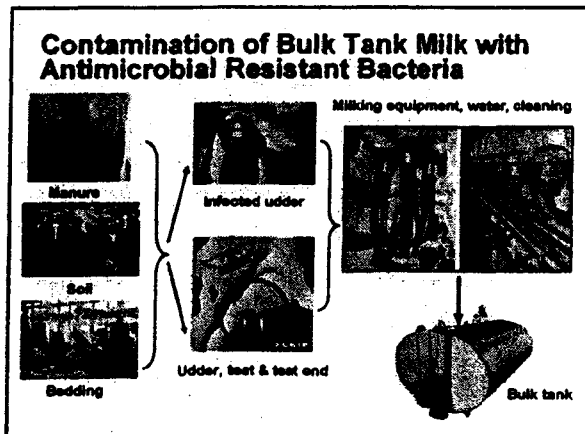
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Source: PAMFES-2006







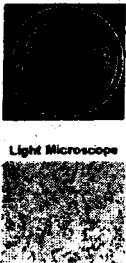
● ● ● **Health risks associated with raw milk consumption ?**

* Several reports on foodborne outbreaks due to consumption of raw milk

- *Escherichia coli* O157:H7
- *Salmonella* spp.
- *Campylobacter jejuni*
- *Listeria monocytogenes*
- *Yersinia enterocolitica*
- *Salmonella* spp.

www.PAMFES-2006

● ● ● **What's Salmonella ?**



- Rod shaped bacteria
- Appears pink to red when stained with Gram's stain (Gram-negative)
- Over 2220 serotypes of Salmonella
- Pathogenic to humans and many animals
- Causes typhoid, enteric fevers, gastroenteritis and septicaemia

www.PAMFES-2006

● ● ● **Salmonella**


○ Prevalence in bulk tank milk

• 1987	4.7%*	USA
• 1988	0.2%	United Kingdom
• 1988	2.9%	Canada
• 1992	0.16%	Ireland
• 1992	8.9%	USA
• 1995	0.36%	England & Wales
• 1997	6.1%	USA
• 1998	0.17%	Canada

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Escherichia coli

- o Occur as normal flora in the lower part of intestine of warm blooded animals
- o Toxin producing strains of *E. coli* are important agents of food-borne illnesses
- o Emerging pathogen *E. coli* O157:H7; dairy cattle considered as reservoirs.
- o Prevalence of enterotoxigenic *E. coli* in bulk tank milk

	1989 1.4%	Canada
	1997 3.9%	Germany
	1997 12.3%	Canada
	1997 3.8%	USA
	1998 0.87%	Canada

Jayarao PAMFES-2006

A prolonged outbreak of *E. coli* O157:H7 infection caused by commercially distributed raw milk


- o December 1992- June of 1994;
- o Oregon, Portland area
- o Grocery store sold raw milk from one dairy
- o 14 reported cases
- o DNA fingerprint analysis of *E. coli* O157:H7 isolates from patients, cows (4 of 132 on the farm) and raw milk had similar DNA fingerprint patterns.
- o Conclusion: Without restrictions on distribution of raw milk, outbreaks caused by consumption of raw milk can continue indefinitely, with infections occurring intermittently and unpredictably

Journal of Infectious Diseases. 1997, 176:815-818.

Jayarao PAMFES-2006

Campylobacter jejuni

- o Inhabitant in the reproductive tract, intestine, and oral cavity to humans and animals
- o Excreted in large numbers in feces
- o 1983- Campylobacteriosis associated with raw milk consumption in PA
- o Prevalence in bulk tank milk

	1982 0.9%	USA
	1983 1.8%	USA
	1986 4.8%	USA
	1989 8%	Netherlands
	1988 8%	UK
	1988 4%	USA
	1982 12.3%	USA
	1997 9.3%	USA
	1998 0.47%	Canada

Jayarao PAMFES-2006

A Survey of Foodborne Pathogens in Bulk Tank Milk and Raw Milk Consumption among Farm Families in Pennsylvania

B. M. Jayarao, S. C. Donaldson, B. A. Straley, A. A. Sawant, N. V. Hegde, and J. L. Brown

- o A two-part study was conducted to determine the risk of exposure to human pathogens from raw milk.
 - ◆ The first part of the study focused on determining raw milk consumption habits of dairy producers.
- ◆ A total of 248 dairy producers from 16 counties in Pennsylvania were surveyed.
 - o 105 of 248 (42.3%) of dairy producers consumed raw milk
 - o 170 of 248 (68.5%) dairy producers were aware of foodborne pathogens in raw milk.

