

# THE REVOLUTION WILL NOT BE PASTEURIZED

Inside the raw-milk underground

By Nathanael Johnson

The agents arrived before dawn. They concealed the squad car and police van behind trees, and there, on the road that runs past Michael Schmidt's farm in Durham, Ontario, they waited for the dairyman to make his move. A team from the Ministry of Natural Resources had been watching Schmidt for months, shadowing him on his weekly runs to Toronto. Two officers had even infiltrated the farmer's inner circle, obtaining for themselves samples of his product. Lab tests confirmed their suspicions. It was raw milk. The unpasteurized stuff. Now the time had come to take him down.

Schmidt had risen that morning at 4 A.M. He milked his cows and ate breakfast. He loaded up a delivery, then fired up the bus. But as he reached the end of the driveway, two cars moved in to block his path. A police officer stepped into the road and raised his hand. Another ran to the bus and

banged on the door. Others were close behind. Eventually twenty-four officers from five different agencies would

states. Yet thousands of people in North America still seek raw milk. Some say milk in its natural state keeps

them healthy; others just crave its taste. Schmidt operates one of the many black-market networks that supply these raw-milk enthusiasts.

Schmidt showed men in biohazard suits around his barn, both annoyed and amused by the absurdity of the situation. The government had known that he was producing raw milk for at least a dozen years, yet an officer was now informing him that they would be seizing all the "unpasteurized product" and shuttling it to

the University of Guelph for testing.

In recent years, raids of this sort have not been unusual. In October 2006, Michigan officials destroyed a truckload of Richard Hebron's unpasteurized dairy. The previous month, the Ohio Department of Agriculture shut down Carol Schmitmeyer's farm for selling raw milk. Cincinnati cops also swooped in to stop Gary Oaks in March 2006 as he unloaded raw milk in the parking lot of a local church. When bewildered residents gathered



search the farm. Many of them carried guns.

"The farm basically flooded, from everywhere came these people," Schmidt later told me in his lilting German accent. "It looked like the Russian army coming, all these men with earflap hats."

The process of heating milk to kill bacteria has been common for nearly a century, and selling unpasteurized milk for human consumption is currently illegal in Canada and in half the U.S.

*Nathanael Johnson's last article for Harper's Magazine, "Swine of the Times," appeared in the May 2006 issue.*

around, an officer told them to step away from “the white liquid substance.” The previous September an undercover agent in Ohio asked Amish dairyman Arlie Stutzman for a jug of unpasteurized milk. Stutzman refused payment, but when the agent offered to leave a donation instead, the farmer said he could give whatever he thought was fair. Busted.

If the police actions against Schmidt and other farmers have been overzealous, they are nevertheless motivated by a real threat. The requirement for pasteurization—heating milk to at least 161 degrees Fahrenheit for fifteen seconds—neutralizes such deadly bacteria as *Campylobacter jejuni*, *Listeria monocytogenes*, *Escherichia coli*, and salmonella. Between 1919, when only a third of the milk in Massachusetts was pasteurized, and 1939, when almost all of it was, the number of outbreaks of milk-borne disease fell by nearly 90 percent. Indeed, pasteurization is part of a much broader security cordon set up in the past century to protect people from germs. Although milk has a special place on the watch list (it’s not washable and comes out of apertures that sit just below the orifice of excretion), all foods are subject to scrutiny. The thing that makes our defense against raw milk so interesting, however, is the mounting evidence that these health measures also could be doing us great harm.

Over the past fifty years, people in developed countries began showing up in doctors’ offices with autoimmune disorders in far greater numbers. In many places, the rates of such conditions as multiple sclerosis, type 1 diabetes, and Crohn’s disease have doubled and even tripled. Almost half the people living in First World nations now suffer from allergies. It turns out that people who grow up on farms are much less likely to have these problems. Perhaps, scientists hypothesized, we’ve become too clean and aren’t being exposed to the bacteria we need to prime our immune systems.

