

The Triumph of the Egg

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Grotesques are born out of eggs as out of people.

——“The Triumph of the Egg,” Sherwood Anderson, 1920

On 11 December 1912, Philadelphians encountered an extraordinary sight in their city’s streets. Groups of prominent society women—“famous beauties and matrons . . . known all over the continent”—were selling eggs all over town. These eggs differed from those we buy today in that most had been in storage since April. Housewives nonetheless flocked to buy them, because they cost only 24 cents a dozen, much less than other April eggs. The sellers, themselves members of the Housekeepers’ League, claimed they would not make money off the “hen fruit” that they had bought by the carload, but neither would they lose it. Rather, they aimed to break a commercial corner on eggs that, they claimed, fostered unfair and deceptive trade practices. In particular, they wanted to stop merchants from charging “strictly fresh” prices for what were in fact refrigerated eggs.¹

The Philadelphia ladies were not alone. Within days, the Housewives’ League in New York City and the Clean Food Club in Chicago launched their own trust-busting egg crusades. The following year, a Boston women’s group used chain mail to wage an egg boycott, which the press called “a modern counterpart of the famous tea party.”² All these protests coincided with a period of extraordinarily high inflation in both the United States and Europe. As the cost of provisions rose, so did consumers’ suspicions of the industries that produced, distributed, and stored them. Controversies surrounding cold-storage eggs, however, began well before the inflationary boom, and

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¹ “Women Solve Problem of High Living Cost,” *Los Angeles Times*, 12 Dec. 1912.

² “War of Housewives for Cheaper Eggs,” *New York Times*, 16 Dec. 1912; “Club Women and Cheap Egg Sale,” *Chicago Tribune*, 16 Dec. 1912; “Women Start Egg Embargo,” *Boston Daily Globe*, 11 Dec. 1913.

lasted long afterwards. They reflected widespread popular distrust of a technology that was supposed to make the urban food supply cheaper, safer, and more varied, but that also raised troubling questions about when and which foods were truly *fresh*.

At a time when globalization and new food technologies have provoked similar concerns, the cold-storage egg controversies merit attention for at least three reasons. First, they help to illustrate how much the very meaning of “freshness” has varied over time and place, and matters more in some foods than others. Eggs alone do not tell the whole story of freshness, but their history reveals some quite radical shifts in how this taken-for-granted quality is produced and preserved. Second, these controversies show that meanings of freshness are often fuzzy, contradictory, and never *just* about food. Rather, societies’ norms and practices surrounding fresh food reflect much broader ideas about their place in the natural world, and about how, through technology and social relations, they should mediate its perils and penuries. Lastly, these controversies and their eventual resolution illuminate the moral quandaries accompanying the making of modern food supply. At a time when the industrialized world’s consumers enjoyed generally cheaper, cleaner, and more varied provisions than previous generations, refrigeration provoked both dishonesty and distrust, especially when applied to eggs. Farmers ultimately found the solution, and hens paid the price.³

PERISHABILITY AND MARKET POWER

During the period between 1850 and roughly 1930, most Western nations made great progress in feeding their cities. Some of the progress owed to increasing grain, livestock, and fruit production, especially in the Americas, and to the rail and shipping lines that carried settler farmers westward and their harvests back east. Some progress was due to the passage of anti-adulteration laws, and some to the rise of large branded food companies that profited from the marketing of food purity. Some owed to the agricultural output of tropical colonies, which helped bring former luxuries—coffee and tea, sugar and chocolate, bananas and pineapples—into the budgets and diets of the working and middle classes. And much progress, of course, came from advances in food preservation through both heat and cold. All this has been well documented.⁴ Less explored is how some of the technologies and trades that most

³ The paper draws on a review of archival materials, trade journals, newspapers, and secondary sources conducted between July 2004 and December 2006. The bulk of the research was conducted at the Bibliotheque National de France, Baker Library at the Harvard Business School, and the libraries at the University of California-Berkeley. Among the trade journals consulted were *Ice and Refrigeration*, *Le Froid*, *American Egg and Poultry Review*, *Leghorn World*, and *The Hen Coop*.

⁴ Clearly this is a huge literature, but see, for example: William Crossgrove et al., “Colonialism, International Trade and the Nation-State,” in L. Newman, ed., *Hunger in History: Food Shortages*,

contributed to the feeding of modern industrial society—namely by increasing the variety of fresh foods available and affordable year-round—were also the most contested. In particular, urban consumers doubted the durable freshness brought to them via refrigerated railcars, steamers, and warehouses.

Their attitudes contrasted sharply with the quasi-utopian optimism of refrigeration's early boosters. Among them was Charles Tellier, the French inventor of the basic compressed gas chilling method used today.⁵ Like the many other engineers and scientists who experimented with mechanical cold during the second half of the nineteenth century, Tellier believed that refrigeration would allow for the "rational" reorganization of the global fresh food supply, away from crowded urban hinterlands and toward regions where land was abundant and labor cheap. It would encourage increased production, and eradicate gluts, waste, and want. Above all, refrigeration would improve workers' productivity and soldiers' fighting spirit, by making available not just more but better, *fresher* food. Fresh red meat was a top priority, since it was considered the ideal strength-building nutrient, and far more palatable and wholesome than either salted or canned meats.⁶ But refrigeration's advocates saw many ways it could improve the human diet. "By slowing down time's destructive work," Tellier once said, "*le froid* increases the power and resources of Man."⁷

Tellier had such confidence in his invention that he raised money to have it installed on a British steamer, which in 1877 he re-christened *Le Frigorifique* and sailed to Uruguay and back, loaded with chilled beef. After an on-board banquet in Montevideo, the South American press reported on the fine quality of the month-old meat. "The problem has found its solution," one newspaper proclaimed. The problem, of course, was the sheer distance that had

Poverty and Deprivation (Cambridge, Mass.: Basil Blackwell, 1990), 215–41; Jack Goody, *Cooking, Cuisine and Class: A Study in Comparative Sociology* (Cambridge: Cambridge University Press, 1982); Harvey Levenstein, *Revolution at the Table: The Transformation of the American Diet* (Berkeley: University of California, 2003); Sidney Mintz, *Sweetness and Power: The Place of Sugar in Modern History* (New York: Penguin, 1986); Sue Shepard, *Pickled, Potted, and Canned: How the Art and Science of Food Preserving Changed the World* (New York: Simon and Schuster, 2000); Simon Naylor, "Spacing the Can: Empire, Modernity and the Globalization of Food," *Environment and Planning A* 32 (2000): 1625–39; John Burnett, *Plenty and Want: A Social History of Diet in England from 1815 to the Present Day* (London: Nelson, 1966).

⁵ For a useful history of refrigeration inventions, see Barry Donaldson and Bernard Nagengast, *Heat and Cold: Mastering the Great Indoors* (Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1994).

⁶ Alfred Massé, *Le Troupeau Français et la Guerre: Viande Indigène, Viande Importée* (Paris: Librairie Agricole de la Maison Rustique, 1915); Mark Finlay, "Early Marketing of the Theory of Nutrition: The Science and Culture of Leibig's Extract of Meat," in H. Kamminga and A. Cunningham, eds., *The Science and Culture of Nutrition, 1840–1940* (Atlanta: Rodopi, 1995), 48–76.

⁷ G. Le Roy, *La Mort de Charles Tellier: Ses Obseques* (Paris: Association Française du Froid, 1913); Robert Lesage, *Charles Tellier, Le Pere Du Froid* (Paris: A. Giraudon, 1928).

previously prevented the South Americans from selling their own fresh meat to the markets that most hungered for it.⁸

Tellier's compatriots, however, saw things differently. They greeted the arrival of chilled South American meat with alarm, protest, and then hygiene laws strict enough to all but shut down the trade for the next quarter century. France's continental neighbors reacted similarly. Much of the outcry came, not surprisingly, from livestock farmers concerned about preserving their markets.⁹ But refrigerated foods also encountered opposition in cities; the first Parisian fruit wholesaler to build a cold-storage chamber, for example, upset his customers so much that he had to tear it down.¹⁰

In London, then the world's biggest market for all kinds of imported, refrigerated foods, consumers harbored similar doubts. Rumors circulated that cold-storage products caused cancer and appendicitis.¹¹ Even early-twentieth-century Americans objected to refrigeration in certain forms, even though they had been buying iceboxes for decades, supporting a thriving New England ice-harvesting industry.¹² In fact, peoples throughout the non-tropical world had long used cold to preserve food at home, whether that meant putting it in a well, a root cellar, or a snow bank.¹³ So why did cold-preserved foods in the market encounter such opposition? I will argue that the most common concern was not the safety of either the technology itself (though early mechanical refrigeration was prone to explosions, gas leaks, and ruinous temperature variations) or the food it touched (though this, too, was sometimes questionable).¹⁴ Rather, the root problem was *who* controlled both the technology and the food, and the scale and scope of their control.

