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ON JULY 11, 1997, Lee Harding ordered soft chicken tacos at a Mexican restaurant in Pueblo, Colorado. Harding was twenty-two years old, a manager at Safeway. His wife Stacey was a manager at Wendy's. They were out to dinner on a Friday night. When the chicken tacos arrived, Harding thought there was something wrong with them. The meat seemed to have gone bad. The tacos tasted slimy and gross. An hour or so after leaving the restaurant, Harding began to experience severe abdominal cramps. It felt like something was eating away at his stomach. He was fit and healthy, stood six-foot-one, weighed two hundred pounds. He'd never felt pain this intense. The cramps got worse, and Harding lay in bed through the night, tightly curled into a ball. He developed bad diarrhea, then bloody diarrhea. He felt like he was dying, but was afraid to go to the hospital. If I'm going to die, he thought, I want to die at home.

The severe pain and diarrhea lasted through the weekend. On Monday evening Harding decided to seek medical attention; the cramps were getting better, but he was still passing a good deal of blood. He waited three hours in the emergency room at St. Mary-Corwin Hospital in Pueblo, gave a stool sample, and then finally saw a doctor. It's probably just a "summer flu," the doctor said. Harding was sent home with a prescription for an antibiotic. Tuesday afternoon, he heard a knock at his front door. When Harding opened it, nobody was there. But he found a note on the door from the Pueblo City-County Health Department. It said that his stool sample had tested positive for *Escherichia coli* O157:H7, a virulent and potentially lethal foodborne pathogen.

The next morning Harding called Sandra Gallegos, a nurse with the Pueblo Health Department. She asked him to try and remember what

foods he'd eaten during the previous five days. Harding mentioned the dinner at the Mexican restaurant and the foul taste of the chicken tacos. He was sure that was where he had gotten food poisoning. Gallegos disagreed. *E. coli* O157:H7 was rarely found in chicken. She asked if Harding had consumed any ground beef lately. Harding recalled having eaten a hamburger a couple of days before visiting the Mexican restaurant. But he doubted that the hamburger could have made him ill. Both his wife and his wife's sister had eaten the same burgers, during a backyard barbecue, and neither had become sick. He and his wife had also eaten burgers from the same box the week before the barbecue without getting sick. They were frozen hamburgers he'd bought at Safeway. He remembered because it was the first time he'd ever bought frozen hamburgers. Gallegos asked if there were any left. Harding said there just might be, checked the freezer, and found the package. It was a red, white, and blue box that said "Hudson Beef Patties."

A Pueblo health official went to Harding's house, took the remaining hamburgers, and sent one to a USDA laboratory for analysis. State health officials had noticed a spike in the number of people suffering from *E. coli* O157:H7 infections. At the time Colorado was one of only six states with the capability to perform DNA tests on samples of *E. coli* O157:H7. The DNA tests showed that at least ten people had been sickened by the same strain of the bug. Investigators were searching for a common link between scattered cases reported in Pueblo, Brighton, Loveland, Grand Junction, and Colorado Springs. On July 28, the USDA lab notified Gallegos that Lee Harding's hamburger was contaminated with the same strain of *E. coli* O157:H7. Here was the common link.

The lot number on Harding's package said that the frozen patties had been manufactured on June 5 at the Hudson Foods plant in Columbus, Nebraska. The plant seemed an unlikely source for an outbreak of food poisoning. Only two years old, it had been built primarily to supply hamburgers for the Burger King chain. It used state-of-the-art equipment and appeared to be spotlessly clean. But something had gone wrong. A modern factory designed for the mass production of food had instead become a vector for the spread of a deadly disease. The package of hamburger patties in Lee Harding's freezer and astute investigative work by Colorado health officials soon led to the largest recall of food in the nation's history. Roughly 35 million pounds of ground beef produced at the Columbus plant was voluntarily recalled

by Hudson Foods in August of 1997. