



H-Environment

H-Environment Roundtable Reviews

Volume 5, No. 4 (2015)
<https://networks.h-net.org/h-environment>

Publication date: July 20, 2015
Roundtable Review Editor:
Christopher F. Jones

Kendra Smith-Howard, *Pure and Modern Milk: An Environmental History Since 1900* (Oxford: Oxford University Press, 2013). ISBN: 9780199899128

Contents

Introduction by Christopher F. Jones, Arizona State University	2
Comments by Helen Anne Curry, University of Cambridge	4
Comments by E. Melanie DuPuis, Pace University	7
Comments by Helen Zoe Veit, Michigan State University	10
Comments by Daniel R. Block, Chicago State University	15
Author's Response by Kendra Smith-Howard, University at Albany (SUNY)	19
About the Contributors	27

Copyright © 2015 H-Net: Humanities and Social Sciences Online

H-Net permits the redistribution and reprinting of this work for nonprofit, educational purposes, with full and accurate attribution to the author, web location, date of publication, H-Environment, and H-Net: Humanities & Social Sciences Online.

Introduction by Christopher F. Jones, Arizona State University

Milk is a curious substance. It is sold to consumers as the quintessential natural product in containers featuring happy cows grazing in open fields. Hailed as a pure source of sustenance for children, that most vulnerable and precious part of the population, milk is expected to be safe and wholesome. For many consumers, the idea that milk has been technologically altered is distasteful. And yet, the production, transport, and consumption of milk have always been mediated from the moment it leaves a cow's udder (and even before this point if one includes breeding and artificial insemination technologies, as **Kendra Smith-Howard** does). Pails, storage containers, cooling equipment, pasteurizers, transportation networks, and merchandising centers all shape the milk that ends up in a baby's bottle or consumer's glass. If the main thrust of the last couple decades of environmental history has been an embrace of hybridity, as Paul Sutter recently argued, then one could make a case that milk is one of the most characteristic examples imaginable.¹ Yet from outside the framework of environmental history or food studies, milk's hybridity is little recognized. The trouble with wilderness can also be seen as the trouble with milk.²

In her compelling and concise book, *Pure and Modern Milk: An Environmental History Since 1900*, Kendra Smith-Howard explores the tension between the natural and human worlds in the production and consumption of milk and some of its byproducts including butter, ice cream, and waste. She demonstrates that while pastoral images of rural farms were central to the marketing of milk in urban America at the turn of the twentieth century, bringing the country to the city did not guarantee a healthy product. Diseased cows, dirty containers, unrefrigerated railcars, and milk left for several hours on carts before being delivered sickened and killed thousands of urban children. Reformers argued that regulations and new technologies were necessary for keeping this "pure" substance healthy and "modern." Much of milk's history of the course of the twentieth century embodies these tensions between natural and artificial.

Dairy farmers stand at the heart of Smith-Howard's account. Often depicted as natural and static counterparts to industrial cities, she shows that rural farms were dynamic sites of change. While dairy farmers resisted technologies they saw as overly expensive or intrusive to their operations, they eagerly embraced many aspects of industrial agriculture such as cream separators and artificial breeding techniques that could enhance profitability. The history of milk and its byproducts, therefore, serves as an excellent lens to trace the interconnections between production and consumption.

¹ Paul Sutter, "The World with Us: The State of American Environmental History" *Journal of American History* 100 (2013): 94-119.

² William Cronon, "The Trouble with Wilderness; or, Getting Back to the Wrong Nature" in William Cronon, ed., *Uncommon Ground: Rethinking the Human Place in Nature* (New York: W. W. Norton & Co., 1995): 69-90.

I asked **Helen Anne Curry** to join the roundtable because her research examines the intersections of agriculture, biotechnology, and the environment through the history of early genetic technologies. She has also authored several articles that have appeared in *Environmental History*, *Environment and History*, *Technology & Culture*, and the *British Journal for the History of Science*.

E. Melanie DuPuis brings deep expertise in the study of food, culture, politics, and the environment. Author of several books, her 2002 *Nature's Perfect Food: How Milk Became America's Drink* is a pioneering work in food studies. Trained as a sociologist, her works demonstrate the value of interdisciplinary analysis as she deftly weaves in findings and approaches from fields including sociology, history, political ecology, anthropology, and science and technology studies.

A historian of food over the last two centuries, **Helen Zoe Veit** writes on topics including nutrition, children's health, and changing dietary patterns. In addition to publishing scholarly research including *Modern Food*, *Moral Food: Self-Control, Science, and the Rise of Modern American Eating in the Early Twentieth Century*, she has also edited Civil War cookbooks through her American Food in History series.

Geographer **Daniel R. Block** completes our panel, bringing to bear his considerable expertise in urban food markets and the history and regulation of milk. Using Chicago and its hinterlands as a focus, he has examined in depth the construction of regional milk markets with a particular emphasis on the role of public health and policy.

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. In addition, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

Comments by Helen Anne Curry, University of Cambridge

As I read Kendra Smith-Howard's engaging and often surprising history of American dairy, I couldn't help but reflect on my own dairy consumption. How and why do I come to make the daily, and often unconscious, decisions about milk, butter, cheese, and ice cream that I do? Like many people, I have clear preferences when it comes to these products, stronger than those that inform my choices about many foods. But they are hardly consistent. I drink milk substitutes and eat real butter, buy reduced fat yogurt as well as full-fat ice cream, look skeptically at highly processed dairy in the grocery store but enjoy few fast-food treats more than a Dairy Queen blizzard.

We all recognize that food preferences (when the buyer or eater in question is well-off enough to have a choice) emerge from a complex mixture of cultural norms and political values. In this, dairy is little different from other foods. For the most part people eat what those who raised them ate, but these preferences need not be static, over the course of either a month or a lifetime. The items that land in an individual's shopping cart can shift, for example as they develop a new moral stance on some food products or health knowledge that changes their desire to consume others, or when they transition to a different socio-economic status or marry into a different food culture. The grocery list may even shift as they encounter an unbeatable discount on a product once thought second rate. Thinking of my own choices, it's pretty easy to explain them along just these lines: Happy childhood memories fuel a fondness for drive-thru whipped dairy desserts. Health concerns help me navigate the overstocked yogurt aisle. And so on.

What we often fail to see, remarkably, is how many of our food choices are also dependent on obvious and yet too-often invisible elements: farms, technologies, nature. And it is precisely here that Smith-Howard steers the reader in novel directions when thinking about the complex origins and trajectories of food habits. How did farmers' choices about what to feed cows or how to manage insects influence Americans' dairy consumption? How did the introduction of technologies like cream separators, bulk cooling tanks, and artificial insemination affect the quality and availability of products like milk, butter, and ice cream? What role did the endless cycle of seasons play in milk production, or the geographies of production, or bovine venereal diseases?

Of course, it's not just that farms, technologies, and nature influence everyday choices at the grocery store. Smith-Howard also challenges her readers to think about the flip side of this story, to consider not only how these elements influenced Americans' decisions about dairy consumption during the twentieth, but also how consumers' choices have in turn driven changes on the farm and in the environment and encouraged the development of new technologies. Of these, it is farm families who most capture Smith-Howard's interest: these often-neglected actors emerge as the heart and soul of her account. As she often reminds us, dairy farm families bore

the greatest burden of adapting to the significant changes in dairy production and consumption that unfolded during the twentieth century. Whether the introduction of health and sanitary measures to ensure the safety of milk from bacterial contaminants or radioactive material, the development of expensive on-farm technologies like bulk tanks or milking machines, or the shifting demands on land and environment resulting from suburbanization or recreation, those living and working on dairy farms were likely to feel intense pressure to adjust their lives and livelihoods accordingly.