www.PAMFES-2006

Findings of the study

- ◆ Dairy producers who were not aware of foodborne pathogens in raw milk were 2-fold more likely to consume raw milk.
- ◆ The majority of dairy producers who consumed raw milk indicated that taste (72%) and convenience (60%) were the primary factors for consuming raw milk.
- ◆ Dairy producers who resided on the dairy farm were nearly 3-fold more likely to consume raw milk when compared with those who lived elsewhere.


www.PAMFES-2006

Pathogens in BTM

- o *Campylobacter jejuni* (2%),
- o Shiga-toxin producing
- o *Escherichia coli* (2.4%),
- o *Listeria monocytogenes* (2.8%),
- o *Salmonella* (6%),
 - ◆ *S. enterica* serotype Typhimurium (n=10), and *S. enterica* serotype Newport (n= 5), and
- o *Yersinia enterocolitica* (1.2%).
- o Thirty-two of 248 (13 %) bulk tank milk samples contained ≥1 species of bacterial pathogen.

www.PAMFES-2006

Why do people consume raw milk ?



- Access to raw milk
- Less access to pasteurized milk
- Drinking raw milk practiced over time
- Acquired taste
- A notion that raw milk is better than pasteurized milk

www.boulderweekly.com

April 2006 PAMFES-2006

Should one discontinue drinking raw milk ?

- Yes! if you are,
 - Concerned about pathogens in raw milk such as *Salmonella*, *E. coli* O157:H7, *Campylobacter jejuni*
 - Elderly / young / immunocompromised / expectant mothers
 - Genetic type HLA-DQ2, which makes you more disposed to reactive arthritis if exposed to foodborne pathogens such as *Campylobacter jejuni*
 - Guillaine Barre's syndrome
 - Concerned about long term effects on health
- o Can we pasteurize milk in our home ?
 - Yes! you can,
 - Naeco- Safeguard Home Pasteurizer (- \$ 350)

January 2006 PAMFES-2006

END

January 2006 PAMFES-2006

J Food Prot. 2004 Oct;67(10):2165-70.

A multistate outbreak of Salmonella enterica serotype typhimurium infection linked to raw milk consumption--Ohio, 2003.

Mazurek J, Salehi E, Propes D, Holt J, Bannerman T, Nicholson LM, Bundesen M, Duffy R, Moolenaar RL.

Ohio Department of Health, 246 North High Street, Columbus, Ohio 43215, USA.

ACQ8@cdc.gov

In December 2002, the Ohio Department of Health was notified of two children with Salmonella infection. Both had a history of drinking raw milk from a combination dairy-restaurant-petting zoo (dairy). The dairy was the only establishment in Ohio licensed to sell raw milk and reported 1.35 million visitors annually. We investigated to determine the extent of the outbreak and identify illness risk factors. A case patient was any person with pulsed-field gel electrophoresis-matched Salmonella enterica serotype Typhimurium from 30 November 2002 to 18 February 2003. Sixty-two met the confirmed case definition. Forty dairy case patient patrons were included in a case-control study; 56 controls were their well meal companions. Consumption of raw milk was found to be associated with illness (odds ratio, 45.1; 95% confidence interval, 8.8 to 311.9). The dairy discontinued selling raw milk. Because 27 other states still allow the sale of raw milk, awareness of the hazards of its consumption should be raised and relevant regulations carefully reviewed.

MMWR Morb Mortal Wkly Rep. 2003 Jul 4;52(26):613-5.

Multistate outbreak of Salmonella serotype typhimurium infections associated with drinking unpasteurized milk--Illinois, Indiana, Ohio, and Tennessee, 2002-2003.

Centers for Disease Control and Prevention (CDC).

On December 10, 2002, the Clark County Combined Health District and the Ohio Department of Health (ODH) were notified of two hospitalized children infected with Salmonella Enterica serotype Typhimurium. Initial investigation implicated consumption of raw, unpasteurized milk purchased at a local combination dairy-restaurant (dairy) during November 27-December 13, 2002, as the cause. This report summarizes the subsequent investigation. Because 27 states still allow the sale of raw milk, and organizations continue their efforts to allow marketing and sale of raw milk to the public directly from the farm, consumer education about the hazards of raw milk and a careful review of existing policies are needed.