What we pour over our cereal has become the physical analogue of this larger ideological struggle over microbial security. The very thing that makes raw milk dangerous, its dirtiness, may make people healthier, and pasteurization could be cleans-

ing beneficial bacteria from milk. The recent wave of raw-milk busts comes at a time when new evidence is invigorating those who threaten to throw open our borders to bacterial incursion. Public-health officials are infuriated by the raw milkers’ sheer wrongheadedness and inability to correctly interpret the facts, and the raw milkers feel the same way about them. Milk as it emerges from the teat, it seems, is both panacea and poison.

Schmidt responded to the raid on his farm by immediately going on a hunger strike. For a month he consumed nothing but a glass of raw milk a day. He milked a cow on the lawn outside Ontario’s provincial parliament. This was a battle, he said, for which he was prepared to lose his farm. He was ready to go to jail. Actually, he’d been awaiting arrest for more than a decade. For all that time, he told me, he’d carried a camera with him so that he could take pictures when the authorities finally came to shut him down. “And I upgraded. You know, first it was still, then video, then digital came along.”

The fifty-three-year-old Schmidt doesn’t have the demeanor of a rabble-rouser. His temperament, in fact, is not unlike that of the cows he tends. A large man, he moves deliberately, reacts placidly to provocation. He has thin blond hair, light-blue eyes, and pockmarked cheeks. On the farm he invariably wears black jeans, a white shirt, and a black vest. In the summer he dons a broad-brimmed straw hat; in the winter, a black newsboy’s cap.

When Schmidt emigrated from Germany in 1983, he wanted to start a farm that would operate in a manner fundamentally different from that of the average industrial dairy. Instead of lodging his cows in a manure-filled lot, he would give them abundant pastures. Instead of feeding them corn and silage, he’d give them grass. And instead of managing hundreds of anonymous animals to maximize the return on his investment, he would care for about fifty cows and maximize health and ecological harmony. If he kept the grasses and cows and pigs and all the components of the farm’s ecosys-

tem healthy, he believed the bacterial ecosystem in the milk would be healthy, too.

Schmidt bought 600 acres three hours northwest of Toronto. There he built up a herd of Canadiennes, handsome brown-and-black animals with black-tipped horns. Most cattle farmers burn off the horn buds—a guarantee against being gored—but Schmidt believes it’s better to leave things in their natural state whenever possible. The dangers posed by the horns (like the dangers of drinking unpasteurized milk) weighed less heavily on him than the risk of disrupting some unknown element of nature’s design.

The farm flourished under his hand. Schmidt set up a cow-share system whereby, instead of purchasing raw dairy, customers leased a portion of a cow and paid a “boarding fee” when they picked up milk. People were technically drinking milk from their own cows. The animals were, for all practical purposes, still Schmidt’s property, but the scheme made the defiance of the law less flagrant, and health officials could look the other way. Then, in 1994, the Canadian Broadcasting Company aired a documentary about Schmidt and his unpasteurized product. A few months later he was charged with endangering the public health.

Because Schmidt believed that his style of biodynamic farming actually secured the public health, he decided to fight the charges. Newspapers began quoting him on the salubrious powers of raw milk and the detriments of industrial dairy. At this time, strange things started happening around the farm. Vandals broke into his barn. Schmidt found two of his cows lying dead in the yard, apparently poisoned. Then an unmarked van ran his cousin’s car off the road. Men jumped out of the van’s back and forced him inside, holding him there for two hours. Schmidt hadn’t been prepared for the struggle to take this turn. He sent his cousin back to Germany, agreed to plead guilty in court, and sold all but 100 acres of his farm to pay the government fines and cover his lost income.

Schmidt is a man of Teutonic certainty, but as he walked into the field soon after he’d sold the land, he was

filled with doubt. The morning sun had turned the sky red, and mist hung around the legs of the cattle. While he twitched a stick at his bull, Xamos, to turn him away from the cows, Schmidt wondered whether it was even possible to run a farm in the manner he wanted. If he started selling his milk at industrial prices it would erode his meticulous style of farming. He would lose the direct connection to his customers. He'd have to push his cows to produce more milk. He'd be compelled to adopt the newest feed-management strategies and modernize his equipment. Schmidt didn't see Xamos coming, just felt the explosion as the bull struck him. Even as he hit the ground, the animal was on him, bellowing. It stabbed with one horn and then the other, tearing up the earth and ripping off Schmidt's clothes. One horn sank into Schmidt's belly, another ripped into his chest and shoulder, grazing a lung. Only when his wife charged into the field, flanked by the couple's snarling dogs, did Xamos retreat. Another man might have taken this attack as a sure sign, a demonstration of the folly of seeking harmony with nature. As Schmidt lay there bleeding into the earth, however, he felt only humility. "Nature is dangerous, yes," he would tell me later. "But I can't control it, and I can't escape from it. I can only learn the best way to live with it."

