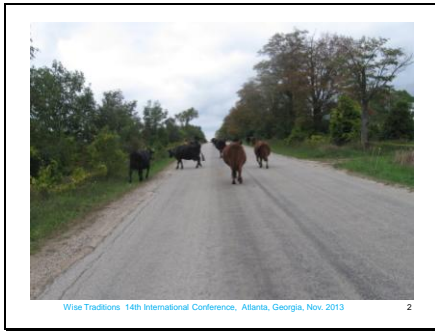


Slide 1



Slide 2




Slide 3



Slide 4

Highlights of a Medical Expert's Support of Fresh Unprocessed Whole Milk



Ted F. Beals, MS, MD

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Full Disclosure

I do not receive financial support or pay for the efforts I devote to the understanding of fresh milk (raw milk), from testifying in support of access to fresh milk, or talking about fresh milk.

However, fresh milk is a major part of my daily diet, I do personally derive the benefits to my health and wellbeing. And would personally be adversely impacted to the extent that my supply of this nutritious food was in any way impaired or threatened.

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Slide 6

Why am I such a strong advocate for the right to choose the food I consume?

- ✓ Because the choices are critical to my wellbeing
- ✓ Because my experience and training helps me see the solid facts, and recognize the distortion of motive.
- ✓ Because of the power behind the relentless push to make food a commodity rather than a necessity of life.
- ✓ Because I believe that truth can enable wise choices.

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Slide 10

Natural Biological Processes that Occur with time

- Microbiological world; depending on diversity and quantity
 - These organisms digest
 - They also produce external products
- Intrinsic Enzymes
- Biological Structure Integrity
- Many component-storage configurations require energy (nutrient dense packaging)

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Model of a milk **micelle** (3 dimensional sphere of stored milk proteins, calcium, phosphate, citrate and enzymes) proposed by Holt

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Comparison of Ways to Prolong Shelf-Life of Milk

Pasteurization	Keeping Cold
<ul style="list-style-type: none"> • Kills most microorganisms <ul style="list-style-type: none"> – Including beneficials – Competitive exclusion destroyed • Intrinsic enzymes deactivated • Kills most living cells • Disrupts Fat Globules • Denatures Proteins & micelles • Lactose remains unchanged • If homogenize as well, profound changes to fat globules, and other membrane systems • Releases destructive enzymes • If virulent pathogens are present, kills nearly all. 	<ul style="list-style-type: none"> • Retards; growth, metabolism, digestion, production of end products of microorganisms' activities • Retards activity of most enzymes • Quiets living cells • Fat globules preserved • Micelles preserved • Lactose remains unchanged • No incentive to homogenize • Membranes and membrane bound enzymes preserved • If any virulent pathogens are present, multiplication, enables competitive exclusion

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Current "Hot" Analysis used by Opponents of fresh milk

Nonpasteurized Dairy Products, Disease Outbreaks, and State Laws—United States, 1993–2006.
by Adam J. Langer, Tracy Ayers, Julian Grass, Michael Lynch, Frederick J. Angulo, and Barbara E. Mahon (employees at the CDC)
Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 18, No. 3, March 2012

"Nonpasteurized products caused a disproportionate number (=150x greater/unit of product consumed) of outbreaks and outbreak-associated illnesses and also disproportionately affected persons <20 years of age. States that restricted sale of nonpasteurized products had fewer outbreaks and illnesses; stronger restrictions and enforcement should be considered."

The analyses in this paper are significantly flawed in multiple ways!

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Flaws in Langer publication

- Miscalculation of amount of milk consumed
- Erroneous estimate of percent of consumers (they use less than 1% when more likely 4%)
- Undocumented criteria of state's laws
- Bias selection of statistical data they highlighted
- illogical range of years for data (1993-2006)

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Critical genomic analysis of Virulent Pathogen's Virulence Techniques

- One of the current advances in pathogen characteristics is total genomic (DNA) analysis with identification of virulent subtypes associated with outbreaks.
- The list of different genetically controlled virulence factors is expanding rapidly.
- And new subtypes of know virulence factors are being found.

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Remember

- Before a **virulent** bacteria can cause foodborne illness:
 - It must be ingested in large enough numbers (infectious dose)
 - Able to withstand gastric environment and immune attack
 - “Swim” over to the gut wall
 - Attach to the gut wall
 - Attach to the appropriate cells
 - Move through the cell wall to enter those cells
 - Find protective niche inside the living cell to thrive
 - Proliferate in that niche
 - Produce products that are harmful
 - Or inadvertently damage the cells in large enough numbers

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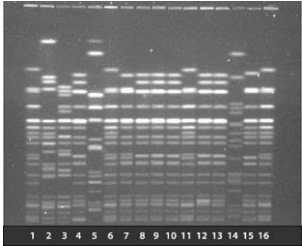
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Consequences of the New Technology
the more we know the more we realize how little we know

- Learning more about the number and complexity of virulence factors
- Appreciate that classical nomenclature (genus and species) is of very little value in identifying the cause of human illness/outbreaks.
- Development of new lab tools to determine if the virulent bacteria isolated from different people are identical demonstrating that they have a common source (are an outbreak cluster).