J Environ Health. 2003 May;65(9):20-1, 24, 26.

Campylobacter jejuni enteritis associated with consumption of raw milk.

Peterson MC.

Division of General Internal Medicine, University of Utah School of Medicine, 591 E. 500 N. Nephi, UT 84648, USA. mike.peterson@utahtelehealth.net

An outbreak of Campylobacter jejuni enteritis occurred among people who had attended a meal where raw milk was served. A case control study was conducted using instances of illness as cases; those who attended the event but did not become ill served as controls. Thirteen of 20 people who had attended the meal became ill. C. jejuni was cultured from five of six stools that were submitted. Raw milk consumption was strongly associated with illness (p = .0072, Fisher exact test). Although C. jejuni outbreaks associated with milk can be prevented with pasteurization, they still occur in association with raw milk consumption.

Int J Infect Dis. 2003 Mar;7(1):42-5.

Hemolytic-uremic syndrome associated with enterohemorrhagic Escherichia coli O26:H infection and consumption of unpasteurized cow's milk.

Allerberger F, Friedrich AW, Grif K, Dierich MP, Dornbusch HJ, Mache CJ, Nachbaur E, Freilinger M, Rieck P, Wagner M, Caprioli A, Karch H, Zimmerhackl LB.

Institute for Hygiene and Social Medicine, University of Innsbruck, Innsbruck, Austria.

Franz.Allerberger@Lwvie.ages.at

BACKGROUND: Enterohemorrhagic Escherichia coli (EHEC) O26 has emerged as a significant cause of hemolytic-uremic syndrome (HUS). The source and the vehicle of contamination with EHEC O26 are not often identified. We report two Austrian cases of HUS due to E. coli O26:H- affecting an 11-month-old boy and a 28-month-old girl in which transmission through unpasteurized cow's milk was positively identified. **METHODS AND RESULTS:** Using automated ribotyping and pulsed-field gel electrophoresis (PFGE), the isolates (which yielded the virulence genes stx2, eae, and hly) were indistinguishable from each other. An epidemiologic investigation revealed that the children had stayed in the same hotel. Both patients had consumed unpasteurized cow's milk from the breakfast buffet. Fecal samples were taken from the cows of the farm producing the incriminating milk, and one of three cattle EHEC O26:H- isolates had a PFGE pattern indistinguishable from that of the patients' strains. **CONCLUSIONS:** These two cases of E. coli O26 infection illustrate the hazards associated with the consumption of raw milk, and underline the importance of microbiological diagnostic approaches able to detect sorbitol-fermenting, non-O157 EHEC.

Commun Dis Public Health. 2002 Jun;5(2):151-6.

Continued raw milk consumption on farms: why?

Hegarty H, O'Sullivan MB, Buckley J, Foley-Nolan C.

Department of Public Health, Southern Health Board, Sarsfield House, Sarsfield Road, Wilton, Cork, Ireland. hegartyh@shb.ie

The potential dangers associated with drinking unpasteurized milk have been highlighted over recent years. Nevertheless, the vast majority of Irish farming families persist in the practice. This qualitative study was undertaken to ascertain the reasons why. It was found that farmers generally believe their milk to be risk free on the basis of 'routine' test results. They also believe it to be of better quality than pasteurised milk, in addition to being the cheaper option. Adherence to tradition is another factor. The targeting of a more informed, credible public health message which takes account of commonly held, and understandable, views among the farming community is proposed.

Euro Surveill. 2001 Oct;6(10):147-51.

Escherichia coli O157 infections and unpasteurised milk.

Allerberger F, Wagner M, Schweiger P, Rammer HP, Resch A, Dierich MP, Friedrich AW, Karch H.

National Reference Laboratory for Enterohaemorrhagic Escherichia coli at the Federal Public Health Laboratory, Innsbruck, Austria.

We report on two children with Escherichia coli O157 infection, one of whom developed haemolytic uraemic syndrome (HUS). Both had drunk raw cows or goats milk in the week before their illness. Molecular subtyping identified a sorbitol fermenting Escherichia coli O157:H isolate from a dairy cow. This isolate differed from Shiga toxin producing O157:H strains

isolated from the 6 year old boy with HUS. This result underlines the need to search for other causes of infection, despite documented consumption of unpasteurised milk. In the second patient, human sorbitol non-fermenting O157:H isolates and animal isolates from goats were indistinguishable. The isolation of indistinguishable sorbitol non-fermenting *Escherichia coli* O157:H from contact animals supports the association between HUS and consumption of raw goats milk, and re-emphasises the importance of pasteurising milk.