By the time Schmidt could walk again, almost six weeks later, he'd decided to continue farming on his own terms. He announced his intentions publicly, but the regulators must have felt that they'd made their point. For years he continued farming quietly, as an outlaw, until the morning that government agents descended on his dairy. After the hunger strike and the other public acts of protest, Schmidt settled in for the long fight. He hired a top defense lawyer in hopes of overturning Ontario's raw-milk ban.

**I**n the twenty-five years that Schmidt has operated the dairy, no one has ever reported falling sick after drinking his milk. Yet raw-milk illnesses do crop up. According to the Centers for Disease Control, the United States averages seventy cases

of raw-dairy food poisoning each year. In the fall of 2006, for instance, California officials announced that raw milk tainted with *E. coli* was responsible for a rash of illnesses. It is legal to sell unpasteurized dairy in California, and the tainted milk came from Organic Pastures, in Fresno, the largest of several farms that supply the state's health-food stores.

Tony Martin had agonized over buying the raw milk. He'd never brought it home before. He knew that milk was pasteurized for a reason, but he'd also heard that the raw stuff might help his son's allergies. "There was a lot of picking it up off the shelf and putting it back," he said. Chris, his seven-year-old, drank the Organic Pastures milk three days in a row over a Labor Day weekend. On Wednesday, Chris woke up pale and lethargic. On Thursday he had diarrhea and was vomiting. That night he had blood in his stool, and the Martins rushed him to the hospital. Shortly afterward, several other children checked into southern California hospitals. All of them had drunk Organic Pastures raw-milk products, and they all were diagnosed as being infected with a virulent strain of *E. coli* known as O157:H7. Some of the children recovered rapidly, but two, Chris Martin and Lauren Herzog, got progressively worse. The O157:H7 strain releases a jet of toxins when it comes into contact with antibiotics, so doctors face the difficult decision of allowing nature to take its course or intervening and risking further damage. Chris's doctors administered antibiotics, Lauren's did not, yet both children's kidneys shut down. While Chris was on dialysis, his body became so swollen that his father said he wouldn't have recognized him if he passed him on the street. Chris was in the hospital fifty-five days. Lauren went home after a month but then relapsed and had to return. Both children eventually recovered but may have suffered permanent kidney damage.

The illnesses didn't stop raw-milk sales. Even as the state ordered store managers to destroy the milk on their shelves, customers rushed in to buy whatever they could. Several Organic Pastures customers said regulators had simply pinned unrelated illnesses on the milk. They pointed out that siblings and friends of the sick children had



drunk the same milk from the same bottles and didn't get so much as diarrhea. Tests for *E. coli* in one of the milk bottles in question had also turned up negative. Although it seemed implausible that the state would frame Mark McAfee, the owner of Organic Pastures, it certainly was possible that regulators were predisposed to declare raw milk guilty. When state veterinarians came to search Organic Pastures for *E. coli*, they were surprised to see that the manure they pulled from the cows' rectums was watery and contained less bacteria than usual. Patrick Kennelly, chief of the food-safety section at the California Department of Health Services, confronted McAfee with these facts in an email, writing, "Not only is this unnatural, but it is consistent with the type of reactions that an animal might have after being treated with high doses of antibiotics. . . . Why were your cows in this condition, Mark?"

McAfee does not use antibiotics on his organic farm. The state tests all shipments of his milk for antibiotics residue and has never found any. Allan Nation, a grazing expert, offered another explanation: the cows had been eating grass. Grass-fed cows carry a lower number of pathogens, he said. And for a few days in the spring and fall, when the weather changes and new grass sprouts, the cows "tend to squirt," as Nation put it. But grass-eating cows have become so rare that, to California health officials, they seemed unnatural. The norms of industrial dairying had become so deeply ingrained that a regulator could jump to the conclusion that all milk is dirty until pasteurized.