This was an era when people worried about the expanding scope and scale of many kinds of economic enterprise, especially if it threatened their own

⁸ Charles Tellier, *Communication aux Actionnaires de la Société Fondatrice pour la Conservation de la Viande Fraîche par le Froid* (Paris: E. Donnaud, 1877); and *Histoire d'une Invention Moderne: Le Frigorifique* (Paris: C. Delagrave, 1910).

⁹ "La Crise Alimentaire et l'Industrie Frigorifique," *Journal du Syndicat de la Boucherie de Paris* 17 Mar. (1912): 1; James Critchell and Joseph Raymond, *A History of the Frozen Meat Trade* (London: Constable and Company, 1912); Kyri Claffin, "Culture, Politics and Modernization in Paris Provisioning, 1880–1920," Ph.D. diss., History, Boston University, 2006.

¹⁰ Guy Chemla, *Les Ventres de Paris: les Halles, la Villette, Rungis: l'Histoire du Plus Grand Marché du Monde* (Grenoble: Glenat, 1994), 213, n. 146.

¹¹ "Refrigeration Abroad," *Ice and Refrigeration* 26 (1904): 244.

¹² Richard Osborn Cummings, *The American Ice Harvests: A Historical Study in Technology, 1800–1918* (Berkeley: University of California Press, 1949).

¹³ Shepard, *Pickled, Potted, and Canned*; C. Anne Wilson, *Waste Not, Want Not: Food Preservation from Early Times to the Present Day* (Edinburgh: Edinburgh University Press, 1991).

¹⁴ Although early refrigeration endangered food safety when it malfunctioned or was improperly operated, it appears the more common "turning points" came before and after food went into refrigeration. Food that went into cold storage was often already past its prime, and then when it came out neither retailers nor their customers had any place to keep it cool. Oscar Anderson, *Refrigeration in America* (Princeton, N.J.: Princeton University Press, 1953), 31–32.

livelihoods.¹⁵ But again, popular opposition to refrigeration—and in particular, to commercial cold storage—was rather more complicated. It did not simply reflect generalized concerns about the corporations that increasingly controlled local markets, but also resistance to the market's conquest of a vital food quality. "Vital" here means both *containing* biological life (and thus subject to ripening and decay) and *crucial* to certain aspects of human life, social as well as physiological. These days we consider fresh foods vital to a healthy life insofar as they contain nutrients, fiber, and minimal "empty" calories. So we consider them worth eating every day and almost everywhere, whether in the form of a home-prepared family meal or, increasingly, a solitary on-the-road snack.¹⁶

In the days before scientific nutrition and germ theory, the perceived healthfulness of fresh foods depended much more on context; consumed out of season or out of place, they might sicken or even kill. Somewhat paradoxically, however, fresh foods' seasonal and unstable nature also made them vital to the social life of many pre-industrial peoples, whether they fished in the Pacific Northwest, farmed in middle Europe, or hunted in the Kalahari.¹⁷ One could say that the very ephemerality of these foods helped societies endure. Seasonal feasts celebrated more than good harvests and hunts, and nourished more than the bodies of the feasters. As forms of redistribution, they recognized and reinforced patron-client relations.¹⁸ Perishability also strengthened the bonds of kin and community, for it imposed temporal rhythms and geographic boundaries on food exchange in as well as beyond the market. People had to come together regularly both to share meals and to buy and sell the ingredients.¹⁹

The sociability of marketplace exchange, in particular, was not just mandated but also mediated by food's seasonality and perishability. A large anthropological literature shows how fresh produce traders across the world have

¹⁵ Robert H. Wiebe, *The Search for Order, 1877–1920* (New York: Hill and Wang, 1967).

¹⁶ Mobile "fresh" snacks account for one of the fastest growing segments of the contemporary food industry. Jon Mooallem, "Twelve Easy Pieces," *New York Times Magazine*, 12 Feb. 2006.

¹⁷ The archaeological and anthropological literature on feasting suggests that meat, fish, and some tubers count among the perishable foods most central to celebratory meals, but Lévi-Strauss also discusses the significance of serving salad at wedding ceremonies in some parts of rural France. Claude Lévi-Strauss, *Le Cru et le Cuit* (Paris: Plon 1964), 340–42.

¹⁸ Pauline Wilson Wiessner and Wulf Schiefelhövel, *Food and the Status Quest: An Interdisciplinary Perspective* (Providence: Berghahn Books, 1996).

¹⁹ Such customs frustrated the late-nineteenth-century American ice industry's efforts to drum up business in southern Europe. In 1892, the industry's main trade journal, *Ice and Refrigeration*, surveyed American consuls about the food preservation habits in their host cities. One reported from the south of France, "in the great cities of Marseilles and Bordeaux butchering is done every day in winter and twice a day in summer, and the meat is cooked within a few hours after killing. . . . The mass of the population use no ice, but purchase their supplies of food twice a day, consuming the total purchase at once, making no effort to preserve anything." And from Genoa: "Economy is practiced here to such an extent that fully ninety-seven families out of every one hundred purchase only sufficient food for daily wants. Nothing remains over for the morrow—not even bread or vegetables" ("Ice in Europe," *Ice and Refrigeration* 3 (1892): 359–62).

traditionally coped with the volatile and unpredictable nature of their goods by cultivating the trust and loyalty of both suppliers and customers.²⁰ Less well-documented is how perishability has shaped relations between trader and traded as much as between seller and buyer. These two kinds of relationships are intimately linked. In other words, to the extent that a foodstuff's natural perishability limits farmers' and merchants' ability to wait or search for more lucrative markets, it also limits their bargaining power vis-à-vis customers. For the consumer, this check on the seller's power historically provided some assurance of a fair price for the expected quality, quality that depended at least partly on the product's freshness. When consumers could not immediately confirm this quality by sight or smell (as in the case of eggs) they had to trust the seller. But again, the seller of such perishable foods would likely be local or at least familiar,²¹ and would not want to spoil a reputation by selling spoiled goods.

These generalizations about "traditional" market relations do not imply that such relations assured either food quality or transparent trade in any general way. On the contrary, in the mid-to-late nineteenth century—the period preceding refrigeration's spread, and thus the reference point for consumer nostalgia—the industrialized world's urban food supplies suffered from rampant adulteration, fraud, filth, and spoilage.²² The point here is that refrigeration profoundly threatened the norms, practices and social relationships making up the moral economy of the perishable marketplace.²³ The inventor Charles Tellier died in poverty not because he overestimated refrigeration's revolutionary potential, but rather the reverse. Its very capacity to "slow down time's destructive work," as he put it, gave those who controlled the technology greater power over both their goods and their clients.

The first to realize refrigeration's potential were the Chicago meatpackers. Led by the ambitious Gustavus Swift, they invested in its development and transcontinental dissemination, building some of the world's first modern

²⁰ Gracia Clark, *Onions Are My Husband: Survival and Accumulation by West African Market Women* (Chicago: University of Chicago Press, 1994); Sidney Mintz, "Men, Women and Trade," *Comparative Studies in Society and History* 13 (1971): 247–69; Michelle De la Pradelle, *Market Day in Provence* (Chicago: University of Chicago Press, 2006); Nancy Horn, *Cultivating Customers: Marketwomen in Harare, Zimbabwe* (Boulder: Lynne Rienner, 1994); R. J. Bromley, "Marketplace Trade in Latin America," *Latin American Research Review* 9 (1974): 3–38.

²¹ M. A. Jull et al., "The Poultry Industry," in United States Department of Agriculture, *Yearbook of the Department of Agriculture* (Washington, D.C.: G.P.O., 1925), 377–456.

²² E. J. T. Collins, "Food Adulteration and Food Safety in Britain in the 19th and Early 20th Centuries," *Food Policy* (1993): 95–109; Frederick Filby, *A History of Food Adulteration and Analysis* (London: George Allen and Unwin, 1934); Arthur Hassall, *Adulterations Detected; or, Plain Instructions for the Discovery of Frauds in Food and Medicine* (London: Longman Brown Green Longmans and Roberts, 1857). Jean-Paul Aron, *Essai sur la Sensibilité Alimentaire à Paris au 19e Siècle* (Paris: Librairie A. Colin, 1967); John Burnett, *Plenty and Want*.

