

Response to William Marler Blog: Revisiting the Bias in the CDC Statistics

In a previous response to personal injury lawyer William Marler (realmilk.com/documents/ResponsetoMarlerListofStudies.pdf), we reviewed 102 citations from the peer-reviewed literature and concluded that the literature exhibits a “systematic bias” against raw milk and a frequent rush to blame raw milk for an outbreak of foodborne illness without sufficient evidence of causation or often even in the face of contrary evidence.

Marler recently responded (www.marlerblog.com/2009/10/articles/lawyer-oped/comparing-the-food-safety-record-of-pasteurized-and-raw-milk-products-part-3/), claiming that this bias was a “major misconception” of the Weston A. Price Foundation and concluding that pasteurized milk is much safer to drink than raw milk.

Marler’s conclusion rests on three flawed assumptions:

- No bias against raw milk exists in the literature because health officials investigate illnesses traced to raw milk using the same approaches they use to investigate illnesses traced to any other food.
- It is not necessary to demonstrate that raw milk is contaminated with a pathogen in order to demonstrate that it is responsible for an outbreak of foodborne illness.
- CDC data shows that raw milk products are responsible for the majority of milk-related outbreaks.

These arguments miss the basic point. We identified the following as the two most important questions:

- First, is raw milk uniquely dangerous, such that it should be singled out for prohibition or damaging regulation?
- Second, is there a reason why producers and consumers should not have the liberty to engage in voluntary exchanges without lawyers and bureaucrats telling them what to eat and drink?

In order to show that raw milk is uniquely dangerous, its safety should be compared to that of all foods, including deli meats, hot dogs, spinach, and other foods to which outbreaks of foodborne illness are often attributed but whose rightful place in the free market no one ever questions. **Unless raw milk is unique among all foods in the supposed danger it presents, it should not be singled out.** Informed consumers, moreover, must have the basic freedom to choose for themselves what foods to consume.

In addition to ignoring these vital questions, Marler’s three arguments are fundamentally flawed, and we will address each of them below.

A Question of Bias

Foodborne illnesses, especially those caused by such organisms as *Campylobacter Jejuni*, *E. coli 0157:H7*, *Listeria monocytogenes* and *Salmonella enteritidis*, can often result in serious and even permanent harm to victims with underlying illnesses or other conditions predisposing them to these risks. Any food, whether raw or pasteurized, carries some risk of contamination. To protect these victims from such pernicious effects and to protect the general population and our society from wasted time and resources due to milder and more common forms of foodborne illness, we thus consider it imperative that farmers produce raw milk and raw milk products in accordance with the most conscientious standards, from grass-feeding to proper sanitation of bottling equipment. While raw milk contains numerous built in safety mechanisms (most of which are compromised or destroyed by pasteurization), this safety system can be overwhelmed in extreme situations, such as in confinement dairies where cows are fed a diet based on grains, or where large amounts of pathogens from contaminated water or manure inadvertently get into the milk.

Furthermore, while we believe that raw milk is itself protective against systemic infection, we still have the responsibility as a society to further investigate how individuals can maximize their immunity to foodborne illness.

The fact that pasteurized milk, deli meats, spinach, and many other commonly consumed foods present as great a risk or perhaps an even greater risk than raw milk does not excuse farmers from bearing responsibility for their own raw milk products. As we have shown in our initial response to Marler, however, one cannot use the commonality of publications in the peer-reviewed literature to make a quantitative claim about how dangerous raw milk is. This is, first of all, because most of these publications lack sufficient evidence to conclude that raw milk in fact caused the outbreak. In cases where an outbreak genuinely points to raw milk, moreover, the investigation is more likely to be published simply because outbreaks due to raw milk are more traceable and containable than outbreaks due to other foods, thus making raw milk a safer and more accountable food.

Marler acknowledges that not all foodborne illnesses are reported to the CDC and that some outbreaks are investigated more intensively than others at the local level, but claims that since this is true of investigations involving both raw and pasteurized milk, there is “no indication of a ‘systematic bias’ against raw milk.”

Ironically, the three examples Marler gives of outbreaks not listed in CDC databases are an outbreak sickening over 200,000 people linked to pasteurized ice cream, an outbreak sickening 1,644 people linked to pasteurized milk, and an outbreak sickening eight people linked to raw milk. Had he included these three outbreaks in his analysis, Marler would clearly tip the tables in favor of raw milk.

Marler also fails to convey just how few foodborne illnesses are actually reported. If most illnesses were reported, we could more reasonably assume that the proportion of

outbreaks reported for a given food reflects the proportion of outbreaks actually attributed to that food. According to the CDC estimates cited in our review, however, less than one out of every thousand cases of foodborne illness is reported. This means that over 99.9 percent of foodborne illnesses go unreported.

To claim that the percentage of *reported* outbreaks traced to raw milk represents the percentage of *actual* outbreaks truly caused by raw milk when the reported outbreaks are estimated to represent such a small sample of the total denies all the basic principles of statistics and experimental science. Statisticians consider reported data in a sample of the population to reflect what is actually happening in the true population if and only if the sample is a *random sample*. Similarly, in order to determine whether a treatment is effective, experimental scientists will *randomly assign* people to a treatment or to a placebo. The opposite of this random assignment is self-selection. No one gives real credence to the figures generated by internet polls where whoever wants to vote can vote. The voters cannot be trusted to be a random sample of the population. No one would trust a study in which people chose themselves whether to take a treatment or a placebo because the treatment group would not be a random sample of the study population. Likewise, if 0.1 percent of foodborne illnesses are self-reported or physician-reported to the CDC, we cannot trust these figures to be a random sample of all foodborne illnesses.