Pure and Modern Milk is, in the best way, a little bit of everything. It is part environmental history, part history of science, technology, and medicine, part American social and cultural history. And, of course, it is also agricultural history—how could a history of dairying in America not be? One of the most striking aspects of the book is the author's skill in drawing together these different approaches to history, linking stories and perspectives that, however intimately connected, tend to drift apart as they are told by scholars with inclinations towards different methods and literatures. Smith-Howard, with her eye on the dairy farm as the central site of historical change, sees that attention to all of these facets is needed to give a satisfying account of trends as seemingly straightforward as the uptake of skim milk as a health food in the later twentieth century.

Although the main body of the work clocks in at just 165 pages, it is a detailed and at times dense book, one that covers an impressive amount of historical ground. The reader joins the history of American milk at the turn of the twentieth century, when the major project of milk producers and regulators was to convince Americans that milk was healthy, then follows the triumphs and travails of dairy through the industrialization of butter production, the management of dairy waste products ranging from whey to bulls, the rise of post-war consumer culture including the massification of ice cream, and the re-emergence of health fears about milk linked to antibiotics and radiation. It concludes with a whirlwind tour of recent conflicts over rBGH and the embrace of raw milk as the most "natural" milk on the market (or not on the market, depending on where you live). Throughout, the reader is invited to view this history from the perspective of milk and butter buyers as well as producers, and those in the production line include both farmers and middlemen like creameries, cooperatives, and centralized distributors.

This array of actors and subjects is essential to the complex and entangled story that Smith-Howard wants to tell, a story in which there is no clear separation between technological and natural, rural and urban, producer and consumer. However, it is also one in which the actors whose historical presence and influence Smith-Howard seems most keen to assert—the dairy farmers—are sometimes lost. The reader is offered many illuminating snapshots of life on the farm, whether to understand better the agonizing chore of cleaning the butter separator through the reminiscences of Isabel Baumann of Wisconsin or seeing firsthand how scientific breeding altered life on the Mallary farm in Vermont in the 1940s and 50s. But large impersonal trends nonetheless seem to rule the day. Similarly, the story is for the

most part placeless, an unusual feature for an environmental history. In dealing with farms scattered across the country, situated in different ecological and economic settings, Smith-Howard must for the most part stay above the local nitty-gritties to present a picture of generalized, broad scale environmental changes. In this way, *Pure and Modern Milk* reveals the challenges—as well as the rewards!—of trying to balance close-up social and environmental history, in which we see in detail the kinds of changes wrought on (and by) individual lives and landscapes, with an account of large-scale economic, cultural, and technological trends.

What I yearned for more of as I read this insightful, detailed, nuanced history—a history which moves continually between local events and national trends and between individual stories and collective experiences, which gives attention to environmental, social, and technological change, and which moves relentlessly forward through nearly a century of dairy farming—was some figure or group to use as a polestar in navigating this complex terrain. No single farmer or community or organization appears as a consistent guide to the changing features of dairying. Not even milk is a continual presence, as we put aside that frothy, contested beverage to investigate butter making and whey disposal and ice cream freezers. Yet despite the changing cast of characters, sites, and subjects, the history coheres. The steady if sometimes patchy process of American dairy farm industrialization drives the narrative along, and the observation that milk's purity and naturalness were as much created by technology as threatened by it provides the overarching framework for understanding this process of industrialization.

Another thing I wanted to see was a bolder declaration by Smith-Howard of how historians ought to research and write the history of food differently—for it seems clear, reading this book, that they should. One way to address this question would be for Smith-Howard to do a bit more to compare her history of twentieth-century dairy farming with the histories of other non-dairy farm products, to show how the approach taken in *Pure and Modern Milk* would inform or transform these. How well does this new story of dairy farming match up with the histories of rural industrialization as experienced by those raising maize or apples or chickens? There's admittedly a problem here, in that scholars (with a few notable exceptions) haven't gotten very far in charting these histories in the way that Smith-Howard has done with dairy. But there is surely enough material to invite conjecture: How would our understanding of the history of other kinds of farming—and of Americans' changing consumption of different farm products—look different if historians were to follow the model provided in *Pure and Modern Milk*?

In the end, even this comment seems unfair, as it is only asking a book that already achieves a great deal to do still more. No doubt others will follow Smith-Howard's lead and, in time, produce complementary narratives for other aspects of American agriculture—narratives for which her book will surely be a model.

Comments by E. Melanie DuPuis, Pace University

In much of the Northeastern part of the US, one meets up with stone walls in walks through forests. Those walls likely delineated fields that kept in livestock, often dairy cows. It's hard to imagine these forests as meadow, but easy to understand that the meadows represented labor – the labor of clearing trees and mowing grass, labor which abandoned these landscapes and left them for trees. What caused that abandonment?

Kendra Smith-Howards book, *Pure and Modern Milk: An Environmental History since 1900*, explains the rise of milk as a natural-industrial food. She argues that milk is both a natural substance and one that is intrinsically dependent on industrial processes. Her story, while presented as an “Environmental History” is less about those farm fields than about the substance – milk – itself, what Erik Swyngedouw calls a “socio-natural object.”³ I would be interested in hearing her talk about why she took this approach. Swyngedouw’s concept tends to be taken up by the discipline of Science and Technology Studies and, while likely to be of interest to those in STS concerned with hybrid objects – it is not the framework used by Smith-Howard. Instead, she is in fertile conversation with the literature in environmental history, particularly the current understanding that wilderness is not completely wild and industry is not completely artificial. She explores the shifting and entangled boundaries between the wild and the artificial in one food, milk, as played out in its various forms, including butter, fresh milk, and skim milk. She does this through deeply-researched histories of dairy processing, once again more of a topic for technological history, but her goal – to discover the interactions between nature and human industry, is squarely within environmental history. She is, in other words, taking an area of focus commonly addressed through one literature and interpreting it through another.

Which is why I kept wondering when the farm fields would come in. If we are talking environment, wouldn't we include a discussion of the impact these changes had on the landscape? Cows are no longer in fields because they are in barns, they are fed grass as part of their “ration” and – if not on an organic or “grass-fed” farm – seldom see a meadow. Smith-Howard talks about how barns have changed, from stantion – where cows are headlocked in stalls -- to freestall barns where they walk around inside. Many argue that freestall barns are more humane, but that doesn't take into account the other changes, like the fact that stantion barns were used in grass-fed meadowed systems, which perhaps means that a chance to wander inside only became important once cows couldn't wander outside.

Yet, like most excellent and well-researched books, I'm only asking for more because Smith-Howard has given us so much. She tells us, for example, not just how skim milk technology was developed, but why (because they needed something to do

³ Swyngedouw, Erik. "Apocalypse forever? Post-political populism and the spectre of climate change." *Theory, Culture & Society* 27, no. 2-3 (2010): 213-232.

with the waste from butter processing, which tended to end up, rotting, in streams, because farmers were less likely to raise pigs as they specialized). She looks even at the strange ways in which scientists turned a dairy-processing by-product, casein, into buttons and paint. Casein turned out to be a useful ingredient, but only because people worked hard to make it so. Simply as a history of one set of modern waste-streams hers is a marvelous and path-breaking project.

The overall arc of the book also follows milk from its beginnings as a dangerous but necessary substance, to its redemption through sanitary technology and regulation, to today, when industrial food has become highly suspect. What to do with a food that only became safe through its insertion in the industrial system? As food safety regulations expand beyond milk to spinach and cantaloupe, the history of milk safety can tell us something about our food futures.

Interestingly, this question about safety and nature came up a few months ago when I was part of a panel with Smith-Howard on milk politics in Albany, New York. A college field trip group was visiting the Capitol state agricultural agency and happened to see the advertisement for the panel. The college course was dairy management and the students were taking the course because they all wanted to be dairy farmers, specifically raw milk dairy farmers, because they knew about the rise in raw milk consumption and saw it as a way to save local dairy agriculture and to get into the business.

Needless to say the panelists – food safety law experts, a Cornell representative, Smith-Howard and myself – were polite but appalled. We all knew that fresh milk was a product of the industrial system and that making it raw would just make it dangerous once again. But, as the dairy management professor told us, one raw milk farm, once it made the press for its listeria outbreak, tripled its orders. The students wanted to know why, if consumers wanted it, and accepted the risk, why couldn't they sell it?