²³ E. P. Thompson, "The Moral Economy Reviewed," in E. P. Thompson, ed., *Customs in Common* (New York: New Press, 1991), 259–352.

corporations.²⁴ Their chilled slaughterhouses and railcars enabled them to produce and ship what was then known as “dead meat” on an unprecedented scale, and with unparalleled efficiency. Quickly conquering markets once supplied by live-cattle shippers and local butchers, they soon diversified beyond meat. Armour, for example, became one of the United States’ biggest fruit packers, and later one of its biggest vegetable shippers. They were also major dealers in butter and eggs.²⁵

Yet refrigeration could not do everything for the packers. While it helped change popular ideas about what fresh meat should look like and where it could come from, it provided little shelter against the accusations of the anti-trust and pure-food campaigners.²⁶ These accusations proliferated in the early years of the twentieth century, and they were not directed only at the meat-packers and their meat. In some ways, cold-storage eggs became even more controversial commodities. They set off debates that were nominally about laws and labels, yet fundamentally about the meaning of freshness, and about who could be trusted to protect it. Both the debates themselves and their ultimate resolution provide new insights into what went into the creation of a perennially fresh food supply.

THE SPRING CROP

These days few people realize that the egg was once a seasonal crop. Acutely sensitive to changes in daylight and temperature, hens (at least those in the world’s non-tropical zones) laid most of their eggs during the springtime. Egg quality as well as quantity dropped off in the summer as hens rested and molted. “Broody” hen varieties stopped laying altogether, instead seeking to sit on the eggs they had already laid. Except for the rare “everlasting layers”—varieties who could lay through the winter if well-fed and

²⁴ On the meatpackers’ use of refrigeration in the conquest of national and then international markets, see William Cronon, *Nature’s Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1991); S. Giedion, *Mechanization Takes Command: A Contribution to Anonymous History* (New York: Norton, 1969); Mary Yeager Kujovich, “The Refrigerator Car and the Growth of the American Dressed Beef Industry,” *Business History Review* 46 (1970): 460–82; Alfred Dupont Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass.: Harvard University Press, 1977). Autobiographical and biographical sources include: J. Ogden Armour, *The Packers, the Private Car Lines and the People* (Philadelphia: Henry Altemus, 1906); and Louis Franklin Swift, *The Yankee of the Yards: The Biography of Gustavus Franklin Swift* (Chicago: A. W. Shaw, 1927).

²⁵ Kujovich, *The Refrigerator Car*; Armour, *The Packer*; Helen B. Lamb, “Industrial Relations in the Western Lettuce Industry,” Ph.D. diss. Harvard University, 1942. Steven Stoll, *The Fruits of Natural Advantage: Making the Industrial Countryside in California* (Berkeley: University of California Press, 1998).

²⁶ Charles Edward Russell, *The Greatest Trust in the World* (New York: Ridgway-Thayer, 1905). Lorine Swainston Goodwin, *The Pure Food, Drink, and Drug Crusaders, 1879–1914* (Jefferson, N.C.: McFarland, 1999); J. H. Young, *Pure Food: Securing the Federal Food and Drugs Act of 1906* (Princeton: Princeton University Press, 1989).

housed²⁷—most hens' output picked up again only in late winter, when their pituitary glands produced more of the hormones needed for egg maturation.

This seasonality made perfect evolutionary sense, because chicks hatched in fall or winter were least likely to survive. Culturally, the reappearance of eggs in a hen's nest signaled "as surely as buds swelling on trees" that winter would soon end.²⁸ It also marked the beginning of a season when people celebrated Easter and other spring holidays by eating, painting, rolling, and otherwise reveling in eggs. Not only did they symbolize rebirth and fertility; eggs were also "sweeter" and far more abundant than they would be any other time of the year. In the mid-nineteenth century, for example, New York City received seventy-two times more eggs in May than it did in January.²⁹ Prices varied accordingly, and, depending on the month and region, off-season eggs might easily cost three times as much as spring eggs.³⁰

In North America as in much of the egg-eating world, newly laid eggs were a rare luxury during the fall and winter. Yet rather than give up eggs altogether during those seasons, people found ways to store them. Not to be confused with *preserved* eggs (i.e., the pickled kind found in English pubs, or China's "ancient" salt-preserved varieties), home-stored eggs were by some accounts "just as good" as fresh, even after two years. The basic objective was to seal the shell and thus protect the egg against dehydration (which leads to shrinkage and staleness) and bacterial and fungal invasion (which leads to full-on spoilage). One of the most common preservation mediums was a sodium silicate solution known as "glass-water."³¹ Coating them with varnish or butter and then burying them in barrels of salt, bran, or oats also did the trick.³² For just a few weeks of storage, *The Book of Poultry* recommended putting eggs "in a cool but not very cold place—about 50 to 60 degrees is best—and with the large end down."³³

Because eggs were both seasonal and storable, they became long-distance trade commodities long before the advent of refrigeration. By the 1840s, when England became a major importer of eggs from Ireland and France,

²⁷ Daniel J. Browne, *The American Poultry Yard* (New York: C. M. Saxton, 1850). The silver and golden Hamburgs were among the "everlasting layers."

²⁸ Page Smith and Charles Daniel, *The Chicken Book* (Boston: Little, Brown and Co., 1975), 176.

²⁹ January receipts accounted for .25 percent of the annual total, whereas May receipts accounted for 18 percent. M. A. Jull et al., "The Poultry Industry," 377–456, quote pp. 385–86.

³⁰ Even in the 1920s, prices varied dramatically between seasons. New York City wholesale prices for a dozen white eggs ranged from \$.36 in April to \$.83 in November (*ibid.*, 404).

³¹ William V. Cruess, *Home and Farm Food Preservation* (New York: Macmillan, 1918), 149; Dora Morrell Hughes, *Thrifty in the Household* (Boston: Lothrop, Lee and Shepard, 1918), 82–86.

³² Alvin Wood Chase, *Dr. Chase's Receipt Book* (Detroit: F. B. Dickerson Company, 1891). See also Harry R. Lewis, *Productive Farm Poultry* (Philadelphia: J. B. Lipincott, 1919), 441. The search for techniques to keep eggs "as good as" fresh was not limited to the United States. For example, "Assurez La Conservation Parfaite Des Oeufs," *Vie à la Campagne* 12 (1911): 283.

³³ Lewis Wright, *The Book of Poultry* (London: Cassell and Co, 1902), 46.

China's coastal egg trade was centuries old.³⁴ In the United States, however, most egg marketing was local and small-scale. Even in the early years of the twentieth century, an estimated 90 percent of eggs came from family farms. "The flocks usually consist of 100–300 fowls which range freely," said one report, "little attention is paid to feeding. . . . The work connected with the fowls is done by women and children, and poultry is usually regarded as a source of pin money for the housewife. Marketing of eggs is through the general store or the traveling huckster."³⁵

At the same time, however, expanding rail networks encouraged regional and local specialization. Chicken-rich counties in Illinois and Ohio competed with New Jersey and Long Island egg producers for shares of the New York market. In temperate central California, Petaluma became "the egg basket of the world," and one of the state's richest towns in the early twentieth century (see Figure 1).³⁶ Millions of its eggs traveled to New York, as well as to western cities from Los Angeles to Fairbanks.³⁷

In all these cities, most of the eggs arrived in springtime, and many went into storage. The first refrigerated warehouses were built in the 1860s. Chilled by ice and insulated with sawdust, they served primarily to store fruit, which did not require particularly cold temperatures. But as demand for perishables increased, cold storage became an industry in its own right. Temperature control improved with better insulation, and then in the 1890s with the gradual replacement of ice by mechanical refrigeration.³⁸

By 1904, the United States had more than six hundred cold-storage warehouses, most of them urban and many of them several stories tall. With a combined capacity of more than 102 million cubic feet, they held staggering quantities of food. Boston's Quincy Market Cold Storage Company had room for 150 million eggs at a time.³⁹ In addition, meat-packers, breweries, dairies, and fruit wholesalers were quickly building millions more cubic feet of refrigerated storage space, also mostly in urban areas. No other country—not even import-dependent Britain—had comparable facilities.⁴⁰ European refrigeration engineers marveled at the

³⁴ Smith and Daniel, *The Chicken Book*, 35; Jull et al., "The Poultry Industry," 268.

