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Milk: The More Things Change, the More Technophobia Stays the Same

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America's food supply is among the safest and most abundant in the world, thanks in part to a variety of technologies used to safeguard it. Nonetheless, in the last decade or so there has been an increasingly vocal minority that claims our foods are simply not as healthful or nutritious as they used to be. One of their targets is milk.

The Value of Pasteurization

Milk is replete with vitamins, minerals, proteins, and other nutrients all valuable contributions to the American diet. Because of its ample spectrum of nutrients, however, it is also easily colonized by microorganisms that want to share this bountiful supply. This is where technology comes into play.

In the early twentieth century, urban populations grew as people from rural areas migrated to find jobs and (they hoped) an easier lifestyle. But food safety technology did not keep up with them and with the need to preserve food as it was transported. Infant and childhood deaths traceable to contaminated and/or adulterated milk were all too common. Tuberculosis, passed from infected cows to their milk, was rampant among the population in many urban areas.

But the technology to deal with these health threats did exist. In 1890, tuberculin testing of dairy herds was first introduced, and about five years later the first commercial pasteurizing machinery was introduced. In 1908 Chicago passed the first compulsory pasteurization law, which applied to all milk except from cows that had been tested and found free of tuberculosis.

Pasteurization is simply the heating of raw milk to 65 degrees Celsius (149 degrees Farenheit) for 30 minutes or to 72 degrees C (about 162 degrees F) for 15 seconds. The milk is then rapidly cooled. This process destroys disease-causing bacteria, yeasts, molds, and many non-pathogenic bacteria. It also will inactivate enzymes that can cause the milk to spoil quickly, thus extending the shelf life of the product.

In 1924, the Public Health service published the first set of recommendations (the Pasteurized Milk Ordinance) to set out the steps necessary to protect the milk supply (including pasteurization).

Today, all milk traded in interstate commerce must be pasteurized, thus providing assurance that it, and products made from it, will be wholesome when they reach consumers. The effectiveness of such procedures is shown by the drop in milk-borne illnesses during the twentieth century. In 1938, fluid milk and products made from it were associated with 25% of all disease outbreaks due to food or water contamination today, that figure is less than 1%!

The Enzyme Advocates

In spite of such obvious evidence of the value of pasteurization, there are those who claim that, for a variety of pseudo-scientific reasons, the process impairs the quality of milk. According to them, raw (unpasteurized) milk is in all ways superior to the pasteurized variety.

One claim is that heating "kills" valuable enzymes in the milk, enzymes that we need for optimal health. The truth is that while heating does inactivate enzymes (enzymes aren't "alive," so it's impossible to "kill" them), they wouldn't do us much good anyway.

For example, some raw milk proponents say that since lactase (the enzyme that breaks down the milk sugar called lactose) is inactivated by heating, pasteurization contributes to lactose intolerance because heating would inactivate the enzyme. This statement is not true for a couple of reasons.

First, lactase is produced (in humans and other animals) by cells lining the small intestine it is not present in milk! The only dairy product in which one could reasonably expect to find lactase is yogurt. And even in that case, the bacteria that actually produce the lactase are added to milk *after* pasteurization, so they're not heated to high temperatures.

Second, even if there were lactase in milk, it wouldn't do us much good. That's because this enzyme works best in the small intestine, where it is formed. The highly acidic environment of the stomach would inactivate it. So even if we drank milk with active lactase in it, it's unlikely that much if any of it would survive the stomach acid and arrive in the small intestine in an active state.

Raw Milk as Bacteria-Killer?

A newer story that has been making the rounds lately is that raw (but not pasteurized) milk has bacteriocidal properties. Indeed, this claim was recently promoted on a radio station from California. The basis of the claim is the existence of a protein lactoferrin in milk. Known for many years to nutritionists as a protein that transports iron in the blood, it has lately been found to kill bacteria in the lab and in animal studies.

The raw milk promoter on the radio station cited experiments in which bacteria inoculated into raw milk did not fare well. This may well be true but until the same experiment is performed at the same time and under the same conditions with *pasteurized* milk, there is no scientific basis for claiming the superiority of the unheated product.

Dream of the Ideal Glass of Milk

What, I wonder, inspires the public's ongoing interest in such theories? Is it that the substantial benefits of technology have been around so long that we forget why they were adopted in the first place? Or is it our fascination with a mythical Eden we think existed before the Industrial Revolution a time when, in fact, infectious disease and foodborne illness were terrible scourges?

Our penchant for romantic nostalgia can blind us to the real health benefits that technology has brought to our lives.

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