**A**round the time that Chicago passed the first pasteurization law in the United States, in 1908, many of the dairies supplying cities had themselves become urban. They were crowded, grassless, and filthy. Unscrupulous proprietors added chalk and plaster of paris to extend the milk. Consumptive workers coughed into their pails, spreading tuberculosis; children contracted diseases like scarlet fever from milk. Pasteurization was an easy solution. But pasteurization also gave farmers license to be unsanitary. They knew that if fecal bacteria got in the milk, the heating process would eventually take

care of it. Customers didn't notice, or pay less, when they drank the corpses of a few thousand pathogens. As a result, farmers who emphasized animal health and cleanliness were at a disadvantage to those who simply pushed for greater production.

After a century of pasteurization, modern dairies, to put it bluntly, are covered in shit. Most have a viscous lagoon full of it. Cows lie in it. Wastewater is recycled to flush out their stalls. Farmers do dip cows' teats in iodine, but standards mandate only that the number of germs swimming around their bulk tanks be below 100,000 per milliliter.

When I was working as a newspaper reporter in Cassia County, Idaho, a local dairyman, Brent Stoker, had wanted to raise thousands of calves on his farm and sell them to dairies as replacements for their worn-out cows. Stoker's neighbors, incensed by the idea of all that manure near their houses, stopped the project. Stoker wasn't an especially dirty farmer—dairy associations showed off his farm on tours—but, to survive, dairies must produce a lot of milk, which means producing a lot of feces. I called Stoker recently, to talk dairy and catch up. He was in the middle of another fight with the neighbors. This time he wanted to build a large organic dairy. I said I hadn't taken him for the organic type.

"Pay me enough and I am," he said. Organic may mean no antibiotics and no pesticides, but it doesn't necessarily mean grass-fed. When it comes to making milk, grass-fed cows simply can't compete. Stoker's current herd of non-organic cows produce a prodigious eighty pounds of milk per day. That's mostly because they are fed like Olympic athletes. They eat a carefully formulated mix of roughage and high-energy grains. "If you were to try to pasture them, you'd lose production down to about forty pounds," Stoker said. "Of course, the cow would last a lot longer."

Cows are designed to eat grass, not grain. Unlike mammals that can't digest the cellulose in grass, ruminants are able to access the solar energy locked in a green pasture by enlisting the aid of microbes. These bacteria are cellulose specialists and turn grass into the nutrient building blocks that cud-chewing animals need. In return, cows

provide a place for bacteria to live—the rumen—and a steady supply of food. This relationship shifts when a cow begins eating grain. The cellulose specialists lose their place to bacteria better suited to the new food supply but not necessarily so well suited to the cow. The new bacteria give off acids, which in extreme conditions can send the animal into shock. Pushing too much high-energy feed through a cow can twist part of its stomach around other organs. This kink backs up the digestive flow to a trickle. The cow will stop eating, and sometimes you can see the knotted guts bulging under the skin. Other disorders also result from the combination of high-energy feeds and high production: abscessed liver, ulcerated rumen, rotten hooves, inflammation of the udders.

It is in a farmer's interest to keep a cow healthy—but not too healthy. If a dairyman decreased the grain portion of a cow's rations to a level that eliminated health problems, he would lose money. A balance must be struck between health and yield. It's not surprising, then, that farmers end up sending grain-fed cows off to the hamburger plant at a much younger age than their pastured counterparts. On average, dairy farmers slaughter a third of their herds each year. As Brent Stoker put it, "We're mining the cow."

There are other bacterial opportunists that move in when a cow's gastric environment is disturbed by a change in diet. Tired cows and ubiquitous feces combine to create conditions that are ideal for the transmission of pathogens. In a 2002 survey of American farms, the U.S. Department of Agriculture found *Campylobacter* in 98 percent of all dairies and *E. coli* O157:H7 on more than half of farms with 500 or more cows. When the milk at these large farms was tested, the researchers discovered salmonella in 3 percent of all bulk tanks and *Listeria monocytogenes* in 7 percent. If that milk were shipped to supermarkets without pasteurization, a lot of people would get sick. Healthy cows with plenty of energy are less likely to take on pathogens.