³⁵ J. H. Barber, general manager, Poultry Producers of Central California, quoted in Donald Bell, "Forces that Have Helped Shape the US Egg Industry," *Poultry Tribune*, Sept. (1995): 30–43, quote p. 31.

³⁶ Petaluma Chamber of Commerce, *Petaluma, Sonoma County, California: The Largest Poultry Center in the World* (Petaluma: City of Petaluma, 1916), 11; Harry R. Lewis, *Productive Poultry Husbandry* (Philadelphia: J. B. Lipincott, 1919), 11; Kenneth Kahn, *Comrades and Chicken Farmers: The Story of a California Jewish Community* (Ithaca, N.Y.: Cornell, 1993).

³⁷ Smith and Daniel, *The Chicken Book*, 252–53.

³⁸ Anderson, *Refrigeration in America*, 46–47; Mary Pennington, "Fifty Years of Refrigeration in the Egg and Poultry Industry," *Ice and Refrigeration* 101 (1941): 43–48.

³⁹ "Advertising Cold Storage," *Ice and Refrigeration* 73 (1927): 347–49.

⁴⁰ "Ice in Europe."



FIGURE 1 A Petaluma chicken farm, ca. 1910, photographer unknown. Courtesy of the Petaluma Historical Society.

speed with which the United States had built a nationwide network of “industrial cold,” and at the variety of fresh, seasonal foods stored and sold year-round in East Coast cities.⁴¹

COLD STORAGE CONTROVERSIES

What we are interested in when we buy eggs is whether they are good or not, and if it is a good egg its past history should be of no importance.

—O. C. Mackay, President, Cold Storage Division of the American Warehousemen’s Association, 1930⁴²

The American people did not share the foreign engineers’ enthusiasm for industrial cold. This was despite the fact that many of them owned kitchen iceboxes, and patronized grocers, butchers, and fishmongers who also used ice. Indeed, in their appetite for ice, Americans had long ago established

⁴¹ L. Houllevigue, “Causerie scientifique: le congrès du froid,” *Journal du Syndicat de la Boucherie de Paris* (1912): 2.

⁴² Radio address, quoted in W. M. O’Keefe, “Cold Storage Division A.W.A.,” *Ice and Refrigeration* 78 (1930): 513–15.

themselves as the “first refrigerated nation.”⁴³ But the warehouses were different. Not only did they store fresh food for much longer periods than domestic iceboxes—perhaps longer than it was *meant* to be stored—they also gave middlemen unprecedented control over the supply, price, and quality of that food. These were distinct concerns, but often conflated.

People had good reason to doubt early cold storage, simply because it often did not work very well. Ice-chilled warehouses were difficult to keep at a stable temperature and humidity. They also lacked adequate air circulation, so goods might freeze in one corner and spoil in another.⁴⁴ While mechanical refrigeration facilitated temperature control, many merchants and warehousemen did not know which temperatures to use for different foodstuffs. Nor did they know how to keep them from developing a telltale “storage taste.” Merchants bore the cost of obviously spoiled food, such as moldy meat, but sometimes they just marked down prices. At Boston’s Quincy Market in 1900, egg dealers had to discount stocks found to have a “fruity flavor,” most likely absorbed from apples in the next chamber. They reassured shoppers that this was “not a novel occurrence” and that the eggs were still fine for cooking.⁴⁵ The storage goods that sowed the most distrust, however, were those that consumers discovered were *not* fine only after they bought them, such as rotten eggs, mushy fruit, and frozen beef that spoiled as it thawed. Stories of these unfortunate purchases circulated long after refrigeration as a technology had greatly improved.

So did theories about the health dangers of cold storage. Early on, they focused on refrigerated beef, which was alternately accused of causing cholera, cancer, and appendicitis.⁴⁶ Again, the newness of the technology meant that experts did not really know what happened to food that spent months under its influence. They contributed to the kind of hearsay that one letter writer to the *New York Times* reported in 1906: “The writer has just returned from a seaside resort, where he found among the visitors as well as the residents annoying illness was the rule rather than the exception . . . the two physicians I consulted expressed the opinion that while weather conditions were responsible for some of these troubles, they thought cold storage, artificially preserved, and low-grade articles of food were responsible for their share of it. This bears out the opinion of the writer. . . .”⁴⁷

In 1906, shortly after the passage of the Pure Food and Drug Act, the Department of Agriculture’s Food Chemistry Bureau undertook one of the first systematic epidemiological investigations of cold-stored foodstuffs. The findings were mixed. Dr. Harvey Wiley, the Bureau’s chief and a self-proclaimed

⁴³ Gavin Weightman, *The Frozen Water Trade* (New York: Hyperion, 2003), 12.

⁴⁴ Anderson, *Refrigeration in America*, 70.

⁴⁵ “Eggs Have Fruity Flavor: Forty Thousand in Boston Found to Have a Novel Taste,” *New York Times*, 31 Aug. 1900: 1.

⁴⁶ No title, *Ice and Refrigeration* 6 (1894): 112; “Refrigeration Abroad.”

⁴⁷ “Danger of Eating Cold Storage Food” (letter), *New York Times*, 4 Aug. 1906.

champion of cold storage, reported that some foods, namely meat and fruit, actually benefited from up to three months in a warehouse. Milk, cream, and eggs, on the other hand, all deteriorated “immediately” in storage.⁴⁸ A few years later expert opinion shifted. A Massachusetts study declared that properly stored foods, including eggs, were perfectly safe and wholesome, and could stay that way for nine months or longer. The *Journal of the American Medical Association* agreed: “the charge that cold storage in general is detrimental to public health is refuted by an impartial examination of this subject in hygienic aspects.”⁴⁹

But what happened when intermediaries used cold storage to hide *improper* trade practices? Here the public had more reason to worry. In the early years, merchants routinely stored goods that were already going bad, such as meat or fish that had spent all day in an exposed market stall. Cases of eggs went directly from the railcar to the warehouse without candling to check for rot or staleness.⁵⁰ Then retailers retrieved them in the “blind faith,” as one Department of Agriculture report put it, “that some magic property of cold storage had made good eggs of all the bad eggs, or else accepted the situation as one for which they were not responsible and which they could not remedy.”⁵¹ Warehousemen indirectly encouraged these practices by offering easy credit to their clients and asking few questions.⁵²

In other words, cold storage was easy to use, and to abuse. In retail markets where neither shopkeepers nor their customers could assess freshness according to traditional measures (i.e., according to the season and the reputation of the farmer) cold storage itself took the blame. As a result, off-season eggs marketed as “freshly laid” continued to command a significant premium—say, 50 cents a dozen versus 35, at the height of winter. Many dealers, perversely, contributed to the poor image of cold-storage eggs by candling their own stocks, selling the best as “freshly laid” (and thus at the higher price), and leaving only the worst ones to bear the “storage” label.⁵³ Not surprisingly, experts warned against serving these eggs *as* eggs: “Of course I shouldn’t

⁴⁸ “Cold Storage Meats Good Three Months,” *New York Times*, 30 Jan. 1907.

⁴⁹ Quoted in anon., “Cold Storage Prejudice Declining,” *Ice and Refrigeration* 43 (1912): 56–57. Massachusetts Commission on Cold Storage of Food, *Report of the Commission to Investigate the Subject of the Cold Storage of Food and of Food Products Kept in Cold Storage* (Boston: Wright and Potter, 1912).

⁵⁰ As the name implies, candling simply means holding an egg up to a bright light, in order to detect the volume and viscosity of its contents. The less fresh the egg, the more watery the white is, and the larger the airspace.

⁵¹ I. C. Franklin, “The Service of Cold Storage in the Conservation of Foodstuffs,” in, United States Department of Agriculture, *Yearbook of the Department of Agriculture* 1917, 363–69, quote p. 366.

⁵² Anon., “Cold Storage Legislation,” *Ice and Refrigeration* 39 (1910): 51–53.