In our initial review, we never claimed that investigations of illnesses tied to raw milk are conducted differently than investigations of illnesses tied to other foods. Instead, we pointed out how strong biases can inadvertently be incorporated into investigations because “most investigators are thoroughly convinced that raw milk poses a major threat to public health, and thus they often rush to judgment to implicate raw milk even when the science is not fully supportive.” We gave several examples of how this view could bias both the reporting and investigation of foodborne illness. Since so few illnesses are reported and investigated, the mere potential for bias precludes us from drawing any valid statistical conclusions from CDC databases or the peer-reviewed literature.

Ironically, some of this reporting bias may actually reflect a level of accountability unique to raw milk, which actually makes it a very safe product. Marler treats the foodborne illness statistics he uses as if they were either complete data for the population or data from a true random sample of the population. They are neither. All we can infer from them is how often some illnesses are *reported* to involve raw milk or pasteurized milk. In order to determine how often illnesses are truly attributable to raw milk, pasteurized milk, and the many other foods to which illnesses can be attributed, we would need quality scientific data for the other 99.9 percent of foodborne illnesses that the CDC estimates go unreported.

The Case of the Missing Pathogen

Marler claims that while isolation of the outbreak strain from a food product provides “The Smoking Gun,” it is “not a requirement to take action to prevent new illnesses.” He notes that it is often not possible to isolate the outbreak strain, either because there is no

contaminated food left to test or because the pathogen “already died-off in the leftover milk.”

One of the examples in which *Campylobacter jejuni* was claimed to have died off in milk samples before testing was a paper published by Hutchinson and colleagues in 1985. They could not culture *C. jejuni* under the sterile laboratory conditions usually used to isolate pathogens and could only obtain a positive result if they performed the isolation procedure in the open air on the farm. They claimed that *C. jejuni* was unable to tolerate the “natural antibacterial effect of fresh milk” for the several hours it took to transport the milk to the lab. Neither these authors nor Marler have been able to explain how *C. jejuni* can survive long enough in milk to cause human illness if it cannot survive for several hours during transportation to a laboratory.

It is certainly true that failure to culture the outbreak strain from a food sample does not in and of itself prove that the food did not cause the outbreak. Investigators will blame raw milk, however, even when the milk tests negative and other foods test positive. In 1987, for example, Schmid and colleagues ([www.ncbi.nlm.nih.gov/pubmed/3598217?](http://www.ncbi.nlm.nih.gov/pubmed/3598217)) blamed an outbreak of *C. jejuni* on raw milk when all of the raw milk tested negative and 360 samples of locally sold chicken tested positive!

In many other cases, investigators who fail to find the pathogen responsible for the outbreak in any milk samples will nevertheless blame raw milk for the outbreak without testing any other foods, nor the water on the farm, simply because some of those who became ill drank raw milk. In how many cases would they have found the locally sold chicken or other locally sold foods to be contaminated? We do not know the answer to this question because oftentimes once the investigators generate even the semblance of a connection between the outbreak and raw milk consumption, they stop looking any further. In these cases, not only is raw milk improperly blamed, but the true cause of the outbreak is never identified.

What, If Anything, Can We Learn From the CDC Data?

Marler claims that the CDC data show that although only one percent of consumers drink raw milk in the United States, it is responsible for over 50 percent of all milk-associated outbreaks. Marler not only incorrectly treats the small sample of reported statistics as representative of the total number of outbreaks, but makes an additional error by choosing to examine the number of outbreaks rather than the number of people who became ill. Marler claims that outbreaks associated with pasteurized milk will be larger simply due to the greater distribution of that product. He therefore presents a pie chart in which the majority of the area is covered by raw milk-associated outbreaks.

This represents a further lack of understanding and misuse of statistics. We cannot compare the percentage of *individuals* who drink raw milk to the percentage of *groups* who become ill. We must compare the percentage of *individuals* who drink raw milk to the percentage of *individuals* who become ill from drinking raw milk. Raw milk, according to the CDC figures, is associated with just over nine percent of all milk-

associated foodborne illnesses. These figures still indicate a disproportionate share, but over five times less disproportionate than Marler's analysis suggests. If Marler presented his pie chart based on the percentage of individual illnesses, over 90 percent of the area in the chart would be covered with illnesses attributed to pasteurized milk.

There are two basic problems with Marler's analysis. First, we really do not know how many people drink raw milk. The one-percent figure is derived from estimates by state governments for which the authors of the original publication by Headrick and colleagues in 1998 presented no evidence. This group conducted a more reliable phone survey (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1381950/>) the previous year, concluding that 3.2 percent of Californians drink raw milk, but this study was limited to only one state. Second, as discussed before, 99.9 percent of foodborne illnesses are not reported and those that are reported are not a random sample of the total. We cannot accurately estimate from these figures what percentage of foodborne illnesses are truly caused by any given food. Even among the outbreaks reported, we have demonstrated that most of the outbreaks investigators have attributed to raw milk have lacked sufficient evidence to implicate raw milk.

The Real Question

The real question, which Marler has yet to answer, is what scientific evidence can justify the singling out of raw milk from among all other foods for prohibition or damaging regulation when nearly all observers including Marler himself agree that foods other than milk (raw or pasteurized) cause in excess of 99 percent of the CDC-estimated 76 million cases of foodborne illness that occur in the US every year. Our conclusion from our initial review, then, still stands:

According to the founding documents of the United States, personal liberties are self-evident and inalienable rights, not privileges endowed by state health departments, federal bureaucracies, or personal injury lawyers. There is no scientific evidence to justify the singling out of raw milk from among other foods for prohibition or damaging regulation, and there is no legitimate constitutional or philosophical basis on which Americans or anyone else should be deprived of the basic human right to determine what to eat and drink.