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Continuing proof that so called "finger-print" analysis can NOT determine that bacteria from different ill people came from the same source.

- Appreciation that **none** of the newest lab technologies is equivalent to real finger-print analysis.
 - Pulse Field Gel Electrophoresis (PFGE)
 - Multiple-Locus Variant-Repeat Analysis (MLVA)

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Pathogens

- Are not designed to cause disease. They are NOT malevolent
- Their adverse effects on people (illness) is "collateral damage" from products they may produce, damage to cells/tissues, and occur when they are actively growing.
- Cause disease only when:
 - They are present in adequate numbers (infectious dose)
 - They have the capability of producing virulence factors
 - And they actually produce those virulence factors
 - And those virulence factors are produced when they are in the specific locations and at times that those factors can function
 - And the person does not have adequate defenses or until those defenses are effective

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?????

The principle reason given for banning fresh milk is that when pathogens are in milk they **thrive and multiply** and can therefore cause infection. Even a single pathogen is enough.

Yet.... The explanation most often given for **NOT** finding a pathogen in the milk from a dairy suspected of spreading infection is -----

It is extremely difficult to find the pathogen in the milk, even using the most advanced culture enhancements we have developed, because there are so few and they just don't grow well.

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Microbiota of Milk Production

- We need to understand what every artisan cheese producers know: there are large numbers and remarkable diversity in the microorganisms in our production environment.
- We need to appreciate that almost every aspect of our milk production is affected in significant ways by the microbiota
- We need to implement management that promotes beneficial/healthy micro-ecosystems in milk and the milk environment.
- Indiscriminate or shotgun killing of microorganisms is NOT a rational approach.

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Microorganism ecology

- In the soils
- In the water we use
- On the seeds we sow
- In the additives to the soils
- On the feed utilized by the animals
- On and in other animals in the environment
- On the animals
- In the animal's digestive tract
- In the teat canals and teats
- In the collection containers
- In the equipment, distribution and storage systems
- In the environment of the milking, storage, distribution areas
- On the handlers' clothing
- On the handlers
- In the handler's digestive and respiratory tracts
- In and on the containers used to distribute the milk
- In and on the consumers
- In the consumer's environment
- In the consumer's digestive system
- In the other foods consumed with milk

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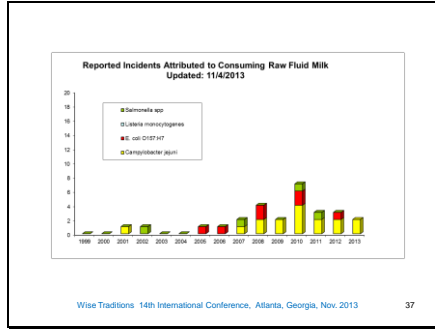
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Microbiota

- The diversity and numbers of microorganism varies considerably however we can make this generalization, in all of the physical locations in the above list:
 - The organisms are focused on eating and proliferating,
 - Competing with their neighbors for space and nutrients
 - They are under "infectious" treats from their own "pathogens" (phages, other microorganisms)
 - Given time, they will establish an equilibrium

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Observations on Illness Data for Incidents implicating Fresh Fluid Milk

- The average yearly number of illness is Extremely small - 50
- There are far more illnesses that implicate meat, poultry, vegetables, nuts, shell-fish.
- Campylobacter jejuni* is the most frequently implicated pathogen
- Listeria monocytogenes* has NOT been implicated in outbreaks
- Most incidents have less than 19 illnesses.

The number of consumers has increased dramatically
The number of dairies producing fresh milk is increasing

- However, there has **not** been an increase in illnesses
- It looks like the rate of incidents and illnesses is random
- There is no difference in the number of illness attributed to fresh milk in states that permit distribution, than in those that ban all sale/distribution
- The risk of injury from many commonly accepted activities is greater than the purported risks of drinking fresh milk.

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The Untold Story of Recalls

- There are two types of food “recalls”:
 - Recalls of a product when it is suspected that it is the source of an outbreak
 - Recalls when a routine/regulatory food sample is found to be “positive”.
- There has not been a single example of a recall from a positive regulatory sample with any finding of illnesses in the consuming public after the recall.

All links of illness with a pathogen test cultures of food product are from Investigations of previously existing foodborne outbreaks.

None from routine or voluntary pathogen lab testing.

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