⁵³ “The Senate Committee Hearings,” *Ice and Refrigeration* 38 (1910): 385–87.

think of trying to boil or even scramble them,” wrote one *Good Housekeeping* columnist, “But they help out in cooking.”⁵⁴

In order to improve their industry’s image, warehousemen eventually began to set basic standards, such as requiring that eggs be candled before storage. However, these efforts at quality control did not appease those who believed that the very practice of large-scale, long-term food storage reeked of unscrupulous speculation (see Figure 2). There was no question that dealers bought millions of spring eggs in order to sell them at a profit several months later. But did this constitute hoarding? Did it drive up overall prices? Cold-storage proponents contended that, on the contrary, it made off-season eggs much more affordable. By reducing the likelihood of ruinous spring gluts, they said, cold storage also encouraged farmers to produce more eggs, thus increasing overall supply.⁵⁵

This argument looked tenuous when, for one reason or another, egg prices climbed. It did not help when newspapers reported that members of the “beef trust”—the meatpackers Armour, Swift, and Morris—stored millions of eggs in Chicago and other Midwestern cities. The first such reports appeared in 1902, and suggested that the meatpackers’ eggs stocks foretold a giant “food combine.”⁵⁶ Within a few years the press routinely referred to “the egg trust,” but noted that early springs and winter warm spells—which brought on unexpected egg laying—could undermine its speculative profits. “The Hen as a Trust-Buster,” ran one headline in spring 1905. “Hens Happy—Smashed Egg Trust’s Shell Game,” said another in January 1906.⁵⁷

When prices began to rise rapidly in 1909, talk of a refrigerated “food trust” once again filled the press. No one seemed quite sure who belonged to this trust or how much food they controlled, partly because companies did not have to report storage volumes. The mountains of perishables going into public cold-storage houses did indicate that the meatpackers were not the only suspects. Refrigeration’s role in this trust appeared obvious.⁵⁸ As a *Washington Post*

⁵⁴ Miriam Dexter, “The Housekeeping Club,” *Good Housekeeping* n.v. (1910): 263–67.

⁵⁵ See, for example, Mary Pennington, “Better Food for the Masses,” *Ice and Refrigeration* 75 (1928): 33–35. Egg production did increase from approximately 450 million dozen in 1880 to 1.9 billion in 1907. S. S. Van der Vaart, “Growth and Present Status of the Refrigerating Industry in the United States,” In R. J. de Loverdo, ed., *Premier Congrès International du Froid*, vol. 3 (Paris: Secrétariat Général de l’Association Internationale du Froid, 1908), 299–327, quote p. 341.

⁵⁶ “Got’em in the Ice Box,” *Los Angeles Times*, 23 Apr. 1902: 5; “Ruined by Trust,” *Boston Daily Globe*, 24 Apr. 1902: 1; “Corner in Eggs,” *Hartford Courant*, 19 Apr. 1902: 1; “Food Combine May Come,” *New York Times*, 18 Apr. 1902: 1.

⁵⁷ “The Hen as a Trust Buster,” *Los Angeles Times*, 7 May 1905: 114. “Hens Happy,” *Boston Daily Globe*, 20 Jan. 1906: 1.

⁵⁸ These warehouses were usually privately owned, but open for public use (unlike the meatpackers’ stores). Most cold-storage companies were relatively small and their ownership distributed among stockholders. Boston’s Quincy Market, for example, had 228 stockholders in 1910. These companies also typically did not own the goods they stored; they belonged to a wide range of wholesalers, some bigger than others. For these reasons, all state and federal investigations into



FIGURE 2 “A double hold-up—good guns in bad hands,” by Udo Keppler. Published in *Puck Magazine*, 20 May 1910. Library of Congress Prints and Photographs Division, Washington, D.C.

letter writer, signed “Householder,” put it in 1909, “I see editorials now and then commenting on the high prices of food . . . the explanation, however, is very simple. It is not because food is scarce. It is because there is a food trust . . . I don’t think it is an organized concern, but to all intents and purposes, it might as well be. I understand that in our own markets, right here in town, the dealers get together and decide on prices before they open their stalls. Cold storage is responsible for the prices they charge. . . . They have thousands and thousands of eggs, but keep them in the refrigerator, in order to keep prices high.”⁵⁹

Soon politicians and Progressive reformers called for government action. The Chicago city council had voted down one of the first attempts at cold-storage regulation in 1906, after “energetic” opposition from warehousemen and their customers.⁶⁰ From 1909 onwards, several other cities and states introduced their own cold-storage bills. Most of these bills proposed to limit legal storage time to anywhere from one month to one year. Most called also for warehouse licensing and inspections, and the mandatory labeling of all cold-stored foods.⁶¹ In New Jersey, the push for legislation began with a price-fixing

a possible ‘cold storage monopoly’ concluded that it did not exist. Massachusetts Commission on Cold Storage of Food, *Report of the Commission to Investigate the Subject of the Cold Storage of Food and of Food Products Kept in Cold Storage* (Boston, 1912), 94–96; Anderson, *Refrigeration in America*, 134.

⁵⁹ “A Trust in Food?” *Washington Post*, 11 Dec 1909: 61.

⁶⁰ Anon., “The Cold Storage Ordinance,” *Ice and Refrigeration* 31 (1906): 8.

⁶¹ Anderson, *Refrigeration in America*, 138.

investigation. In 1910, a grand jury indicted six companies (including the meat-packers Armour and Swift) “for conspiring to increase the price of foodstuffs.” The jury did not buy the argument about how cold storage evened out scarcity and glut, instead noting, “When eggs were plentiful they were cornered and kept from the market at times when it was natural that they should be cheap.”⁶²

In turn, warehousemen blamed the press for turning cold storage into populist politicians’ favorite cause. Editorials in *Ice and Refrigeration*, the industry trade journal, expressed a mix of anger and bewilderment. “A consideration of the agitation which has led to the legislation, discloses a curious condition of the public mind. It has the symptoms of an unreal nervous and mental disease. . . . It is not based upon knowledge, fact, or investigation, and has no sponsors nor advocates except the sensational newspapers and the politicians who are looking for an issue.”⁶³

Newspapers did in fact run inflammatory headlines about what the *New York World* called “storage horrors.” Tapping into two reliable sources of reader outrage, they suggested that consumers were being simultaneously poisoned and cheated: “Thousands of Tons of Food Unfit to Eat Foisted on Public by Freezer Owners,” raged one headline. “Bad Eggs, Poisoned Poultry, Deadly Fish, Unwholesome Butter, and Decaying Vegetables Kept to Get Benefit of High Prices,” said another. The press also fueled suspicions of speculative hoarding by publishing figures on the quantity of warehoused provisions that, as the *New York Evening Mail* claimed in January 1910, could “feed the population of the United States for a month.” These reported reserves included the meat of 14 million cattle, 25 million dollars worth of fish, and more than 100 million dollars worth of other perishables—including, no doubt, lots of eggs.⁶⁴

Ice and Refrigeration urged its readers to combat these charges with more positive publicity. Informative advertising and recipe booklets, argued one columnist, would help calm the “agitation” of consumers who “do not understand the function of a cold storage warehouse, and do not understand anything but the simple fact that here is a big building . . . containing food that they want to get hold of.”⁶⁵ In Chicago, city officials and reporters were invited to a luncheon featuring exclusively cold-storage ingredients. The *Chicago Tribune* announced the event with the headline “TO DINE ON EMBALMED FOOD.”⁶⁶

⁶² “Got’em in the Ice Box.”

⁶³ Frank A. Horne, “Legislation Affecting Cold Storage and Cold Stored Products,” *Ice and Refrigeration* 41 (1911): 180–83, quote p. 180.

⁶⁴ Quoted in anon., “Anti Cold Storage Agitation,” *Ice and Refrigeration* 38 (1910): 104–6.

⁶⁵ Thomas A. Bird, “The Ice Man as an Advertiser,” *Ice and Refrigeration* 38 (1910): 144–45, quote p. 14.

⁶⁶ “To Dine on Embalmed Food: Produce Merchants Invite City Officials to Cold Storage Meal,” *Chicago Daily Tribune*, 27 Sept. 1911.

The warehousemen and their major clients also stepped up their lobbying at the federal level, where a bill reached the Senate in 1910. The bill was the product of an investigation into the high cost of living led by the Massachusetts Senator Henry Cabot Lodge. Here, as in the press, questions of fairness and freshness were rarely far apart. In hearings held by the Committee on Manufactures, meatpackers reported on how cold storage affected meat pricing, and USDA chemists on how it affected meat texture and taste.⁶⁷ Physicians discussed digestibility, and lawyers brought lists of consumers who went on record to say they liked eating cold-storage foods.⁶⁸

Among those testifying in favor of cold storage was Dr. Mary Pennington, the director of the USDA's Food Research Laboratory and a woman once called the "voice of conscience in the refrigeration world."⁶⁹ She was also one of the Western world's foremost authorities on chicken and egg hygiene. Like many refrigeration advocates, she blamed the bad image of cold-storage goods—especially eggs—on ideas leftover from the days when, "the nearby farm was the source of supply and when 'freshness' was measured by the number of hours that elapsed between the gathering of the produce and its delivery to the consumer. The fewer the hours, then, the better the goods, because the farmer had no facilities for preventing decay . . . Because the consumer has insisted that he must have produce 'right fresh from the country' the vendor has imposed upon his ignorance by pretending to give it to him."⁷⁰

If consumers and congressmen wanted honest trade, in other words, they had to accept that refrigeration had altered the physics of freshness; no longer did it depend on time or distance. Whether or not the senators agreed with this view, it ultimately convinced them that setting time limits on the cold storage of an entire nation's food supply was just too complicated. After months of hearings, the bill died in committee.