The reason, of course, is that consumers sometimes want what is impossible for agriculture to give them – that is, completely “natural” but completely safe food. Smith-Howard's book makes that clear. This is an argument I started to make in my own book, *Nature's Perfect Food* and more so in my forthcoming book, *Dangerous Digestion* but Smith-Howard delves into the back and forth between food reformers, government representatives and farmers with a deep knowledge of primary sources only first-rate historians can provide. Whether we convinced the dairy students that their idea was complete folly is unclear.⁴

My own arguments focus on transformations in the cheese system, which evolved from a separate more grass-based, artisanal and local production network –

⁴ DuPuis, E. Melanie. *Nature's Perfect Food: How Milk Became America's Drink*. NYU Press, 2002; E. Melanie DuPuis. *Dangerous Digestion: the Politics of American Food Advice*. UC Press, forthcoming.

separated by regulatory and geographical boundaries – into a side-show of the fresh milk system, just a way to deal with excess fresh milk. I argue that the previous system had a different agroecology to it and that the death of this type of dairying was the death of meadows – an ecosystem that contributed to the biodiversity of Northeastern ecologies, ecologies, and their species, now threatened because of the super-forestation of much of the rural parts of the region. For example, the Northeast is losing bird species that depended on meadows. Smith-Howard, however, spends little time on cheese, or on the ecological arguments I made about this type of dairy agroecology. I'd be curious to know why.

There have been several books on milk history since my own was published more than 10 years ago. But none have been as comprehensive, or as enlightening of larger disciplinary conversations, as Smith-Howard's. The book testifies to her expertise in teasing out, with deep knowledge of the archives, what happened with milk. And this historical perspective will help us to understand the future of this sacred-awkward substance.

Comments by Helen Zoe Veit, Michigan State University

Americans' relationship to milk is deeply strange, as Kendra Smith-Howard explores in her beautifully nuanced *Pure and Modern Milk*, a fascinating environmental history of Americans' most romanticized food. At times, Americans have held up milk as a preeminently natural product, one whose power lay in the fact that it was supposedly untouched and unchanging. At other times – and, in fact, sometimes simultaneously – Americans have celebrated the modern technologies that protected consumers from milk's many dangers. The truth lies in the contradiction, Smith-Howard argues: milk has long been a hybrid of nature and culture, a farm product that reaches consumers “in an altogether different state from that in which it originated” (4).

A rural/urban opposition makes little sense in the context of milk production. Smith-Howard believes that environmental historians have too often replicated a romantic family farm fantasy, ignoring in the process how rural areas were industrializing at the same time as urban areas. Milk's manipulation, fully underway by the early twentieth century, didn't start in cities or factories but on farms and pastures: farmers extended cow's formerly seasonal milk production by feeding them silage and fodder crops in fall and winter; they used new tools to sunder cream from milk and then stored the results in new cement cooling tanks; they turned to artificial insemination to produce calves with desired traits. Instead of treating rural and industrial change in isolation, Smith-Howard says, it's more accurate to think about a process of “rural industrialization” (7).

Just as historians have romanticized the rural, so too have they sometimes demonized urban and industrial forces as inevitable threats to rural life. But in some of the strongest sections of the book Smith-Howard shows how national, technological, and industrial forces could be the very forces sustaining small, diverse farms. Take butter, for example. By 1920, most U.S. butter wasn't made on farms but in creameries – that is, in butter factories. But instead of hurting small farms, centralized creameries helped support them. The hand-cranked separator, widely adopted in the 1910s and 1920s, meant farmers could separate milk from cream themselves and send only the cream to the creameries, a more efficient prospect that allowed farmers with only a few cows to sell their cream for profit for the first time. By gathering small amounts of cream from scattered farms, Smith-Howard shows, creameries “incorporated small-scale farmers into the national economy” (40). In this typically telling case study, Smith-Howard complicates relationships between the small and the corporate and between the local and the national.

The butter example also reveals the ways that rural industrialization was never a simple progress narrative. In this instance, even as cream separators offered farmers novel income possibilities, they also introduced new public health threats when they were poorly sanitized. Creameries mixed together cream from hundreds

of small farms or more, which meant a single spoiled contribution could taint the whole batch, potentially sickening consumers far and wide. But the bad cream was often impossible to trace, and cleaning cream separators remained a tedious, labor-intensive task in which it was tempting to cut corners, especially when the dire health consequences of poor hygiene weren't visible to the people doing the cleaning.

Throughout the book, Smith-Howard convincingly shows that one of the most important and consistent themes in the history of milk is worry. Turn-of-the-century Americans worried about spoilage and dirt and contagion. Unrefrigerated milk, swimming with natural sugars, was a perfect medium for diseases, and throughout the nineteenth century thousands of children had sickened and died each summer from drinking milk that carried typhoid, scarlet fever, or bovine tuberculosis. The problem got worse before it got better. By the end of the nineteenth century, new transportation technologies resulted in longer food distribution chains that presented only greater opportunities for milk to be tainted or go bad as it sloshed along for days on railcars and horse carts, sometimes open to flies and often inadequately cooled. Smith-Howard rightly points out that the twentieth-century dogma that milk was "nature's perfect food" and that milk-drinking was a precondition for child health would have sounded like nonsense as late as 1900.

Attitudes towards milk's purity stayed complicated in the Progressive Era, as milk reformers worked to improve on nature even as they celebrated country milk as a naturally wholesome product. In the name of public health, reformers demanded dairy farm modernization on multiple levels, and in many instances they successfully implemented bovine tuberculosis inspections and standards for bacterial counts. But farmers' business needs often clashed with sanitary advice, in part because few farmers in the early twentieth century did dairy exclusively. More often, a small dairy herd was one of many farm activities, and farmers with a relatively minor dairy investment were reluctant to undertake expensive changes. As public health codes increasingly required such changes, farmers either modernized or gave up on milk.

Pasteurization was another Progressive Era sea change. Bovine tuberculosis had long been a grave threat to milk drinkers because milk from infected cows caused intestinal infections, diarrhea, and human tuberculosis. Pasteurization solved the problem – not by curing sick cows but by making their milk safe for humans to drink. Pasteurization had less positive effects on milk, too, destroying lactic acid and beneficial bacteria and eliminating the "cream line" that earlier generations of consumers had sought out as a mark of butterfat content and healthfulness. Still, pasteurization was an enormous success overall, and it became nearly ubiquitous by the 1930s. Together, pasteurization, farm inspections, and home refrigeration made milk consistently safe for children in the interwar period, and this – in tandem with the era's nutritional boosterism – made milk the drink *of* children.

If anything, claims about milk's purity and authenticity only got more complex over time. For example, before the mid-twentieth century butter boosters attacked margarine as a fake product made with foreign oils and dyed in a sad imitation of butter's genuine yellow. But Smith-Howard shows how butter and margarine were both hybrids products. By the 1930s, a perfected hydrogenation process meant that American margarine could be made with southern peanut and cottonseed oils, making it a product every bit as domestic as butter – especially because butter was getting less local as more U.S. dairy cows increasingly ate low-cost supplements imported from far away, sometimes made with the very oils going into margarine. Changing feeding regimes also made it harder for butter-makers to argue that cows' diets were purely natural. Cows in the early twentieth century had gotten most of their roughage from fresh grass, with cows going out to pasture on the first day of spring and grazing through the summer. But during the twentieth century American cows increasingly ate pre-cut grass in the barnyard, sometimes well after the pastures got dry and brown. Farmers who cut and hauled grass did so because they thought it was more efficient: instead of trampling pasture and picking out only the most succulent grasses, cows who ate from a trough were forced to eat a diverse mix of grass cuttings along with cheaper oil concentrates and hay pellets. Also, crucially, longer periods of indoor grass consumption made milk production less seasonal. By the 1960s, many farmers were feeding cows grass clippings all year long. Indeed, even as they pointed out the dye in margarine, butter-makers themselves were quietly coloring their own product in the winter months, when cows living on stored feed naturally produced paler milk.