J Dairy Sci. 2001 Oct;84(10):2157-62.

Prevalence of foodborne pathogens in bulk tank milk.

Jayarao BM, Henning DR.

Minnesota-South Dakota Dairy Food Research Center, Department of Dairy Science, South Dakota State University, Brookings 57007-0647, USA. bmj3@psu.edu

Bulk tank milk from 131 dairy herds in eastern South Dakota and western Minnesota was examined for the presence of foodborne pathogens. *Campylobacter jejuni*, shiga-toxin producing *Escherichia coli*, *Listeria monocytogenes*, *Salmonella* spp., and *Yersinia enterocolitica* were detected in 9.2, 3.8, 4.6, 6.1, and 6.1% of bulk tank milk samples, respectively. Thirty-five of 131 (26.7%) bulk tank milk samples contained one or more species of pathogenic bacteria. Isolates of *Salmonella* belonged to group D (n = 4), B (n = 2), C (n = 1), and E (n = 1) "O" serogroups. All six isolates of *Listeria monocytogenes* were identified as O antigen type 1. Four of five isolates of *E. coli* encoded for the shiga-toxin 2 gene, while one strain encoded for the shiga-toxin 1 gene. *Escherichia coli* O157:H7 was not isolated from bulk tank milk samples. Based on autoagglutination testing, it was inferred that all eight isolates of *Yersinia enterocolitica* were likely to be virulent. Non A-grade (manufacturing grade) raw milk producers were at a higher risk (odd's ratio, 4.98; confidence interval, 1.96 to 12.22) of having one or more pathogens in their bulk tank milk than were Grade A producers. It was observed that 21 of 79 (26.6%) dairy producers who consumed raw milk had one or more pathogenic bacteria in their bulk tank milk. The findings of the study warrant the need for educational programs for dairy producers about the risks associated with consumption of raw milk.

WMJ. 2000 Aug;99(5):32-7.

***Escherichia coli* O157:H7 infections in Wisconsin, 1992-1999.**

Proctor ME, Davis JP.

Communicable Disease Epidemiology Section, Wisconsin Division of Public Health, Madison 53701-2659, USA. proctme@dhfs.state.wi.us

Escherichia coli O157:H7 infection became a reportable condition in Wisconsin on April 1, 2000; previously cases were voluntarily reported by physicians and laboratories. During 1992 through 1999, 1333 cases of *E. coli* O157:H7 infection occurred in Wisconsin residents and were reported to the Wisconsin Division of Public Health. During this interval, the highest age-specific mean annual incidence, 13.2 cases per 100,000 population, occurred in persons 3 to 5 years old. Only 28% of patients with reported cases identified bloody diarrhea among their signs and symptoms. Of reported cases, 17% (231/1333) were involved in the eight outbreaks investigated during this interval. Among case patient identifiable risk exposures, farm related (13.4%), recreational water related (8.1%), and unpasteurized milk/dairy product (7.0%) exposures were the most frequently noted. Relatively few infections involved raw/undercooked ground beef consumption (5.8%). Recent use of pulsed-field gel electrophoresis has facilitated linkage of sporadically reported cases into recognized outbreaks. *E. coli* O157:H7 infections

frequently occur in Wisconsin; acquisition of these infections in a wide variety of settings poses important challenges to their prevention and control.

J Infect Dis. 2000 May;181(5):1834-7. Epub 2000 May 15.

An outbreak of *Yersinia enterocolitica* O:8 infections associated with pasteurized milk.

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In October 1995, an outbreak of *Yersinia enterocolitica* O:8 infections occurred in the Upper Valley of Vermont and New Hampshire. Ten patients were identified, median age 9 years (range, 6 months-44 years). Three patients were hospitalized; 1 underwent an appendectomy. Consumption of bottled pasteurized milk from a local dairy was associated with illness (matched odds ratio undefined; lower 95% confidence interval, 1.9). No deficiencies in pasteurization procedures or equipment were detected. *Y. enterocolitica* O:8 was isolated from 1 raw-milk sample and from a fecal sample from 1 dairy pig. The route of contamination was not determined; this outbreak likely resulted from postpasteurization contamination of milk. Dairy pigs were the most likely source of contamination. Milk bottles were likely contaminated by rinsing with untreated well water prior to filling or by other environmental routes. Educating dairy owners about *Y. enterocolitica* and postpasteurization contamination is necessary to prevent further outbreaks.