More local initiatives were just heating up, however. Contrary to Pennington's characterizations of "the consumer," the women who organized the city-wide egg sales in 1912 had no illusions about getting fresh-laid eggs in December. And they had no qualms about advertising their stocks as "fine Aprils."⁷¹ Their gripe lay with the speculators who restricted the supply of

⁶⁷ "The Senate Committee Hearings," *Ice and Refrigeration* 38 (1910): 385–87; "The Hearings on Senate Bill 136," *Ice and Refrigeration* 41 (1911): 1–11.

⁶⁸ Hearings 9 June 1910, quoted in "The Hearings on Senate Bill 136."

⁶⁹ Barbara Heggie, "Ice Woman: Dr. Mary Engle Pennington," *New Yorker* 17 (1941): 23–24. For further biographical information on Pennington, see Rima Apple, "Science Gendered: Nutrition in the United States, 1840–1940," in H. Kamminga and A. Cunningham, *The Science and Culture of Nutrition, 1840–1940* (Atlanta: Rodopi, 1995), 129–54.

⁷⁰ Mary Pennington, "Relation of Cold Storage to the Food Supply and the Consumer," *Annals of the American Academy of Political and Social Science* 48 (1913): 154–63, quote pp. 154–55.

⁷¹ "Clubwomen and Cheap Egg Sale," *Chicago Tribune*, 16 Dec. 1912: 3.

such eggs, and the retailers who clearly profited from the pretense that they were fresh. As the leader of New York's Housewives' League explained, "The clerk tells [the housewife] he does not think she would like the storage eggs, and advises her to take fresh eggs. She pays 60 cents for the supposed fresh eggs, which in reality are storage eggs. Nine times out of ten when a woman believes she is getting fresh eggs she is getting storage eggs."⁷²

The women's egg sales succeeded in pushing prices down until spring, and encouraged politicians to push forward with legislation. By 1915, eleven states, including California, Indiana, New Jersey, and New York, had passed cold-storage acts. Combined with the easing of inflation and the outbreak of World War I, these laws helped ease, at least temporarily, popular opposition to cold storage.⁷³ As the Warehousemen's Association gratefully noted in 1915, "The intervention of foreign strife has given the press so much to write about . . . that cold storage topics have slept peacefully."⁷⁴

The new laws' labeling provisions, however, proved almost impossible to enforce in eggs, which were labeled by the case. It was still easy and tempting to switch eggs in and out of their cases and sell the best ones as "fresh" and the rest as "storage" eggs, a practice that became known as egg "bootlegging." By the mid-1920s, health officials estimated that some 75 percent of the nation's cold-storage stock had been bootlegged.⁷⁵ So it is not surprising that consumers doubted the quality of these eggs long after they stopped worrying about the use of cold storage as a speculative tool.

Consumers' doubts, and the resulting price differential, also persisted despite years of pro-cold-storage egg campaigning on the part of the warehouse and poultry industries, as well as the USDA. Educational pamphlets and movies, a demonstration railcar, cut-rate pricing, free omelets at public health expositions—none of these publicity efforts convinced consumers that nine-month-old storage eggs could taste, as Mary Pennington insisted, "not only good but really delectable."⁷⁶

To combat bootlegging, some states abolished their cold-storage labeling laws altogether, requiring that eggs be sold by grade instead.⁷⁷ Since grades rate eggs according to measurable quality indicators (including the size of the internal air cell), this policy shift neatly erased age as a measure of freshness. So too did the USDA's voluntary egg standards, adopted in 1925. At the same time, several states, under pressure from their own farmers'

⁷² "War of Housewives for Cheaper Food," *New York Times*, 16 Dec. 1912: 1.

⁷³ H. A. Haring, "Cold Storage Regulation," *Ice and Refrigeration* 68 (1925): 419–21.

⁷⁴ American Warehousemen's Association, *Proceedings of the 25th Annual Meeting of the American Warehousemen's Association* (New York, 1915), 235.

⁷⁵ O'Keefe, "Cold Storage Division."

⁷⁶ Dr. M. E. Pennington, "Address to National Convention of the United Master Butchers of America," *Ice and Refrigeration* 59 (1920): 98.

⁷⁷ "Doom of Cold-Storage Egg," *Business Week*, 21 Mar. 1936: 28.

organizations, continued to protect geographic measures of freshness. In Florida, for example, only Florida eggs could be sold as “fresh;” out-of-state eggs had to be labeled “shipped.” In the Northeast, state-of-origin labels (i.e., “New York Whites”) encouraged consumers to buy local eggs.⁷⁸ Ultimately, though, the most revolutionary changes in the meanings of egg freshness—changes that ironically helped to destroy both cold-storage and local egg trades—did not pass through any state house. The place of real foment was the henhouse.

FIXING THE CHICKEN

If the egg came first in the longer history of engineering seasonless freshness, ultimately it was the chicken whose nature had to change most.⁷⁹ Farmers had long recognized that seasonal shifts in temperature and daylight affected their hens’ eating, laying, and brooding habits. They also knew that they could modify these habits somewhat by giving them warm winter housing and richer feed. In the early years of the twentieth century, as urban demand for eggs increased, poultry scientists and a small but growing class of specialized poultry farmers undertook more systematic experiments. They sought to increase not simply overall egg production but also off-season laying. The first step was to suppress the hen’s maternal instinct. As Rutgers University poultry science professor Harold Lewis put it in 1913, “The hen is too valuable an egg machine to allow her to waste weeks and months in hatching eggs.”⁸⁰ Lewis advised farmers, “if a continuous heavy production is desired, it is necessary to break up the broody habit as soon as possible. . . . The best way . . . is to confine them from three to five days . . . in specially constructed coops with slatted bottoms, feeding them light rations of wheat, with plenty of water. . . . The desire to sit is thus more quickly discouraged.”⁸¹

Poultry breeding, previously a hobby that produced elegant and exotic show birds, increasingly focused on laying traits. Among breeds, the scrawny Leghorn excelled, thanks to a weak maternal instinct and strong metabolism. Leghorn hens regularly won the egg-laying contests that became popular around the turn of the century, and ads for Leghorn chicks emphasized that farmers, too, could be winners if they raised these seemingly winter-proofed birds. “Everlay” Brown Leghorns, for instance, were advertised as having “the winter-laying habit bred into them. You can own a flock of these Real Money Makers at small cost.”⁸²

⁷⁸ William Jasper, “Marketing,” in, O. A. Hanke, J. L. Skinner, and J. H. Florea, eds., *American Poultry History 1823–1873* (Madison, Wisc.: American Poultry Historical Society, 1974), 306–69, quote p. 312. “Getting Fresh with Our Fresh Eggs,” *Pacific Rural Press*, 29 Dec. 1934: 494.

⁷⁹ Histories of chickens and eggs include: Paul Mandeville, ed., *Eggs* (Chicago: Progress Publications, 1933); and Smith and Daniel, *The Chicken Book*.

⁸⁰ Quoted in Smith and Daniel, *The Chicken Book*, 29.

⁸¹ Lewis, *Productive Farm Poultry*, 274.

⁸² *Leghorn World*, Feb. (1931): 339.