Smith-Howard also explores the question of dairy waste, which increased as farms became more specialized. In earlier times, farmers with small, diverse operations would have had leftover skim milk, but they would also normally have had a few pigs happy to eat it. By the mid-twentieth century, however, dairy farmers generally had bigger herds, lots of leftover skim milk or whey, and no other animals to which it could readily go as feed. Often, they just dumped leftovers in the ditch. Pollution happened on a much bigger scale in milk plants, especially in dairy states like Wisconsin where plant managers dumped untreated dairy byproducts into streams and rivers by the ton. Indeed, in states like Wisconsin that had both lots of dairy plants and lots of rural tourism, outdoor enthusiasts became an important force against water pollution. But Smith-Howard also points out that their activism was often motivated by hazy pastoral ideals; when rural tourists went to the county for recreation, they rarely understood that “the place they encountered was a place of modernization and mass production, not a landscape locked into a static past” (115).

One solution to the problem of dairy waste was to turn farm byproducts into industrial raw materials. For instance, skim milk could be separated into whey and casein, and the latter could be used to make industrial products like glue, plastic, and paper. Another solution to the problem of dairy waste was to stop seeing it as waste at all. Starting in the mid-twentieth century Americans gradually started viewing skim milk as a desirable product in its own right, although Smith-Howard stresses that getting consumers to actually like drinking a beverage many still

thought of as the main ingredient in hog slop was hardly inevitable. World War II helped by lending patriotic urgency to skim milk consumption, and so did a booming postwar diet culture, as marketers increasingly pitched skim milk to women as a weight loss aid.

Smith-Howard links her discussion of dairy waste to a section on artificial insemination, arguing that greater control over cows' reproduction led farmers to view individual animals in terms of either resources or waste. The organizational logic behind tying these topics together seemed relatively weak; much more successful was the fascinating discussion of how and why farmers welcomed technologies like artificial insemination in the first place. Artificial insemination offered insurance against a bull's own mortality; once a bull's semen had been collected and frozen, that semen wouldn't die, contract a disease, or have an accident. And for farmers who had feared bull attack or a cow's contracting a venereal disease, artificial insemination offered unparalleled predictability and personal safety. In Smith-Howard's empathetic telling, it becomes clear why farmers embraced technological changes that some historians later equated to an "abstract alienated relationship to nature" (93). But even as she dispels pastoral fantasies, Smith-Howard doesn't overcorrect, either, emphasizing the interplay of the natural and the human here and throughout. Biology has been and is a crucial part of milk production, she stresses, so that even as humans modernized farms, changed cows through breeding, and ultimately altered milk, the natural attributes of all those things continued to matter. In the case of bovine reproductive technologies, for instance, it's telling that young bulls still beat scientists at knowing when a cow was most fertile. So interesting was the discussion of artificial insemination in cows that I found myself wishing the author had explored the ways that artificial insemination in humans – which first became commercially available in large cities in the World War II era – borrowed from its technologies and mindsets.

Throughout the book, Smith-Howard returns to the ways that rural landscapes changed alongside urban and suburban ones. The mid-twentieth century was an especially transformative period for rural infrastructure, as the broader cultural emphasis on mass consumption and abundance shaped national expectations about farm production and farmers' own expectations about work and income. These cultural shifts – and, indeed, American abundance itself – resulted in a series of problems. For instance, one ironic result of the technological ramping up of dairy farms was that surplus milk led to lower prices, foiling farmers' efforts to get ahead. Meanwhile, dairy specialization and confinement livestock methods led to surplus manure, as a product that had been highly valued for increasing soil fertility accumulated in amounts greater than soil could absorb.

And, too, there was the surplus of calories. A food economy flooded with affordable dairy fat contributed directly to higher rates of overweight and heart disease. Cheap dairy also transformed American diets. In fact, for a book that's all about food, I found myself wishing there was more about eating. Dairy came to play a starring role in American meals in the twentieth century, and Smith-Howard's discussions of

dietary changes like diminishing butter consumption and the transformation of ice cream from a rare summer treat to a home freezer staple only left me eager for more. What about cheese, for instance? Americans today might not be surprising to find virtually no yogurt in nineteenth-century U.S. cookbooks, but they might be surprised by how rarely cheese showed up, too. The growing prominence of cheese in American meals throughout the twentieth century represented one of the most dramatic changes in modern American cuisine, and it would have been useful to hear more about it. And while Smith-Howard mentions worries over cholesterol and briefly touches on diet culture in the mid-twentieth century, I would have liked to see a deeper discussion throughout the book about the many ways Americans have both prized dairy and fretted about it over time. These are relatively minor points, however, and my lingering curiosity testifies to how thought provoking the book was in general.

One of the major points of the book is that Americans didn't stop worrying about their milk even as the old risks posed by spoilage, insects, and disease decreased. Instead, starting in the mid-twentieth century, consumer anxieties centered around new potential dangers: antibiotics, pesticides, radioactive particles, and, by the late twentieth century, recombinant bovine growth hormone – all threats as vexingly invisible to consumers as typhoid and tuberculosis had been. If anything, milk's confirmed status as the drink of childhood only heightened adult vigilance and anxiety. For instance, even though radioactive isotopes showed up in higher concentrations in produce, people worried most about their presence most in milk. Likewise, for many grocery shoppers by the late twentieth century milk had become the single item that had to be organic. In fact, the very popularity of organic milk was a crucial factor in turning organic food from a grassroots niche product into a big business featured in retailers like Walmart.

Ironically, of course, some of the contaminants that late-twentieth-century consumers worried about were the very technologies deployed to protect earlier generations from milk's "natural" hazards, especially antibiotics and pesticides. For instance, in its early years DDT had seemed to help assure milk's purity by killing disease-carrying flies, and Smith-Howard points out that coming to view DDT and other pesticides as sources of disease rather than assurances against it required a major shift in perceptions. In another reversal, some consumers in the last forty years have turned to raw milk as a product that is supposedly not just pure but also salubriously anti-modern, and they seek freedom from state oversight just as vigorously as Progressive Era dairy reformers fought for it. Smith-Howard takes raw milk enthusiasts to task for their nostalgic disregard of history. Indeed, dairy nostalgia is unlikely to afflict anyone who reads this book. One of Kendra Smith-Howard's strongest arguments throughout is that the tenacity of Americans' ongoing quest for a pure milk ideal is all the more remarkable when you know milk's history, because in many ways that history is one of Americans acknowledging, over and over again, that milk is anything but natural.

Comments by Daniel R. Block, Chicago State University

During a spring break trip home during the first year of my Ph.D. program in geography, I went to Chicago's central library to complete an overdue term paper comparing the Wisconsin and California dairy industries. Taking a break, I decided to see what the Chicago Public Library might carry on dairy policy. Much to my surprise, among the public documents was a 1917 report from a city committee on "the More Economic Distribution and Delivery of Milk." Responding to the World War I era spike in the cost of milk, the committee suggested consolidating milk delivery routes by creating a system whereby multiple milk delivery companies did not serve each Chicago block. This was an interesting proposal, but even more interesting to me at the time was the fact that the recommendations went beyond the city. The committee recommended that farmer cooperatives set up their own milk plants, stating: "Is it beyond reason to believe that co-operative milk depots, built and maintained by farmers and handled by well paid experts, which will distribute efficiently and economically a uniform grade of pure milk and cream for which an organized group of farmers or producers is responsible, will sooner or later be developed to supply neighboring cities?"⁵ While Chicago and cities across the US and the world have today created food policies that focus on production as well as consumption, in 1992 the idea that a Chicago City Council report had ever made recommendations to farmers was fascinating and surprising, and sparked my choice to write my dissertation on the subject. Particularly interesting to me was how milk brought together urban economic and health concerns with the economic concerns of dairy farmers, framed within city, state, and federal policy.