I asked Stoker if he'd ever considered returning to a smaller, healthier style of farming. "If I had a way to provide for my six kids and have a com-

parable standard of living I would do that,” Stoker said. “The way it is now, I’m more stressed, the animals are more stressed, our crops are probably more stressed. There’s nothing I would like more than to go back to that, but I’m too stupid to figure out how.”

The problem isn’t Stoker’s intelligence; it’s what he calls the “dishonesty of the market.” Advertisers promise that consumers can have the healthiest possible food from happy animals in idyllic settings at current prices. This obviously is a lie, but it’s a lie that most people accept. Although American consumers are periodically outraged by the realities of modern agriculture, they never stop demanding cheaper food. Stoker doesn’t mind playing the hand he’s been dealt. He’s good at producing cheap food. But, he acknowledged,

“cheap food makes for expensive health care.”

**T**he people who buy from Michael Schmidt are atypical consumers. They pay a premium for food they believe will keep them healthy. In their estimation, Schmidt has a biological formula working for him that will be to their benefit. The elements of a dairy farm—the cows, plants, microbes, and humans—have been together long enough to have sorted out their differences. By working within this system, Schmidt can take advantage of some natural efficiencies. Although the life expectancy of a conventional dairy cow is a little under five years, Schmidt’s cows are eight, nine, and twelve years old; they are glossy-coated and solid on their feet. Schmidt told me that he hasn’t needed to have someone trim his cows’ hooves in fifteen years. The cows produce only around twenty-five pounds of milk daily, one third the production of Brent Stoker’s animals, but Schmidt doesn’t have to pay much for veterinary service. He doesn’t have to slap haunches to roust exhausted animals from their beds; his cows actually line up on their own for milking. There’s a little trick he likes to show off when it’s time for them to return from the fields.

“Watch this,” Schmidt said, and he pulled open the door. The cows came jogging in, each one peeling

out of line to take her place, unprompted, in the barn beneath a white placard bearing her name: ANNA, SOPHIA, CANTATE, LAURA. They buried their heads in the hay. He beamed. So far the microbes that end up in Schmidt’s milk have been benign, possibly beneficial. He says biodynamic farming doesn’t open up new niches for unfamiliar forms of bacteria, and it encourages the ones people have adapted to.

It turns out that black-market buyers aren’t the only ones who think germ-infested milk is healthy. The yogurt giant Dannon has invested heavily in understanding the benefits of bacteria, and the company now sells dairy products stocked with healthy, or “probiotic,” microbes: DanActive, “an ally for your body’s defenses,” which comes in a small pill-shaped bottle and provides a dose of an organism owned in full by Dannon called *L. casei Immunitas*; Danimals, a more playfully packaged bacteria-infused drink, designed to appeal to children; and Activia, a yogurt containing a bacterium the company has named *Bifidus regularis*, which “is scientifically proven to help with slow intestinal transit.” Both Michael Schmidt and Dannon may be working to reintroduce bacteria into the modern diet, but Schmidt labors under a principle of submission. He accepts the presence of unknown microbes and tries to make his customers healthy by keeping the creeks that run through his farm clean, by maintaining the stability of his ecosystem. In contrast, Dannon’s is a philosophy of mastery.

Milk comes to Dannon’s Fort Worth processing plant in tanker trucks, arriving wild, full of its own diverse bacteria. It leaves the factory civilized and safe, in four-ounce cups. It takes a lot of machinery to accomplish this domestication: miles of stainless-steel pipes, huge fermentation vats, and dozens of white-frosted, hairnet-wearing workers. Although the process is intricate, the concept is simple: kill the bacteria, then add bacteria. Workers pasteurize the milk not once but twice. All yogurt is made when benign bacteria are mixed





## THE POLITICS OF WAR

THE STORY OF TWO WARS  
WHICH ALTERED FOREVER  
THE POLITICAL LIFE OF  
THE AMERICAN REPUBLIC  
(1890–1920)

WALTER KARP

"There is an important connection between clarity of prose and political honesty, and it doesn't occur often enough for us to pass up the chance of celebrating it. I hereby celebrate Walter Karp."

