

## Straight from the Udder

A COLLABORATION BETWEEN THE VIRGINIA DEPARTMENTS OF HEALTH, GAME AND INLAND FISHERIES, AND AGRICULTURE AND CONSUMER SERVICES

Bovine tuberculosis, *Mycobacterium bovis*, is a zoonotic pathogen that can be transmitted through ingestion of unpasteurized, contaminated milk or dairy products. To eliminate this pathogen from dairy products, milk for human consumption is pasteurized, a process that started in the 1900s. Today, bovine tuberculosis is a rarity in American dairy herds. The near elimination of this disease, along with advancements in milking hygiene has enabled the American dairy industry to produce a much-less contaminated product. However, multiple pathogens that can cause human illness continue to be found in raw milk products<sup>1</sup>.

In 2005, the average American consumed 32 pounds of cheese, 8.6 pounds of yogurt, 27 pounds of fat-free milk, 81 pounds of reduced fat milk, 57 pounds of whole milk, 4.4 pounds of sour cream / dips, 14.5 pounds of flavored milk, 26 pounds of ice cream, and 2.6 pounds of cottage cheese<sup>8</sup>.

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The Centers for Disease Control and Prevention report that from 1998 to 2005 raw milk or raw milk products have been implicated in 45 foodborne illness outbreaks in the US, accounting for more than 1,000 cases of illness<sup>2</sup>. It is usually safe to assume that the actual number of cases is higher because significant numbers of cases are not usually identified. Some of the potential pathogens that may be found in milk are: *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes*, *Salmonella* spp, *Yersinia enterocolitica* and *Brucella* spp<sup>3</sup>. A recent article in the journal of Clinical Infectious Diseases stated that “the frequency of contamination in pooled farm milk has been reported to be <1% to 8.9% for *Salmonella* species, 2.7% to 6.5% for *L. monocytogenes*, <1% to 3.8% for Shiga toxin producing *E. coli*, <1% to 12.3% for *C. jejuni*, and 1.2% to 6.1% for *Yersinia enterocolitica*”<sup>1</sup>. From 1982 to 2002, raw milk products accounted for 4% of *E. coli* 0157:H7 outbreaks<sup>4</sup>.

Milk from cows that are known to be clinically ill should not enter the bulk milk

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tank, yet milk in the bulk tank may be contaminated by ‘healthy’ cows with a subclinical or asymptomatic infections. The environmental contamination of milk is also a risk during the collection or storage processes. The nutrient-rich composition and neutral pH of raw milk make it an excellent media for the proliferation of bacteria at certain temperatures.

In 1987, the Federal government made it illegal to sell raw milk packaged for human consumption across state lines in order to protect consumers from the potential pathogens that may be in raw milk products. The sale of raw milk products within a state is regulated by that state. In Virginia, it is legal to drink raw milk from a cow that you own. Many Virginia consumers of raw milk do so through ‘cow-share’ or cow boarding programs. These programs allow the consumer to pay a fee to a farmer to lease or own part of a cow that he cares for in exchange for raw milk from that cow. Sally Fallon, founding president of the Weston A. Price Foundation, which is “dedicated to restoring nutrient-dense foods to the human diet through education, research and activism”, estimates that more than 500,000 Americans regularly consume raw milk<sup>5</sup>. Often, these consumers chose to drink raw milk because they believe that the pasteurization process reduces the nutritional value of milk, is associated with allergies and makes it more difficult for people to process lactose<sup>3,6</sup>.

Research has shown that there is no significant nutritional difference between pasteurized and unpasteurized milk. For example, there is no significant difference in the levels of calcium, conjugated lactic acids, lactose or milk proteins when raw and pasteurized milk products are compared<sup>3,6,7</sup>. Barbara Ingham Ph.D., an associate professor and extension food scientist at the University of Wisconsin-Madison states that “there is no scientific evidence that raw milk contains an anti-arthritis factor or that it enhances resistance to other diseases”<sup>3</sup>. Both the American Medical Association and the American Veterinary Medical Association support the pasteurization of milk products for human consumption. People with compromised immune systems or taking antacids are more susceptible to foodborne diseases and should be particularly diligent about avoiding unpasteurized dairy products. It is important to remember that unpasteurized dairy products can include yogurts, puddings, ice cream, and soft cheeses, like brie, camembert, queso fresco, and queso blanco.

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## It's summertime and that means melons!

By Chris Gordon, MA, REHS, CPFS

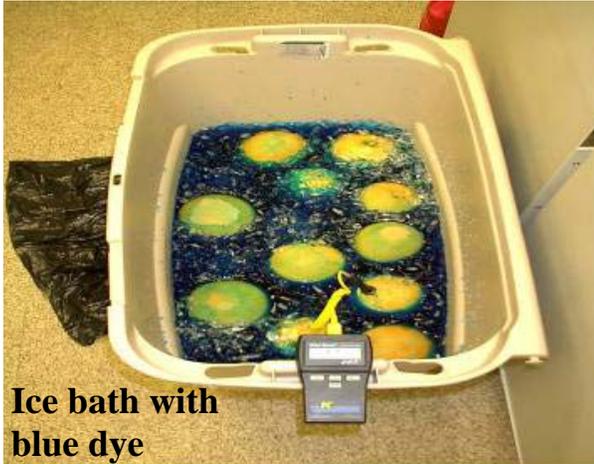
With the average daily temperature hovering closer to the 90s each day, it's clear that summertime is right around the corner. Summer is a great time for picnics, gatherings, festivals, and spending time with friends and family. With this change in season, fresh fruits and vegetables become a regular part of the meals shared with others during this time. Watermelons, cantaloupes, tomatoes on the vine, and leafy greens are just some of the common vegetables that can make it onto the plate. But along with their nutritious benefits can come some unwanted guests as well—bacteria.

With the 2006 *E.coli* O157:H7 outbreak associated with spinach and the 2008 *Salmonella saintpaul* outbreak associated with serrano peppers fresh in our minds, it's time to re-evaluate some of our long-standing beliefs regarding fresh fruits and vegetables. Investigations following each of these outbreaks have shown us that foods previously thought to be 'risk-free' from contamination can actually be incubators for foodborne pathogens, given the right conditions. Understanding how this is possible gives a revealing look into how the science of food safety has advanced our knowledge of potential foodborne illness risks and steps taken to control them.

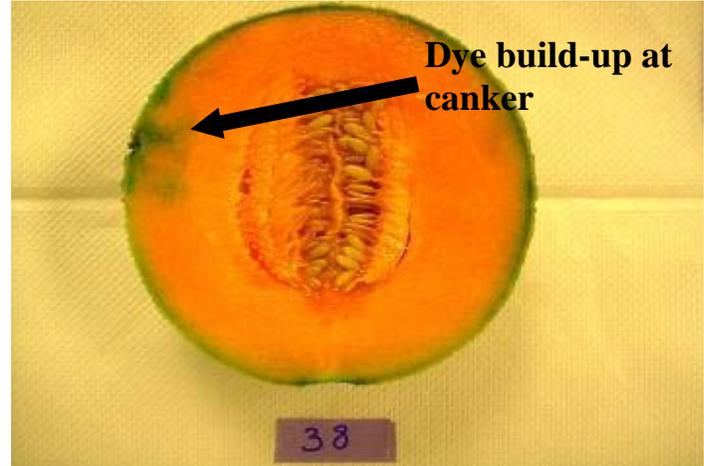
Following numerous outbreaks associated with honeydew, cantaloupe, and watermelons, tests were conducted to understand how uncut fresh fruits and vegetables could lead to foodborne illness. The following pictures show whole cantaloupes taken from room temperature and exposed to dye concentrations for several hours in an ice bath. The cross-sections of the melon show that, following immersion in the blue-colored ice water, the blue color infiltrated the cankers and rind blemishes. The difference in temperature caused after exposure from warm to cold environments caused the air-cell in the center of the cantaloupe to contract, creating a 'vacuum-like' condition that draws in the blue color dye. Studies conducted on whole tomatoes have found a similar effect. When whole, uncut fruits and vegetables experience rapid temperature change, as often happens during picking when they are taken from the hot outdoors and brought inside for rinsing, there is a

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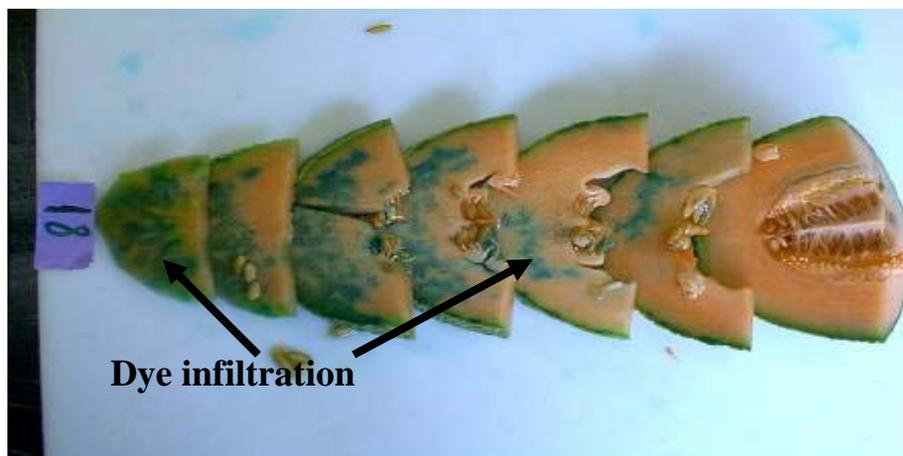
potential for pathogen infiltration.



**Ice bath with blue dye**



**Dye build-up at canker**



**Dye infiltration**

But the physiological effects of this air-cell shrinkage are only part of the story. It turns out that biological properties of the food such as pH and water activity also influence pathogen growth. Research conducted on cantaloupe have found that the average pH (6.2-7.1) and water activity (0.99) are ideal for pathogen growth. Tomatoes (pH 4.2-5.0,  $A_w$  0.99) and lettuce (pH 5.8,  $A_w$  0.99) also tell a similar story. Armed with this knowledge, the Food and Drug Administration has taken steps to advise the public that once cut, these foods should be kept at refrigeration temperatures to limit the growth of organisms of public health concern.

So when you're out this summer hosting a barbeque at a backyard gathering, remember to keep those cut melons, tomatoes, and lettuce on ice—your guests will thank you for it!

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