Over the past twenty-five years a slow stream of books and articles on the history of milk have appeared, written by historians, geographers, sociologists, and others. E. Melanie DuPuis came first with her wonderful book *Nature's Perfect Food: How Milk Became America's Drink* (2002). In 2010, Peter Atkins published an investigation of the development of the British milk industry entitled *Liquid Materialities: A History of Milk, Science, and the Law*. Other books have been published by Andrea Wiley (2014, 2011) and Deborah Valenze (2011).⁶ While this flowering of milk books probably has its roots at least partially in the development of food culture in general, milk in specific brings together questions of policy, culture, science, and ideas of purity and nature in ways that fascinate scholars and the general public alike. Milk

⁵ Committee on Health, Chicago City Council. Report on the More Economic Distribution and Delivery of Milk. Municipal Reference Bulletin 8, 1917. Available at: http://archive.org/stream/reportonmoreecon00chic/reportonmoreecon00chic_djvu.txt. Accessed June 3, 2015.

⁶ E. Melanie DuPuis, *Nature's Perfect Food: How Milk Became America's Drink* (New York: New York University Press, 2002); Peter Atkins, *Liquid Materialities: A History of Milk, Science at the Law* (Burlington, VT: Ashgate, 2010); Andrea Wiley, *Re-imagining Milk: Cultural and Biological Perspectives* (New York: Routledge, 2009); Andrea Wiley, *Cultures of Milk: The Biology and Meaning of Dairy Products in the United States and India* (Cambridge, MA: Harvard University Press, 2014); Deborah Valenze, *Milk: A Local and Global History* (New Haven: Yale University Press, 2011).

can act as a tool to reveal relationships within the societies for which it is a staple, helping to uncover answers to questions such as how staple foods are chosen, how levels of regulation as well as price controls are set, how society deals with the risky nature of such a perishable product, and who benefits from the systems that are put into place.

Kendra Smith-Howard's *Pure and Modern Milk: An Environmental History Since 1900* is a great example of the use of the study of milk to reveal characteristics of US society and economy. It also fills a gaping hole in the previous literature. Most of the recent research has concentrated on relationships between consumers, regulators, and the nature of the milk itself. Farms, while almost always discussed primarily in more general terms, or represented through organizations such as cooperatives, have largely been ignored. While Smith-Howard does not overlook regulators and *Pure and Modern Milk* contains quite a bit on consumers, her gaze lies particularly on dairy farmers themselves. In particular, she analyzes how they reacted to and helped create technological change, including changes to cows, milk, and other dairy products, and how these changes sometimes created unexpected outcomes that the dairy farmers themselves then needed to react to. She also concentrates on how changes in consumer preferences influenced the products dairy farmers produced, the nature of the technologies they used to produce them, the nature of dairy cows, and the lives of dairy farmers. Finally, *Pure and Modern Milk* is a rejoinder to authors such as Michael Pollan and Barbara Kingsolver's overly pure visions of family farming fifty and one hundred years ago. Smith-Howard argues that family dairy farmers were essential actors in bringing dairying technology onto the farm, and that in order to discover why they made decisions whether to embrace dairying technology, one must analyze the lives of the farmers themselves.

A particular example of this focus on dairy farmers and their adoption of technology is in Smith-Howard's discussion of butter and the ways that cream separators transformed on-farm activities. Butter has been a somewhat overlooked dairy product within the recent crop of milk books--which mainly focus solely or predominately on fluid milk, largely because of its ties to the rise of industrial cities in Europe and North America. Smith-Howard begins with a discussion of early twentieth century creameries, the butter-making plants that included small firms, often cooperative, located at crossroads in butter districts, as well as larger manufacturers. Either way, creameries depended on getting high-quality cream from their suppliers. Centralized creameries replaced home production of butter based on the development of the cream separator, a device relying on a centrifuge to separate cream from skim milk. The late nineteenth and early twentieth century invention and adaption of the separator changed the lives of farm women, who lost their responsibility for butter-making, but were now responsible for keeping the separator clean. This was a difficult task involving taking the machine apart and boiling the components in hot water. Cream from unclean separators might transmit disease as well as make the butter produced off-tasting. Cream from many farms were mixed at the centralizers, particularly at large ones, making it more difficult to trace the sources of poor cream (p.42). Poor butter coming from low quality cream

became a complaint of urban housewives. At the same time, the focus on cleanliness caused interventions of the state into farm activities. For instance, farms often fed pigs the skim milk coming from the separators, so separating in the hog barn made operational sense. However, inspectors worried about possible cross-contamination (p. 43). Finally, the butter-making process was divided into butter made from neutralized cream, generally thought of as a more industrialized product, equivalent of pasteurized milk, that allowed cream of varying quality to be made into butter, and sweet cream butter, that required a low lactic acid level--and thus was generally less sour (and presumably was more recently milked, had been kept cooler on the farm, and came from higher quality feed) (p.47).

Smith-Howard tells similar tales of nature, farm work, consumer demands, regulation, and the development of the dairy industry around ice cream, fluid milk purification, milking machines, artificial insemination, the use of silage, and bulk milk tanks. Through a series of these stories, consumer development in the United States is linked to changes on the farm. For instance, she considers the development of self-service groceries as a link in the purification of butter, as consumers increasingly bought directly in highly decorated packages covered with marks of purity. rather than scooped out of a vat behind a grocery counter. Post World War II, the development of Grade A milk standards by the federal government and their adoption by states meant that dairy farmers had to adopt their dairy barns to the new standards or leave the business. Those who chose to invest in the new barns wanted flexibility in the outlets to which they sold their milk. While the higher standards for milk sold to fluid markets were once met primarily by farmers selling to that market, after World War II they were increasingly met by farmers selling to manufacturing markets such as ice cream as well. At the same time, consumers with ever-growing refrigerators and freezers began to buy pre-made ice cream for home consumption. Ice cream producers thus became an additional outlet for farmers investing in improved dairy barns, expanding their markets (p.99). In another example, the adoption of milking machines greatly lessened the amount of effort needed for milking, but it also led to higher levels of mastitis, causing dairy farmers to increase the use of antibiotics. Milk from cows on antibiotics lacked the bacterial flora needed to produce quality cheese and butter and health officials worries about potential allergic reactions from consumers. Long before the worries about overuse of antibiotics on concentrated animal feeding operations and on cows that are given Bovine Growth Hormone, the FDA created a 72 hour withholding rule for the specific udder quarter that was given antibiotics (p. 126).

Smith-Howard also takes on such as issues as the contamination of milk by DDT and nuclear radiation. In particular, she highlights the change from consumer ideas of milk purity being based on a lack of contaminants from on-farm sources such as dirty cream separators or a sick farm hand, to purity being based on a lack of contamination by radiation or by pesticides drifting from nearby fields, situations which are difficult for a farmer to control. She also concentrates on the role that consumer activism played in highlighting dangers from nuclear fallout in particular, even though many other agricultural products might be more likely to be

contaminated (p.130). In an epilogue, Smith-Howard discusses today's dairy industry, including Bovine Growth Hormone and the effects of suburbanization and rising land prices on farmers deciding to get out of dairying, as well as the rising interest in family farmers, consumer choice, and raw milk. In this context, the use of Bovine Growth Hormone (or rBGH) was fought by consumers who both distrusted the technology and felt that it supported large dairies over smaller, family-run dairies (p.151). Raw milk is also seen as linking to family farmers, as well as a more original or "pure" product. The raw milk movement also is characterized by libertarian anti-government rhetoric, supporting consumer choice and decrying public health regulation of milk (p.158).