Am J Public Health. 1998 Aug;88(8):1219-21.

The epidemiology of raw milk-associated foodborne disease outbreaks reported in the United States, 1973 through 1992.

Headrick ML, Korangy S, Bean NH, Angulo FJ, Altekruse SF, Potter ME, Klontz KC.

Epidemiology Branch, Center for Food Safety and Applied Nutrition, Washington, DC, USA.

OBJECTIVES: This study describes the epidemiology of raw milk-associated outbreaks reported to the Centers for Disease Control and Prevention from 1973 through 1992. **METHODS:** Surveillance data for each reported raw milk-associated outbreak were reviewed. A national survey was conducted to determine the legal status of intrastate raw milk sales for the period 1973 through 1995. **RESULTS:** Forty-six raw milk-associated outbreaks were reported during the study period; 40 outbreaks (87%) occurred in states where the intrastate sale of raw milk was legal. **CONCLUSIONS:** Consumption of raw milk remains a preventable cause of foodborne disease outbreaks.

Public Health Rep. 1997 Sep-Oct;112(5):418-22.

Profile of raw milk consumers in California.

Headrick ML, Timbo B, Klontz KC, Werner SB.

Center for Food Safety and Applied Nutrition, Food and Drug Administration (FDA), Washington, DC, USA.

OBJECTIVES: The authors sought to determine the prevalence of raw milk consumption in California--the largest producer of certified raw milk in the United States--and to describe the

demographic and behavioral characteristics of raw milk consumers in that state. **METHODS:** The authors analyzed responses to questions on the 1994 California Behavioral Risk Factor Surveillance System Survey that asked respondents about whether they drank raw milk, the amount consumed, the reason for drinking raw milk, and where raw milk was most often obtained. **RESULTS:** Among 3999 survey respondents, 3.2% reported drinking raw milk in the previous year. Raw milk drinkers were more likely than nondrinkers to be younger than age 40, male, and Hispanic and to have less than a high school education. **CONCLUSIONS:** Raw milk continues to be consumed by some residents of California despite the documented hazards associated with this dietary practice.

J Infect Dis. 1997 Sep;176(3):815-8.

A prolonged outbreak of Escherichia coli O157:H7 infections caused by commercially distributed raw milk.

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A protracted outbreak of Escherichia coli O157:H7 infections was caused by consumption of unpasteurized ("raw") milk sold at Oregon grocery stores. Although it never caused a noticeable increase in reported infections, the outbreak was recognized because of routine follow-up interviews. Six of 16 Portland-area cases reported between December 1992 and April 1993 involved people who drank raw milk from dairy A. By pulsed-field gel electrophoresis (PFGE), E. coli O157:H7 isolates from these cases and from the dairy A herd were homologous (initially, 4 of 132 animals were E. coli O157:H7-positive). Despite public warnings, new labeling requirements, and increased monitoring of dairy A, retail sales and dairy-associated infections continued until June 1994 (a total of 14 primary cases). Seven distinguishable PFGE patterns in 3 homology groups were identified among patient and dairy herd E. coli O157:H7 isolates. Without restrictions on distribution, E. coli O157:H7 outbreaks caused by raw milk consumption can continue indefinitely, with infections occurring intermittently and unpredictably.

Rev Saude Publica. 1996 Dec;30(6):549-52.

[Health risk due to the consumption of raw milk commercialized without due authorization]

Badini KB, Nader Filho A, do Amaral LA, Germano PM.

Faculdade de Medicina Veterinaria da Universidade de Marilia, SP-Brasil.

Sixty raw milk samples commercialized without due authorization in the counties of Botucatu and S. Manuel, State of S. Paulo (Brazil), were submitted to mesophilic microorganism and coagulase-positive Staphylococcus and most probable number of total coliform and fecal coliform counts. Forty-one (68.3%) and 50 (83.3%) of the samples were found, respectively to contain mesophilic microorganisms and total coliforms above the maximum limits established by the Health Ministry for type C pasteurized milk. Thirty (50.0%) and 11 (18.3%) of the samples were found, respectively, to be contaminated by coagulase-positive Staphylococcus and fecal coliforms. Only 5 (8.3%) samples were found to comply with the required legal standards. The results showed the unsatisfactory hygienic and sanitary conditions of the raw milk and suggest the existence of great risk to the health of the consumers, especially when the product is taken without being boiled.