The 1910s and 1920s also saw advances in avian nutrition. As with breeding, experts promoted scientific feeding as a means to increase egg production during the most profitable months of the year. Poultry manuals and magazines recommended formulas that would synchronize birds' life cycles with the egg market. A relatively sparse diet, for example, slowed down the maturation of chicks, so that they started and stopped laying later in the season. A few days of no food whatsoever "forced" an early molt, bringing hens back into full production before the springtime glut. And a rich, well-balanced winter diet—including buttermilk and leafy greens—encouraged them to lay throughout the cold months.⁸³ Not surprisingly, feed and chemical manufacturers soon offered convenient, vitamin-fortified alternatives to home-prepared rations. Products such as Quaker's Ful-O-Pep Egg Mash and Purina Poultry Chow specifically promised to boost laying during "high price time."⁸⁴

While careful breeding and feeding brought incremental improvements in off-season egg production, the most immediate results came at the flick of a switch—literally. Sometime around the end of the nineteenth century, at least a few chicken owners found that their hens saw no difference between sunlight and artificial light, supplied by the newly invented light bulb.⁸⁵ This meant that they could effectively be "tricked" into thinking that it was May—and thus time to lay—even in the dead of winter. Whether or not the authors of *The Chicken Book* are right in calling henhouse lighting the "single most important discovery in the history of the domesticated chicken," it certainly marked a turning point in the history of the egg.⁸⁶ One "early adopter" of electric lighting, a Cambridge, Massachusetts poultry farmer, reportedly described it as "the most definite control of production that we have. You can turn on a switch or turn it off."⁸⁷

⁸³ Ernest Cobb, *The Hen at Work: A Brief Manual of Home Poultry Culture* (New York: G. P. Putnam's Sons, 1919).

⁸⁴ E. I. Farrington, "How to Make Sure of Winter Eggs," *Country Life* 36 (1919): 82–86; Lewis, *Productive Poultry Husbandry*; Bell, "Forces that Have Helped Shape the US Egg Industry," 36. Other products that claimed to help winter egg production included Exadol, a poultry feed supplement, and The Gizzard Capsule, a de-worming pill (advertised in *American Poultry Journal* and *Leghorn World*).

⁸⁵ Spanish farmers may have made this discovery well before Edison's invention, according to Francisco Dieste's *Tratado Económico Dividido en Tres Discursos*, first published in 1781. As a 1936 article in *Nature* noted, the basic assumption in the eighteenth century, as in the twentieth, was that if hens received more light, they would eat more and thus lay more. "The keeper during winter would disturb the hens in their sleep, and make them go to the trough at which there should be lights or torches of wood or other material so that the birds could see the food. The hens grew accustomed within a week to eat at that hour, and 'come running as soon as they saw the light.'" John Randal Baker, "Increasing Winter Egg-Production in Spain More than a Hundred Years Ago," *Nature* 143 (1936): 477; Francisco Dieste y Buil, *Tratado económico dividido en tres discursos* (Madrid: Benito Cano, 1803).

⁸⁶ Smith and Daniel, *The Chicken Book*, 264.

⁸⁷ Frank Platt, "Poultry Keeping: An Art, a Science, an Industry," in Paul Mandeville, ed., *Eggs* (Chicago: Progress Publications, 1933), 135–36.

For farmers, control over the hen's laying cycle was invaluable, at least in principle. Especially as an egg glut sent high-season prices plummeting after World War I, off-season fresh eggs offered the salvation of surefire profits. Indeed, *Scientific American* in 1919 called the effects of lights on hens as "neither more nor less than a miracle." A letter-writer from Bemidji, Minnesota described what happened when he tried to warm up his barn with a 50 watt light bulb: "To our great astonishment our chickens began to lay eggs, and they have since literally turned night into day, cackling and behaving in liveliest fashion, and laying practically all their eggs in the night, sometimes 3 or 4 even after 10 p.m."⁸⁸

Despite such dramatic results, henhouse lights caught on slowly. This was partly because most farms had no electricity until the mid-1930s, and gas or kerosene lanterns posed too great a fire hazard. Fuel sources aside, many farmers must have been reluctant to tamper with their hens' sensitive cycles. As one 1926 article in *Leghorn World* warned, "Lighting, if it is properly used, is a most remarkable aid in increasing the egg production at the time when eggs are most valuable. It must be remembered, however, that slight mistakes . . . may have disastrous effects as birds are under more or less artificial conditions. When lights are used they must be used regularly. It is not at all practical to turn on the lights for two or three weeks and then suddenly change . . . it was found that discontinuing the use of lights suddenly dropped the egg production from about 30 percent to almost zero over two weeks. . . ."⁸⁹ Some farmers also reported cases of hen exhaustion. "The vitality of the hens in the Northwest has been greatly reduced through forcing the birds to commence laying in the early fall," *The Hen Coop* wrote in 1922, "A bird cannot be kept off her perch from 4 am until 9 am without showing the effect of the daily grind for eggs."⁹⁰ So it was reasonable to think that too much artificial light would be akin to killing the goose that laid the golden egg.

Such fears seemed to fade by the end of the 1920s. Writing in *Poultry World*, Mrs. George Simmons argued that lights for laying hens were indisputably profitable, and would not "deplete their body resources" if farmers simply managed their henhouses as attentively as industrialists did their factories. This essentially meant assuring that the hens had ample food and water for their "overtime" hours. Plus, she noted, once the farm's hens had electricity, so could the home: "it is a heartening thing to know that not only this kind of increase in profits can be ours, but we farm women who have longed for city electrical conveniences can have them as a literal by-product of needed and sensible equipment for our flocks."⁹¹

⁸⁸ Anon., "Electric Light and Egg Production," *Scientific American* 120 (1919): 272.

⁸⁹ Y. P. Bhosale, "How to Secure More Eggs in Winter," *Leghorn World* 11 (1926): 53.

⁹⁰ Anon., "Interest in Forced Egg Production Waning," *The Hen Coop* 6 (1922): 1.

⁹¹ Mrs. George B. Simmons, "Lights for Layers," *Leghorn World* 14 (1929): 56–59.

Additional support came from the Ohio Agricultural Experiment Station, where studies suggested that if a little extra light was good, more was better. In particular, they showed that all-night light, long considered “out of the question,” was actually effective and safe. It was also convenient, since it spared the farmer midnight and pre-dawn trips to the henhouse. The Ohio studies compared the wintertime eating and laying habits of Leghorns receiving no extra light, those receiving light from 4 a.m., and those exposed to all-night light. The differences were remarkable; hens in the all-night light group ate on average 25 percent more than those in the control group, and laid twice as many eggs.⁹²

The researchers warned that the hens eventually tired, so leaving the henhouse lights on all winter would “usually mean less spring eggs.” But while fresh eggs fetched low prices in the spring, fresh chicken meat sold well. The Ohio researchers suggested that this would be a logical way to dispense with worn-out winter layers. Altogether, what made all-night lighting a worthwhile investment was not that it increased *overall* egg production but rather that it increased production during the most profitable period.⁹³

For the many farm families that kept barnyard flocks mostly for their own use, electrifying the henhouse must have seemed like a ludicrous idea in the middle of the depression. Simply keeping their flocks from starving was hard enough.⁹⁴ For commercial poultry farmers, on the other hand, selling fresh eggs in winter looked like a smart survival strategy. So as New Deal electrification projects brought power to rural areas across the country,⁹⁵ henhouse lighting became more commonplace, especially in major egg-producing regions. Poultry magazines provided advice on how to boost winter “henhouse morale” with the help of lamps, automatic on-off switches, and lighting schedules.⁹⁶ Even off-the-grid farmers could light up their henhouses with a Wincharger windmill, which cost \$27.50 in 1941 and advertised an immediate quadrupling of egg production.⁹⁷

By that time, the national January rate of lay averaged nearly 40 eggs per 100 layers. While still considerably lower than the June rate of 53.5 eggs, it marked an 80 percent increase in just fifteen years.⁹⁸ For consumers this meant that

⁹² D. C. Kennard and V. D. Chamberlin, *All-Night Light for Layers*, Ohio Agricultural Experiment Station Bulletin 476 (Wooster, Oh., 1931), 5.

⁹³ *Ibid.*, 8, 11.

⁹⁴ H. V. Tormohlen, “Do Not Shortchange the Pullets,” *Leghorn World* 14 (1930): 42.

⁹⁵ Ronald C. Tobey, *Technology as Freedom: The New Deal and the Electrical Modernization of the American Home* (Berkeley: University of California Press, 1996).

⁹⁶ Anon., “Use of Winter Lighting,” *American Egg and Poultry Review*: 1 (1940): 19; L. C. Porter, “Ultraviolet from the Current,” *American Poultry Journal* 63 (1932): 9; “Lights—to Use or Not to Use,” *Pacific Rural Press*, 18 Dec. 1937: 668.

⁹⁷ *American Poultry and Egg Review*, Apr. (1942): back cover.