Pure and Modern Milk is well-researched, insightful, a great read, and covers new ground in the history of milk and dairying literature. It also inspired me to ask a number of questions. First of all, while mentioned, farmer responses to the Farm Depression of the 1920's and 1930's, as well as the newfound ability to create cooperatives conveyed in the Capper-Volstead Act, were not really discussed. Given the on-farm focus of the book, I was left wondering how decisions about whether to join a cooperative play out on the farm level. Most writing on cooperatives has been on milk strikes and relationships with urban entities such as health departments. How did a farmer decide to join, or even help create, a cooperative? Another question is the role of extension and land-grant universities. Extension is mentioned in a few places, but how "top-down" were extension agents in terms of promoting new technologies, versus new technologies coming out of farmer needs and innovations? Finally, while there are tidbits throughout the book on regulation, and interesting points are made about inconsistent regulation between states, I wondered about the specific effects of changes in regulation on farmers. Milk was, and is, regulated through a tangled web of city, state, and federal regulations. Cities like Chicago regulated milk far beyond its borders. How have these various levels of regulation intertwined and how, in particular, did dealing with this web of regulations affect dairy farmers?

Despite my having spent a good part of ten years studying the US milk economy, *Pure and Modern Milk* taught me many new things about the product and its production. I would like to thank Kendra Smith-Howard for this interesting and insightful new addition to the milk literature.

Response by Kendra Smith-Howard, University at Albany (SUNY)

Many thanks to the reviewers for their careful reading and comments on *Pure and Modern Milk*. Geographers, rural sociologists, and agricultural economists have often offered analysis of food agriculture before historians have come to the scene, so I am glad that sociologist E. Melanie DuPuis and geographer Daniel Block were included in this conversation. Helen Veit and Helen Curry represent the present-day flourishing of historians writing at the intersections of histories of science, technology, food, and environment, and so I am just as grateful for their reflections. Thanks, too, to Christopher Jones for including the book in the roundtable series.

I was pleased to see the reviewers took note of details I hoped readers would think more about. They identified shortcomings that I found just as vexing as I wrote the work. Perhaps most tellingly and fruitfully, their comments have prompted me to imagine new ways to engage the topics at its center.

Melanie DuPuis notes that *Pure and Modern Milk* touches on familiar themes in environmental history—the intersection between nature and technology, culture and environment, but with a different orientation than that which she is accustomed. Hence, I thought it might be helpful to have a sense of the literatures from which it came.

In some ways, the theoretical and methodological underpinnings of *Pure and Modern Milk* were laid in the first month of my first year of college. That term, I enrolled in Professor Jim Farrell's course "American Studies 100." During an early class session, we gathered outside (our instructor knew sunny warm days were numbered in Minnesota). Jim pulled out a Coke can, and proceeded to riff for roughly thirty minutes on the meaning of the object. Bart Elmore hadn't yet written *Citizen Coke*, but Jim found plenty to say. I don't remember the details, but I can guess: the nutrition facts and volume measurements served as a launching point for discussing the development of state standards, government sponsorship of science, and the influence of consumer movements on commerce. It was a single serving, so Jim sounded off on American individualism. It was *classic* coke, so Jim discussed nostalgia and the imagined past as a tactic in advertising. He provoked questions about the resources, both natural and cultural, that made Coke, and detailed the policies governing those resources, like the water and corn syrup made to produce it. He probably hinted at implications of the policies, like the hypoxic zone in the Gulf of Mexico from excess fertilizer run-off from cornfields. What I *do* remember clearly was that I was riveted. With his intervention, a simple Coke became so much more: an object subjected to state regulation, an embodiment of solar energy, a token of capital intervention, a symbol of American culture around the world.

Jim Farrell was a brilliant teacher.⁷ He wasn't the only scholar to use artifacts as touchstones to tell complicated and rich cultural and environmental stories. But because of Jim, I came to environmental history with the lenses of American studies, and my approach to *Pure and Modern Milk* bears his imprint. Even as my graduate training surely made me familiar with science and technology studies and history of technology, my grounding in American studies continued to influence my thinking. Implicitly, I drew upon scholars like Henry Glassie, Ian Quimby, Thomas Schlereth, and Pierce Lewis who paid close attention to the objects, architecture, and landscapes of everyday life. Hence, while Dupuis identifies science and technology studies as a key source of environmental history's attention to hybrid objects, material culture studies constitutes another foundational literature for this theme, and has inspired other environmental historians as well.⁸ Indeed, given the robust role of anthropology in food studies, environmental histories of food are perhaps among the most likely to incorporate material culture analysis. For my part, I drew on those analytical tools largely because it was comforting to me, as a graduate student embarking on a big and unwieldy project, to simply think of each chapter a more elaborate and deeply-researched version of the paper I'd been trained to write since my first semester of college.

If one of my formative scholarly influences was undergraduate training in American studies, a second was a strong and abiding interest and devotion to environmental history, and especially a passion for what historian Tom McCarthy calls its "big connections" school. Like so many environmental historians, I love the middle chapters of William Cronon's *Nature's Metropolis*, and the ways the book makes explicit the environmental underpinnings of Chicago. As Cronon chronicled the white pine forests felled to become balloon-framed houses, corn fields harvested and turned into elevator-stored grain, grazing bison giving way to dressed beef, I saw so clearly the integration of broader ecological systems into objects of consumer culture. *Nature's Metropolis*, but also works like Jennifer Price's *Flight Maps*, Kathryn Morse's *Nature of Gold*, Richard Tucker's *Insatiable Appetite*, and John Soluri's *Banana Cultures*, illuminate a web of economic, cultural, and environmental connections inherent in a single object at a given point in time. While other fields had their own versions of an all-encompassing approach (e.g. rural sociology's commodity-chain analysis), the big connections environmental history served as a model for this book, and Cronon's work as my dissertation advisor only buttressed my commitment to this narrative approach.

I found making "big connections" necessary, because the more I read about history of agriculture and consumer culture, the more I noticed how the fields, in Helen Curry's apt phrasing "tend to drift apart." Despite the recent spate of milk books,

⁷ My greatest regret about this book will forever be that it was released just months after Jim's battle with cancer ended and so he couldn't read it.

⁸ Cindy Ott's *Pumpkin* is a prime example of a recent book that marries the fields. Ott, *Pumpkin: The Curious History of an American Icon* (Seattle: University of Washington, 2012); Neil Prendergast promises to do more of this kind of work in his forthcoming manuscript.

when I began to dream up this project a decade or so ago, there were relatively few historical works on milk and dairy farming.⁹ With a few important exceptions, (Daniel Block's dissertation and Melanie DuPuis' *Nature's Perfect Food* among them), most existing studies stayed firmly either in the realm of production or consumption. Eric Lampard's magisterial 1963 study *The Rise of the Dairy Industry in Wisconsin: A Study in Agricultural Change, 1820-1920* drew the broad outlines of nineteenth and early twentieth century dairy production, but offered few hints about consumers' motivations for purchasing dairy foods, other than noting the harm to cheese export markets due to adulteration. Those writing about milk consumption, on the other hand, tended to emphasize moments of tension between professionals about milk, or to highlight the ways in which women's authority over infant feeding waned with the development of infant formula.¹⁰ They said little about the ramifying consequences for milk producers. Both the production and consumption-oriented histories were excellent. (Andrea Wolf's *Don't Kill Your Baby* wins my award for best title). But the audiences they addressed, questions they asked, and subjects of their histories could not have been more different. So I set out to tell a unified environmental history of milk and dairy farming—one that might demonstrate the reciprocal play between production and consumption as I had seen other environmental historians do so elegantly.

A third theme guided my framing of the project: I didn't simply want to tell a history of milk and dairy foods. I wanted to look in that history for specific instances in which concerns about human health or food purity engendered new kinds of environmental relations, or moments when new kinds of environmental relationships prompted different thinking about human health. Writing at a time when environmental histories were beginning to detail hazards of the job, explaining the toxic landscapes of Cancer Alley, and noting the importance of health seeking on Western exploration and leisure, I thought the material pathways and cultural meanings people assigned to milk or butter might reveal something about the role of health on changing environmental relationships. Thinking about how the body served as a vehicle for knowing nature also provided me with a launching pad to think more about animals' bodies as both objects of study and formative agents in producing knowledge about nature—something I played with in the discussion of animal breeding and feeding.¹¹

⁹ Peter Atkins, *Liquid Materialities* (Surrey: Ashgate, 2010); Andrea Wiley, *Re-Imagining Milk* (New York: Routledge, 2011); Deborah Valenze, *Milk: A Local and Global History* (New Haven: Yale University Press, 2011); Andrea Wiley, *Cultures of Milk: The Biology and Meaning of Dairy Products in the United States and India* (Cambridge: Harvard University Press, 2014).