—Christopher Hitchens,  
Newsday

"Eloquent, even elegiac...and we close [The Politics of War] with a sigh for 'that old America that was free and is now dead.'"



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into milk. But Dannon also adds probiotic bacteria, and when I visited the plant last year, this is what I asked to see. Dannon employees looked at one another nervously. The bacterial strains are proprietary, and so are the methods surrounding their use. My public relations minder, Michael Neuwirth, exchanged a few words with J. W. Erskin, the plant manager, then nodded.

"We can see the place where it's done," Neuwirth said.

The room was lined with freezers. Neuwirth opened one, and frost billowed out. Inside were stacks of what looked like one-quart milk cartons, encrusted with ice. "This is for Activia, right?" Neuwirth asked.

"Yep," Erskin said. "Regularis."

The Dannon workers explained that each carton contained thousands of tiny pellets consisting of frozen milk and bacteria. You can buy non-proprietary yogurt-making bacteria for about \$40 a bottle from several suppliers. No one at Dannon would tell me the price of the company's proprietary strains, but Erskin said, "When our little friends die, it's very costly."

Workers wait for the moment when the milk reaches the ideal temperature, then add the bacteria. *Lactobacillus bulgaricus*, a yogurt-making bacterium, acts first, converting sugar to acid; *Streptococcus thermophilus* is next. These prepare the substance for the probiotic strains. Every bacterial move is choreographed. Although the Dannon people wouldn't show me how the healthy microbes fit into this process, they did take me next door, to the bottling room, where the precision continued, though in engineering rather than biochemistry. The most beautiful machine there was the one filling little bottles with DanActive. The bottles moved across the ceiling, propelled by compressed air along a metal track, halting, then scooting forward, like a line of penguins. When the bottles reached the machine, an auger caught them in its threads, sending them spinning in an endless line around gears and carousels. The machine cleaned the bottles with acid, zapped them with sterilizing UV

light, filled, sealed, boxed, and stacked them—in scherzo—at 460 containers per minute.

Erskin stood beside me, watching through the Plexiglas window.

"It's like a ballet," he said.

**D**annon's new lines of products lend some credibility to the claims of bacterial necessity made by Schmidt and other raw-milk advocates. Albeit cautiously, scientists have also begun weighing in on whether such technologies as pasteurization have purged necessary bacteria from our food. When I started talking to milk experts, several told me I needed to speak to Bruce German. A food chemist at U.C. Davis, German realized early in his career that if he could determine what a food perfectly suited to our DNA looked like, he would have a Rosetta Stone with which to solve the puzzle of dietary well-being. He would be able to examine each molecular component of this food to understand what it was doing to make people healthy. No plant would do as a model, since evolutionary pressure tends to favor plants that can avoid being eaten. The model food would be just the opposite: something that had evolved specifically to be a meal, something shaped by constant Darwinian selection to satisfy all the dietary needs of mammals. That Ur-food, of course, is milk.

The day I visited German, he was hosting a reception in honor of Agilent, a company that had helped develop a machine able to analyze oligosaccharides, sugar polymers found in breast milk. As we walked across the U.C. Davis campus, German brought me up to speed. He's a slight, energetic man, with smile lines creased into his face. His excitement for his work is infectious. Oligosaccharides make up a large portion of human milk, in which they are about as abundant as proteins. The curious thing about them, German said, is that they are indigestible. Which means, he said, one hand chopping the air, that they are there to feed the bacteria living inside a baby's gut, not to feed the baby. As far as scientists know, only one microbe thrives on this sugar, a bacterium

named *Bifidobacterium infantis* that has a fairly unique genome.

“There’s a lot of evidence that we coevolved with this organism,” German explained. “It’s really specialized to us and vice versa. Mothers recruit this entire life form to help the process of digestion.”