JAMA. 1992 Dec 9;268(22):3228-30.

Campylobacter enteritis outbreaks associated with drinking raw milk during youth activities. A 10-year review of outbreaks in the United States.

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OBJECTIVE--To determine the incidence of recognized outbreaks of Campylobacter enteritis associated with drinking raw milk during youth activities. **DESIGN**--Retrospective survey of 51 state and territorial health departments. **SETTING**--The 50 United States and the Territory of Puerto Rico. **POPULATIONS**--Persons in preschool through college. **MEASUREMENT**--Information was obtained for all Campylobacter outbreaks associated with consumption of raw milk during youth activities from 1981 through 1990 that were investigated by state and territorial health departments. **RESULTS**--Twenty outbreaks were identified in 11 states. Four hundred fifty-eight outbreak-associated cases occurred among 1013 persons who drank raw milk, with an overall attack rate of 45%. At least one outbreak was reported for each year of the 10-year period. Fourteen outbreaks (70%) occurred among children in kindergarten through third grade, compared with one outbreak (5%) among fourth through sixth graders. The remaining five outbreaks (25%) occurred in mixed groups of children and teenagers. Only nine (60%) of 15 outbreaks identified from 1981 through 1988 were reported to the Campylobacter national surveillance system maintained by the Centers for Disease Control and Prevention.

CONCLUSION--Drinking raw milk on school field trips or other youth activities continues despite the occurrence of multiple Campylobacter outbreaks documented from this practice. Such illnesses can be prevented by educating dairy farmers and officials of schools and youth organizations about the hazards of drinking raw milk. Public health organizations need to develop and implement such educational programs.

Public Health Rep. 1988 Sep-Oct;103(5):489-93.

Assessment of the excess risk of Salmonella dublin infection associated with the use of certified raw milk.

Richwald GA, Greenland S, Johnson BJ, Friedland JM, Goldstein EJ, Plichta DT.

Division of Population and Family Health, UCLA School of Public Health 90024.

The risk of serious illness attributable to infection with Salmonella dublin associated with the consumption of certified raw milk in California was evaluated. Data were derived from case reports of S. dublin isolations from persons in the State of California during the period 1980-83 and from production figures for raw milk from the major supplier. It is estimated that more than one-third of reported S. dublin infections in California in the first 4 years of this decade were attributable to raw milk consumption. Among raw milk consumers, it is estimated that more than 95 percent of reported S. dublin infections were acquired from raw milk; this proportion corresponds to a rate of reported S. dublin infections acquired from raw milk in the range of 8 to 35 cases per 100,000 users per year. It appears that immunocompromised persons are at exceptionally high risk of becoming seriously ill or dying from S. dublin exposure, and therefore raw milk is a particular health hazard for such persons.

Am J Epidemiol. 1987 Aug;126(2):179-86.

Campylobacter jejuni enteritis associated with raw goat's milk.

Harris NV, Kimball TJ, Bennett P, Johnson Y, Wakely D, Nolan CM.

During a three-week period in July 1983, six cases of *Campylobacter jejuni* enteritis in King County, Washington were associated with a dairy that produced raw goat's milk. Four patients consumed the dairy's milk, and the other two patients comprised an employee of the dairy and her infant son. Two case-control studies confirmed that, at the time the cases occurred, consumption of the dairy's milk was a risk factor for *C. jejuni* enteritis in King County. *C. jejuni* was isolated from the intestinal tract of three of the dairy's goats. Two of the three isolates, as well as those from five of the patients (all of those tested), were Lior serotype 36. That serotype was not encountered among 14 other *C. jejuni* isolates from King County during the period of the outbreak, including three isolates from goats at another inspected dairy. The study shows that raw goat's milk may transmit *C. jejuni* infection from animals to humans, as other investigators have shown for unpasteurized cow's milk.

JAMA. 1987 Jan 2;257(1):43-6.

The influence of immunity on raw milk--associated *Campylobacter* infection.

Blaser MJ, Sazie E, Williams LP Jr.