¹⁰ Rima Apple, *Mothers and Medicine: A Social History of Infant Feeding, 1890-1950* (Madison: University of Wisconsin, 1987); Richard Meckel, *Save the Babies: American Public Health Reform and the Prevention of Infant Mortality, 1850-1929* (Baltimore: Johns Hopkins University Press, 1990); Jacqueline Wolf, *Don't Kill Your Baby: Public Health and the Decline of Breastfeeding in the 19th and 20th Centuries* (Columbus: Ohio State University Press, 2001).

¹¹ Christopher Sellers, "Thoreau's Body: Towards an Embodied Environmental History," *Environmental History* 4 (October 1999): 486-514; Sellers, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill: University of North Carolina, 1999); Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land*

These methodological frameworks—of material culture studies, “big connections” environmental history, and the relations of environment to health—shaped fundamental decisions about the architecture of the book. Most importantly, I made things, rather than people or places, the centerpieces of each chapter. Each of these object-oriented chapters traverses back and forth between histories of consumption and production at a given point in time, allowing reflection on how changes on the farm affected dairy consumption, and vice versa. Book-ending the narrative with chapters on milk foregrounded my argument about changing perceptions of milk hazards: from an opening chapter stressing milk’s natural imperfections that drove technological intervention to improve milk in the Progressive Era to a closing one that depicted “all-natural” milk contaminated by human technologies in postwar America. I chose butter because it was so important (and often forgotten) in the dairy industry prior to 1960, and because the Wisconsin Historical Society had creamery records in great multitudes. Tracing the byproducts is a classic environmental history theme, and when I found out more about whey-polluted streams and skim milk as animal feed, I knew I would write a chapter about them. The Smithsonian’s National Museum of American History had records of Carvel and Good Humor, and so it seemed a promising vehicle to discuss trends in post-World War II food culture.

Why, DuPuis and Veit ask, no chapter on cheese? Cheese seemed more complicated to research: from cheddar to chevre, feta to wiz—each variety had an intriguing history, and I didn’t want to melt down the fascinating ethnic, artisanal, and technological histories into a homogenized fondue. I relied instead on butter’s story to explain the central importance of dairy manufacturing. I hinted at cheese throughout: it was cheesemakers, for instance, who first voiced alarms about antibiotic residues in milk. Whey, the byproduct of cheese plants, factors into the book’s third chapter. Helen Veit is right that the increasingly prominent role of cheese in the American diet, and rising concerns about obesity and heart disease make cheese worthy of discussion. At the time I began writing, I didn’t think of obesity or heart disease as *environmental* health problems, and I admittedly paid less attention to them than concerns about flies, spoilage, pesticide or fallout-tainted food. More recent works by Julie Guthman and Bart Elmore have begun to expose the environmental dimensions of these chronic health conditions, thereby opening up possibilities for further research.¹²

Placing objects at the center of each chapter reflected my methodological influences. But it was and remains a bit odd to organize by commodity, rather than region or people. After all, an enduring strand of environmental history is rich

(New York: Basic Books, 2002); Gregg Mitman, “In Search of Health: Landscape and Disease in American Environmental History,” *Environmental History* 10 (April 2005): 184-210; (New Haven: Yale University Press, 2007).

¹² Julie Guthman, *Weighing In: Obesity, Food Justice, and the Limits of Capitalism* (Berkeley: University of California, 2011); Bart Elmore, *Citizen Coke: the Making of Coca-Cola Capitalism* (New York: Norton, 2015).

interdisciplinary case studies of particular places.¹³ Even key works in the big-connections school link explicitly to regions. *Nature's Metropolis* is not about the meat, lumber, or grain of anyplace, but of goods from the "great West" shaping Chicago, specifically. John Soluri's *Banana Cultures* discusses bananas from the northern coast of Honduras. *Nature of Gold* tells of Seattle and the Klondike gold rush.

Early on, I toyed with framing the project through regions, rather than objects, with key dairying states at its center: Vermont, Wisconsin, California. Framing the work as a set of regional comparisons would've made it much easier to do the kinds of fine-grained investigation of the farm environment many readers crave. Had I taken a regional approach, I might have been able to reconstruct with aerial photographs, ecological studies, and historic documents the past landscapes of a few farms. DuPuis suggests, and I concur, that more grass and birds should appear in an environmental history of milk. While I discuss the efforts of Land O'Lakes Cooperative to promote alfalfa and sweet clover cultivation in the 1920s, and state programs that discouraged woodlands pasture grazing in the 1950s, these details are only one strand of a multi-threaded story. Even in a particular region, farmers managed grasslands pastures differently, and so being able to reconstruct when and how habitats fostered or harbored particular avian species and excluded others would require much care. What was the tipping point to make life hospitable or forbidding for meadowlands birds? When did it come? These are fascinating questions, but ones that didn't occur to me. Even if they had, I'm not confident that as a solo researcher, or as a historian, that I could have offered a full account of changing species composition of grazing landscapes, nor am I confident that engaging in collaborative work to do so would have been rewarded (this was, after all, originally a history dissertation). But DuPuis' interest in meadowlands birds has prompted me to reach out to a grasslands ecologist to try to reconstruct, at least in one or two counties, the pasturelands agroecology more fully than I did in the book.

Ultimately, I was more interested in placing milk in the broader arc of twentieth-century environmental history than I was in writing a comparative study of spatial and state contexts on milk production, regulation, distribution, and consumption. Furthermore, although geography mattered a great deal for dairy production, it held less and less sway for the consumption. With the exception of a few dairy foods—like buttermilk and condensed milk—patterns of dairy consumption became less regionally specific over time, and the kinds of records I could use to document consumers' interactions with dairy foods were available more broadly on a national level than on a regional one. In the end, I learned an extraordinary amount by looking broadly that I wouldn't have found out had I focused on dairy-specialized states; for instance, letters penned by Texas dairy farmer Louis Burrus, who struggled mightily with toxic drift from nearby cotton farms made me see the familiar environmental history of DDT from an altogether different perspective.

¹³ Richard White's *Land Use, Environment, and Social Change* and *Organic Machine*, and Donald Worster's *Dust Bowl* foremost among them.

Framing the work through objects also meant that the narrative's turning points do not follow changes in farm policy or state regulation, and so Daniel Block still has questions about how the tangled web of local, state, and federal regulation affected dairy farmers. Milk regulation is indeed a complex topic, even more so than other farm commodities, and so I emphasized regulations with the greatest relevance to shifting views of milk purity or changes to environmental standards. Looking just at one example: that of regulations governing bovine tuberculosis—might help address Block's question. As with many dairy regulations in the Progressive Era, municipalities were the first to pass mandatory tuberculin-testing laws. Although federal and state governments left it to municipalities to create the first tuberculin testing ordinances, federal and state agencies, like the Bureau of Animal Industry and land-grant colleges provided the research on which these ordinances were based, and backed municipal health departments when the laws were legally challenged. But state officials also reflected rural interests, and at times responded to farmers who were suspicious of tuberculin testing. As I'm sure Block knows well, Illinois' state legislators undermined Chicago's tuberculin testing ordinance.¹⁴ Hence, municipalities turned to pasteurization to purify the milk supply, and the state and federal governments tackled livestock disease. This outcome separated the duties of municipal, federal, and state officials; it made urban health officials monitors of food, and state and federal regulators overseers of farms. What did tuberculin testing ordinances mean for farmers? In the short term, farmers encountered uncertainty as they waited to see which regulatory regime took hold. In the longer term, they became accustomed to regular visits from a tuberculin tester—tests that might carry the risk of losing a cow, since positive reactors were culled. By the postwar era, milk companies and the federal government, not municipal health departments, played a greater role in setting milk purity standards and enforcing them, as the book explores through regulatory histories governing pesticide and antibiotic residues.