Chemists have identified numerous other compounds in milk that are there not just to nourish babies but to create a specific microbial ecosystem. Lactoferrin, lysozyme, and lactoperoxidase kill off only harmful bacteria, not beneficial bacteria. (These selective bactericides, along with oligosaccharides, are also in cow’s milk, though in lower concentrations.) Consider, German said, what it means that milk, the model food, has evolved such a sophisticated chemical system that caters not to us but to our microbial friends. It means, he said, raising his eyebrows, that “bacteria are tremendously important to us”—so important that researchers studying the microbes living inside us say it’s unclear where our bodily functions end and the functions of microbes begin.

By any rational measure, this world belongs to microbes. They were mastering the subtleties of evolution three billion years before the first multicellular organism appeared. They continue to evolve and adapt in a tiny fraction of the time it takes us to reproduce once. They flourish in polar ice caps, in boiling water, and amid radioactive waste. We exist only because some of them find us useful. Ninety percent of the cells in our bodies are bacteria. The entirety of human evolution has taken place in an environment saturated with microbes, and humans are so firmly adapted to the routine of sheltering allies and rebuffing enemies that the removal of either can devastate our defense systems.

For the past century, however, we’ve done our best to wall ourselves off from microbes. In 1989, David Strachan put forward the “hygiene hypothesis,” which posed that this separation could be causing the increased incidence of immune disorders. As the years have passed, many studies have helped refine his proposal. Scientists found that hygiene itself wasn’t a problem. People who never used antibacterial soap were just as likely to have asthma as those

who scrubbed obsessively. In a 2006 study of thousands of children living on farms in Shropshire, England, Strachan and another scientist, Michael Perkin, found that raw-milk drinkers were unlikely to have eczema or to react to allergens in skin-prick tests. “The protective effect of unpasteurized milk consumption was remarkably robust,” Strachan and Perkin wrote. Then, in May of 2007, a group of scientists published a paper after surveying almost 15,000 children around Europe. They found that children who drank raw milk were less likely to have any among a wide range of allergies. Either there’s something about industrial milk that’s harmful, Perkin wrote in a commentary that accompanied the paper, or there’s something in raw milk that’s beneficial.

None of these findings mean that raw milk is safe. Every single study contains the caveat that raw milk often harbors pathogens. From an epidemiological perspective, Bruce German told me, advising raw-milk consumption at this point “would be crazy.” Health officials certainly should have a high level of confidence before approving anything risky. But in light of the new evidence, it was becoming harder to deny that something beneficial was being lost during pasteurization. And health officials also have an obligation to ensure that they are not outlawing what makes us healthy.

Last March I drove to Fresno to meet Organic Pastures owner Mark McAfee and see how he had fared since the *E. coli* outbreak. The dairy is made up of a few prefabricated double-wide trailers on 450 acres of pasture extending out into the hazy flatness of California’s Central Valley. When I arrived, some 200 cows were chewing their cud on thirty shadeless acres of closely cropped grass. McAfee culls about 14 percent of his herd each year, far below the industry’s average but still above Schmidt’s. When you have fewer than fifty cows, like Schmidt, it’s different, McAfee said. “You have time to give each one a foot rub every night. You can do yoga with them every morning.”

After walking through the dairy, we

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sat down in McAfee's office. Lab results had found the exact same sub-strain of *E. coli* O157:H7 in almost all of the children who fell ill after drinking unpasteurized dairy. Yet McAfee remained unfazed. How did it help to show that the bacteria from each patient matched, he asked, when one patient, an eighteen-year-old in Nevada City, claimed he hadn't drunk the milk? The disease trackers I talked to explained this by saying that sometimes germs move indirectly. Someone else in the family spills a little milk. You wipe it up. Then you wipe your mouth. But there was another theory I'd been hearing from scientists working to explain why O157:H7 had burst onto the scene in the 1980s with such virulence. Maybe, they said, it wasn't that the bacteria had changed but that we had changed. In Brazil outbreaks of *E. coli* O157:H7 are unheard of, though the bacteria exist there. A pair of recent studies show that Brazilian women have antibodies protecting them against O157:H7 and that they pass these antibodies to their children through the placenta and their breast milk. I found this interesting, especially in light of the fact that in every case I learned about, the victims of the Organic Pastures outbreak had just started drinking McAfee's milk. Perhaps those who had been drinking the milk longer had developed the antibodies.