After a retreat to an Oregon farm, 19 of 31 college students developed an acute gastrointestinal illness. *Campylobacter jejuni* infection was recognized in all the ill students and caused asymptomatic infections in three others. In total, 22 (88%) of 25 students who consumed raw milk for the first time became infected as compared with none of two who had not consumed raw milk. Among ten persons who chronically consumed raw milk, none was ill, a striking difference from the 76% attack rate among the 25 acutely exposed students. The quantity of raw milk consumed was directly related to the occurrence and severity of illness. Acutely infected students showed significant rises in *C. jejuni*-specific immunoglobulins, whereas the low antibody levels seen in unexposed persons did not rise. In contrast, acute-phase serum samples from persons with chronic exposure to raw milk showed elevated antibody levels to *C. jejuni*. These findings indicate that chronic raw milk consumption is associated with elevated levels of *C. jejuni*-specific serum antibodies and with immunity to symptomatic infection.

J Infect. 1986 May;12(3):265-72.

Communicable disease associated with milk and dairy products in England and Wales: 1983-1984.

Barrett NJ.

During the period 1983-1984 32 outbreaks of disease (11 in 1983 and 21 in 1984) associated with consumption of milk and dairy products and affecting at least 714 people were reported from England and Wales. Twenty-seven of the outbreaks were attributed to raw milk, two to contaminated pasteurised milk and one each to cheese, cream and ice-cream. Twenty-two were due to salmonellas, seven to campylobacters and one each to *Staphylococcus aureus*, *Yersinia enterocolitica* and *Streptococcus zooepidemicus*. Two sporadic cases of *Corynebacterium ulcerans* infection associated with raw milk were also reported. There were eight deaths, all associated with the *S. zooepidemicus* outbreak. The continuing occurrence of milk-borne outbreaks, and an increasing number of incidents affecting rural communities, emphasises the urgent need for enforcing pasteurisation of milk and dairy products in England and Wales.

JAMA. 1984 Oct 19;252(15):2048-52.

Unpasteurized milk. The hazards of a health fetish.

Potter ME, Kaufmann AF, Blake PA, Feldman RA.

Meaningful differences in nutritional value between pasteurized and unpasteurized milk have not been demonstrated, and other purported benefits of raw milk consumption have not been substantiated. Conversely, the role of unpasteurized dairy products in the transmission of infectious diseases has been established repeatedly. To effectively counsel patients attracted by the health claims made for raw milk, practicing physicians must understand both the rationale used by proponents of raw milk and the magnitude of the risk involved in drinking raw milk.

N Z Med J. 1984 Jun 27;97(758):411-3.

Raw milk consumption as a probable cause of two outbreaks of campylobacter infection.

Brieseman MA.

Outbreaks of gastro-intestinal illness among groups of children using two different camp sites are described. Fifty of the children in one situation and thirty-eight at the second site were ill, with campylobacter being isolated in 50 children. Circumstantial evidence implicates raw milk as the cause of the illness.

Vet Rec. 1983 Jun 18;112(25):578-80.

Milkborne salmonellosis in Scotland 1980 to 1982.

Reilly WJ, Sharp JC, Forbes GI, Paterson GM.

In Scotland between 1980 and 1982 there were 21 episodes of milkborne salmonella affecting a total of 1090 persons (range one to 654). There were eight deaths, including two children, in people associated with these outbreaks. The problem of milkborne salmonellosis continues to be greater in Scotland, where dairy herds on average are larger and a greater proportion of raw milk is consumed, than elsewhere in Britain. It is anticipated that legislation requiring the pasteurisation of virtually all milk sold for human consumption in Scotland by August 1983, will help to correct the situation.

Am J Epidemiol. 1983 Apr;117(4):475-83.

Human Campylobacter infection associated with certified raw milk.

Potter ME, Blaser MJ, Sikes RK, Kaufmann AF, Wells JG.

Between May 27 and June 18, 1981, 50 individuals in 30 households in suburban Atlanta, Georgia, had a gastrointestinal illness caused by *Campylobacter jejuni*. Epidemiologic evidence strongly associated consumption of unpasteurized milk with illness. A culture survey confirmed fecal carriage of *C. jejuni* by cows in the implicated dairy and in a control dairy, but failed to document presence of the organism in the milk. The standard plate counts and leukocyte counts (two indicators of microbiologic quality of milk), facilities, and operating procedures at the implicated dairy were all within accepted levels for production of Grade A raw milk in Georgia. Inasmuch as the parameters used by regulatory officials to determine the wholesomeness of milk were not violated at the implicated dairy, the only means available to ensure the public's health would be proper pasteurization before consumption.