Putting objects or commodities at the center of each chapter carried a third challenge, one that kept me up at night: what about the people? Despite my love for the big connections school of environmental history, I was acutely aware of the critique sometimes leveraged against it: that the birds-eye view such an approach affords neglects the experience of individual human actors. I made strides, particularly as I revised the dissertation to become a book, to provide more about specific, individual farmers' daily lives and long-term strategies. To this end, I listened to more oral histories and combed individual farmers' diaries to find examples to lend greater specificity and humanity to the book. I am proud and heartened that reviewer Helen Curry can name a few individual farmers—like Isabel Bauman and the Mallery farm—but I am aware that farmers' voices tune in and out. I regret that I was not able to do more to resurrect their voices consistently, or to return to the same set of farms consistently. Usually, the farm records or diaries I

¹⁴ Thomas Pegram, "Public Health and Progressive Dairying in Illinois," *Agricultural History* 65 (1991): 36-50.

used to get a close look at a farm were simply more limited in chronological scope than the outlines of my own narrative. For those seeking a single dairy farm's history over time—Steven Hoffbeck's *The Haymakers* is my favorite for tracing dairy farm life unfolding over centuries on one place.¹⁵

Agricultural researchers and county agents, Daniel Block rightly notes, were another set of important actors in this story. He asks whether extension agents led farmers to adopt new technologies, or if extension agents responded to farmers' needs and innovation. My records suggest a mix. County agents stood alongside Land O'Lakes creamery workers promoting alfalfa and clover hay. They disseminated information on the architectural recommendations of agricultural engineers, and promoted loose housing more enthusiastically than farmers took to it. In this way, they were top-down. But records I've investigated also show county agents and land grant researchers as problem solvers. When farmers asked them to help devise a more cost-effective feed ration, they wrote back. When farmers wrote inquiring about motility of sperm they collected or whether feeds they purchased to feed animals were free of pesticide residues, experts recommended books and provided testing labs. Such instances suggest responsiveness. To be sure, individual personalities—of extension agents and farm people alike—could tilt the scales between whether that relationship was felt as coercive or cooperative, top-down or bottom-up.

Finally, to answer Helen Anne Curry's challenging and bold question: what lessons might *Pure and Modern Milk* lend to historians interested in history of food and agriculture? One model—driven by reflections on a path *Pure and Modern Milk* did not take—would be to involve local historical societies and public libraries in writing farm histories like Hoffbeck's *The Haymakers* that track the a single farm over centuries, and to compile a broad-ranging, geographically diverse set of curated documents and narratives in a one digital place. Despite archivists' best efforts, available farm records still mostly represent politically-connected farmers, highlight farms' more successful years or occupants, or are hidden in small, rural historical societies. Were a wider effort made to collect and make farm histories available in one place, in a manner akin to the oral histories of veterans through the Library of Congress, perhaps future researchers wouldn't face as stark a research decision over whether to pursue a geographically-limited, but richly-textured regional study or sacrifice local detail for a more broad-ranging thematic one.

Second, I hope the book inspires historians to think more about histories of animals and non-food uses of agricultural products as they write about food. Food historians sometimes forget the importance of animals as eaters, and the farm work necessary to keep animals fed. One little-discussed dimension of China's new embrace of milk, for instance, is the export of US-grown hay across the ocean to feed dairy cows: a stunning feat! Skim milk's transformation from hog slop to human food invites more thinking about the cultural work necessary to heighten a food's value: what does it

¹⁵ Steven Hoffbeck, *The Haymakers: A Chronicle of Five Farm Families* (St. Paul: Minnesota Historical Society Press, 2002).

mean when a human food is derided as “rabbit food” and how have these definitions of appropriate animal and human foods changed over time, by region and culture? Thinking more about animals allows some fascinating comparisons between animal and human health. How did animal feeding experiments inform new knowledge of human nutrition? How and why did legislators pushing for more restrictive policies regarding antibiotics in the early 1960s say little regarding animal antibiotics at the same time? There’s a danger, I think, in framing food history in such a way that it only seeks to trace the route from farm to fork, without attention to non-food uses of agricultural goods. Flax, hog fat rendered to make soap, rapeseed: often the same farms producing food also fueled industry, and their products might be channeled into all these markets. What if the path from farm to fork was incidental, a sideline to farmers’ strategy really geared towards supplying an industrial market?

Curry’s question about comparative histories of commodities broadly is spot-on. I was attracted to the quirky, off-beat way that telling the story of a single food allows a historian to pay attention to detail and yet tackle the big picture of American culture, politics, economy and environment. Read side by side, environmental and agricultural histories of food can offer important insights about how the development of consumer culture on human-environment relationships, how the state governed rural landscapes, and even the far-reaching impact of geopolitical decisions on pantries and farm fields. These are issues that should not simply be of interest to foodies, but to historians of the nineteenth and twentieth-century world more broadly. Only insofar as food historians invite contemplation of the big picture, and do not simply revel in their role as chroniclers of the weird and astonishing features of individual products will their projects be more than a flash in the pan.

About the Contributors

Daniel R. Block is a Professor of Geography at Chicago State University and the director of the Fred Blum Neighborhood Assistance Center. He has completed a number of food access studies, including the Northeastern Illinois Community Food Security Assessment, a large scale food access study of the six-county Chicago metro area. His first book, *Chicago: A Food Biography*, co-written with Howard Rosing of DePaul University, will be released fall 2015. Dr. Block has a Ph.D. in geography from UCLA, where he focused on milk, public health, regulation, and the rise of the modern American food system.

Helen Anne Curry is a Lecturer in the Department of History and Philosophy of Science at the University of Cambridge and a fellow of Churchill College. Her research considers the histories of biology and biotechnology, agriculture, and environmental change in the twentieth century. She is currently writing a book on the history of early genetic technologies in American agriculture and imagination.

E. Melanie DuPuis is Professor and Chair of Environmental Studies and Science at Pace University. She writes on food, agriculture, environmental policy and sustainable governance. She is the author of *Nature's Perfect Food: How Milk became America's Drink*. Her most recent co-authored book, with David and Mike Goodman, is *Alternative Food Networks: Practice, Knowledge and Politics*. Her forthcoming book, *Dangerous Digestion: The Politics of American Food Advice* will be published by University of California Press.

Christopher F. Jones, Assistant Professor in the School of Historical, Philosophical, and Religious Studies at Arizona State University, studies the histories of energy, environment, and technology. He is the author of *Routes of Power: Energy and Modern America* (Harvard, 2014) and is currently working on a project examining the relationships between economic theories of growth and the depletion of non-renewable natural resources in the twentieth century.

Kendra Smith-Howard is Associate Professor of History at University at Albany (SUNY). In future work, she seeks to continue to bring together histories of environment, technology, public health, politics, and consumer culture through an environmental history of cleanliness in the twentieth-century United States.

Helen Zoe Veit, Associate Professor of History at Michigan State University, is the author of *Modern Food, Moral Food: Self-Control, Science, and the Rise of Modern American Eating in the Early Twentieth Century* (University of North Carolina Press, 2013). She edits the American Food in History book series with Michigan State University Press and is the director of the NEH-funded What America Ate project, which is creating a digital archive on food in the Great Depression. Her next book, *Small Appetites: A History of Children's Food*, examines children's eating in the last 200 years.

Copyright © 2015 H-Net: Humanities and Social Sciences Online

H-Net permits the redistribution and reprinting of this work for nonprofit, educational purposes, with full and accurate attribution to the author, web location, date of publication, H-Environment, and H-Net: Humanities & Social Sciences Online.