"It's an old story," McAfee said. "You see it again and again in the lists of outbreaks. City kids went to the country, drank raw milk, and got sick; country kids didn't get sick." But, I pointed out, this explanation still implicates Organic Pastures. McAfee shook his head. "Look, if I made four kids sick, I made four kids sick. But show me the 50,000 kids I made healthy. We don't guarantee zero risk. We aren't worried about the .001 percent chance that someone will get sick; we are worried about the 99 percent assurance that you are going to get sick if you eat a totally sterile, anonymous, homogenous diet."

The problem for McAfee is that the .001 percent is shocking and visible. A dying child will make people change their behavior. The diseases that might stem from a lack of bacteria are much more subtle. They come on

slowly. It's difficult to link cause and effect. Businesses that contribute to chronic disease often flourish while businesses that contribute to acute disease get shut down. McAfee, now clearly incensed, dismissed this line of reasoning. "If my milk gets someone sick, I deserve some blame, but not all of it. People have to take responsibility for maintaining their own immune systems. And we have to look at an environmental level too. Where did these germs come from? *E. coli* O157:H7 evolved in grain-fed cattle. It's amazing to me that we've sat by as factory farmers feed more than half the antibiotics in the country to animals and breed these antibiotic-resistant bacteria at the same time the food corporations are destroying our immune systems. I believe our forefathers would have grabbed their muskets and gone and shot someone over this. They would have had a tea party over this."

Instead of grabbing his musket, McAfee is expanding. He's building a \$2 million creamery, complete with a raw-milk museum. He expects to finish construction in 2009. I asked what he'd do if regulators come to shut that down.

"I have an email list of 8,000, ready for immediate revolutionary action," he said. When the California legislature quietly passed a law late last year with such strict standards that it constituted a de facto ban on raw milk, McAfee mobilized these forces. In January hundreds of people packed into a committee chamber in Sacramento carrying their children and wearing black GOT RAW MILK? T-shirts. A legislative study group is now working to come up with new standards.

Aside from the revolutionaries and reactionaries, what are the rest of us to do? When Schmidt's case goes to trial this spring, his lawyer, Clayton Ruby, will challenge the constitutionality of mandatory pasteurization. In Canada, Ruby is one of those lawyers people threaten to hire in the same way people in the United States used to say they were going to hire Johnnie Cochran. He's sure to argue eloquently, but the judge's decision on milk will leave

unanswered the larger question of how we should mend relations with our microbial friends. The court won't tell us whether raw milk is good for people or how Schmidt has managed to distribute it for twenty-five years without making anyone sick. Someday scientists may answer these questions. But until then, we will have to conduct our own calculations to determine what constitutes clean and healthy food.

When I sat at Schmidt's breakfast table early one morning, glass in hand, I understood the possible consequences of my choice. All the competing science was there, along with the stories of epic sickness I'd heard. And I have to confess, the thought crossed my mind that if I got sick it would make a hell of a story. But when it comes down to it, here's why I drank the raw milk. The sun had just come up, and we'd already finished three hours of work in the barn. I was filled with a righteous hunger. The table was laden with eggs from the chickens, salami from the pigs, jarred fruit, steaming porridge, cheese, and yogurt. Although dairy isn't for everyone, I come from the people of the udder: my ancestors relied so heavily on milk that they passed down a mutation allowing me to digest lactose. For many generations my forefathers sat down to meals like this after the morning milking. It felt unambiguously right.

This, of course, is the very definition of bias: the conflation of what feels right with what is scientifically correct. But as it was, I could only hope that my biases were rooted in something more than nostalgia. Perhaps they were. The way a place feels won't tell you anything about whether bacteria have breached the wall of sanitation, but it does reveal something about the overall health of an ecosystem. Humans have relied on such impressions to assess the quality of their food for most of history. Someday the uncertainties of dietary science will fall to manageable levels, but until then I will rely on my gut. I drained my cup and poured thick clabbered milk and apple syrup on my porridge. If any bacteria disagreed with my body, the conflict was too small to detect. ■