⁹⁸ Anon., “Rate of Production Mounting,” *American Egg and Poultry Review*, Feb. (1941): 106; Anon., “Egg Lay Rate Holds Record High,” *American Egg and Poultry Review*, June (1941): 262.

wintertime “strictly fresh” eggs were no longer such a costly luxury. For dealers in cold-storage eggs, on the other hand, this evolution spelled what *Business Week* called the “doom” of their trade: “Of the several factors which have forced the sales of storage eggs to a depressingly low point, the most important is the ever increasing supply of year-round fresh eggs. Millions of modernized hens, scientifically fed and housed, start laying three months earlier than their barnyard sisters. They come into production at a time when eggs are normally scarce and high-priced, and they lay twice as many eggs as those fed on grain and grasshoppers. . . . Now there is only a limited demand for storage eggs, and grocers have to make a wide spread between them and fresh eggs.”⁹⁹

In response, egg dealers tried to convince the USDA that cold-storage eggs should be renamed *refrigerated*, in order to get rid of their “unmerited stigma and unjustly unfavorable reputation.”¹⁰⁰ Warehousemen, though, recognized that a new label could not save an obsolete commodity. At their annual meeting in 1941, one speaker declared that while “the shell egg is fading in importance,” they could celebrate the nation’s booming demand for frozen eggs.¹⁰¹ Sold in cans or cartons, these were the kinds of stable, simple, uncontroversial commodities that warehousemen liked. After all, they did not have to pretend to be “farm fresh.”

EGG CITIES

Chicken Little has truly become Chicken Big.

—W. O. Wilson, 1974¹⁰²

As egg production became less seasonal, it also became more attractive to agribusiness. High prices during World War II briefly boosted the fortunes of family-run chicken farms, but by the early 1950s, they were competing against producers operating on a scale unimaginable in the pre-war era, when 400 birds still counted as a “commercial” flock.¹⁰³ These veritable “egg cities,” whether run by corporations or individual poultry moguls, relied on machines to collect, grade and pack the daily output of tens of thousands of layers. Together with slumping demand (a product of

⁹⁹ “Doom of Cold-Storage Eggs,” *Business Week*, 21 Mar. (1936): 28.

¹⁰⁰ E. B. Heaton, managing director of the American Institute of Poultry Industries, quoted in anon., “Seek Change in Terminology,” *American Egg and Poultry Review*, Apr. (1940): 146–47.

¹⁰¹ R. H. Switzler, “Refrigerated Warehousing over the Years,” in American Warehousemen’s Association, *Proceedings of the 50th Annual Meeting of the American Warehousemen’s Association* (Washington, D.C., 1941), 62–70, quote p. 69.

¹⁰² W. O. Wilson, “Housing,” in O. A. Hanke, J. L. Skinner, and J. H. Florea, eds., *American Poultry History 1823–1973* (Madison, Wisc.: American Poultry Historical Society, 1974), 218–47.

¹⁰³ E. Smith Kimball, “Characteristics of U.S. Poultry Statistics,” *Journal of Farm Economics* 22 (1940): 359–66.

Americans' shift towards a more meat-centered diet) industrial-scale enterprises pushed tens of thousands of small producers out of business within a decade.¹⁰⁴ They also pushed forward pre-war developments in poultry breeding, feeding, and housing. Vitamin D-enriched feeds and UV-light bulbs replaced sunshine, battery cages replaced free-range chicken houses, and the old belief that hens needed exercise and fresh air gave way to the idea that continuous confinement was efficient, clean, and altogether modern.¹⁰⁵

Admittedly, birds kept under these conditions were prone to bad behavior as well as disease. But technology could fix these problems. Cutting off hens' beaks prevented them from pecking their cage-neighbors to death, while antibiotic-enhanced feeds suppressed epidemics and speeded growth.¹⁰⁶ The larger goal of these measures was to maximize hens' capacity, throughout their brief lives, to turn out eggs with assembly-line regularity. In this sense, they worked. Once hens had little or no exposure to seasonal variations in light, temperature, or feed, they obediently became full-time, year-round workers, producing around 300 eggs a year. As the American Egg Board boasts, "Today's laying hen doesn't need to depend upon the fickle sun to tell her when laying time has arrived."¹⁰⁷ Now it is *always* laying time. The USDA's charts of monthly egg production rates, still jagged in the early 1940s, had flattened out by the mid-1970s.¹⁰⁸ Seasonal prices did the same. Eventually, storage eggs disappeared, along with the very idea that eggs were freshest and best in springtime. The giant warehouses were either torn down or, as in the case of Boston's Quincy Market, turned into more valuable real estate.

These days, the typical egg "production complex" is itself a formidable piece of property, housing perhaps a million layers. Such facilities make up the multi-state egg empires of companies such as Cal-Maine Foods and Moark LLC (owner of the Eggland brand). And although most are located in rural areas, news of their unsavory practices and by-products (ranging from labor abuses

¹⁰⁴ As an example of the giant egg producers that emerged during this era, Sawyer describes the "Egg City" founded by Julius Goldman in central California. "He took 205 acres of fairly rough, out of the way land and built an automated egg manufacturing plant. On this one location can be found a hatchery, pullet-growing facilities, several batteries of tremendous houses, a feed mill, a U.S.D.A.-inspected egg-packing plant adjacent to an egg-breaking plant. All this from a man who had to flee Hitler's Germany and landed in New York City as late as 1952." Gordon Sawyer, *The Agribusiness Poultry Industry* (New York: Exposition Press, 1971), 218.

¹⁰⁵ Wilson, "Housing"; William Jasper, *Poultry Farm Practices and Egg Quality* (Washington, D.C.: USDA Production and Marketing Administration, 1952).

¹⁰⁶ Karen Davis, *Prisoned Chickens, Poisoned Eggs: An Inside Look at the Modern Poultry Industry* (Summertown, Tenn.: Book Pub. Co., 1996); Smith and Daniel, *The Chicken Book*, 268.

¹⁰⁷ American Egg Board, Factors that Influence Egg Production, <http://www.aeb.org>, accessed 18 Feb. 2006.

¹⁰⁸ Bell, "Forces that Have Helped Shape the US Egg Industry," 32–33.

and animal cruelty to pollution and antibiotic-resistant bacteria) has by now reached the urban consumer.¹⁰⁹

Much less familiar is the history of the industrial egg itself. Since the early twentieth century egg production has not just become, like agricultural production more generally, more capital-intensive and geographically concentrated. It has also become perennially *fresh*, in response to demand for a vital food quality that consumers ultimately would not entrust to commercial cold storage—or rather, to the *users* of cold storage. This distinction is crucial, for behind consumers' seemingly "irrational" suspicions of cold storage were well-founded concerns about the carelessness and deception that this technology enabled. As Mary Kujovich observed in her account of the Chicago meatpackers' iced railcars, early refrigeration introduced "an element of confusion" into the perishable food marketplace, confounding efforts to develop fair and feasible regulations.¹¹⁰ It did so by altering not just the distances and timeframes of commerce, but also, and more fundamentally, the power relations between different sets of buyers and sellers. The irony is that popular concerns about the resulting manipulation of the fresh egg market helped justify radical and permanent manipulations of the hen's life cycle.

This chicken and egg story forms just one chapter in a much broader history of freshness.¹¹¹ It must be understood in light of concurrent developments in (among other things) nutritional science, public health, and advertising, which together fostered the notion that daily doses of fresh food were essential to a healthy life and productive workforce.¹¹² Nonetheless, even by itself the egg's story shows that the popular legitimacy of the modern industrial food supply hinged on much more than the abolition of famine and deadly filth. As the circuits of food commerce grew lengthier and more complex, the role of intermediaries, both big and small, became more suspect. People demanded assurances that their "fresh" eggs were just that. Seemingly such a naturally desirable food quality, it ultimately was secured through entirely unnatural means.

¹⁰⁹ "Advocates for Animals Turn Attention to Chickens," *New York Times*, 4 Dec. 2002: 20; "Egg Titan's Image is Basket of Contradictions," *Omaha World Herald*, 10 Aug. 2003; "Egg Farm Neighbors Say System is Broken," *Star-Ledger* [New Jersey], 31 Oct. 2004; Nicols Fox, *Spoiled: The Dangerous Truth about a Food Chain Gone Haywire* (New York: Basic Books, 1997).

¹¹⁰ Kujovich, *The Refrigerator Car*, 470.

¹¹¹ Susanne Freidberg, *Fresh: A Perishable History* (Cambridge: Harvard University Press, forthcoming).

¹¹² Helpful overviews of these developments include: Harvey Levenstein, *Paradox of Plenty: A Social History of Eating in Modern America* (New York: Oxford, 1993); Waverly Root and Richard de Rochemont, *Eating in America* (New York: William Morrow and Co, 1976); Hillel Schwartz, *Never Satisfied: A Cultural History of Diets, Fantasies and Fat* (New York: The Free Press, 1986).