

Science Literacy and Mayonnaise

The ever-increasing number of Internet pseudo facts, profound public misunderstanding of science, and growing distrust of the food science and technology profession are distressing. Studies show the lack of science literacy in our population starts early. Children are not exposed to science experiences in elementary schools. They have increased anxiety and dislike for science as they move from elementary to high school. Their enjoyment of science decreases with grade level and a historically low level of science experiences adds to their discomfort. To illustrate the point, here are a few food science illiteracy lessons.

The cartoon character Popeye is noted for massive consumption of spinach to magically confer superhuman abilities such as lifting up to 36 tons, resisting bullets, and rapid swimming with the aid of a tobacco pipe as a propeller. Although spinach contains muscle-building iron, vitamins, and minerals, only a small amount of the iron is bioavailable due to presence of oxalic acid, a potent cation chelator.

It is ironic that consumption of high levels of oxalic acid is associated with elevated risk of kidney stones, gout, and rheumatoid arthritis. Even worse, fresh produce like spinach is a leading vehicle for transmitting foodborne pathogens. Over the past 20 years, more than 20 serious outbreaks of *E. coli* O157:H7 have been traced to consumption of fresh leafy greens, resulting in

tens of millions of dollars in lost sales and medical claims—hardly the stuff of superhero imagery.

In another example, a respected national news orga-

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nization further perpetuates questionable science literacy when it published an attention grabbing online headline: “Cheese – it’s grosser than you thought”. The story continues with this subtitle: “Behind the taste lie bacteria, stomach lining, pesticides and pure fat”. What the article failed to reveal is that cheese bacteria are starter cultures that are necessary to help set the curd and to produce organic acids and flavors. These bacteria do not produce human illness. Although calf stomach lining was originally used in cheese making as a source of rennin, it has long been replaced with genetically-engineered microbial chymosin (rennin). There is little to no evidence that cheeses contain pesticides. Without butterfat, your cheese would lack desirable flavor and texture.

Have you heard of the threat your baby carrots pose? I’m told that the white specks on such carrots are exuded “plastic” from use of chlorinated wash water during processing. Really? These surface discolorations are actually due to dehydration of frayed cut marks on the carrot surface. You can see the same phenomenon on the surface of unpeeled

carrots! How many consumers don’t eat grapes because the white film on the grape skin is “pesticide residue”? Guess what, this film is actually natural yeast

growth—that’s how our ancestors made wine out of grape juice.

Here’s another question I’ve received. “Is it true they put earthworms in hot dogs?” Sure, ingredient labels of many processed meats show the presence of erythorbate, which sounds like “earthworm bait”. Erythorbate is actually a chemical congener of ascorbic acid (vitamin C). It is added as a reducing agent to minimize the formation of potentially toxic nitrosamines during processing.

Back to the issue at hand, a few years ago the National Assessment of Educational Progress (NAEP) had a food science-related question on its exam. The question described a scenario where potato salad made with mayonnaise was left out in the sun and listed possible answers for why this behavior could cause food poisoning. Sadly only 10% of eighth-graders selected the “correct” answer. Pundits at the time used this outcome to bash the level of science literacy in our population. What wasn’t mentioned is the “correct answer” was technically wrong. What is the correct answer?

On the NAEP test, the “correct” answer was “bad

mayonnaise.” Why is bad mayonnaise the wrong “correct” answer? Although homemade mayonnaise made with raw eggs can cause salmonellosis, commer-

cial mayonnaise is manufactured with pasteurized eggs that are free of pathogens. Furthermore, commercial mayonnaise contains ingredients to inhibit microbial growth and survival, such as acidulents (vinegar, lemon juice), salt, and antimicrobials (potassium sorbate, sodium benzoate).

So, what is a better correct answer? The most likely scenario is transfer of pathogens from food handlers, dirty work surfaces, or by addition of contaminated ingredients such as onions, celery, or herbs. Pathogen populations can double in 10 minutes at warm temperatures to quickly reach intoxicating or infectious doses. Thus, the poorly conceived test answer may explain why students performed poorly and may have had little relation to their science acumen.

More alarming is the fact that the question writers lacked fundamental food science knowledge. I think it’s time for the media and policy makers to engage Certified Food Scientists for a more accurate portrayal of what food actually is. **FT**

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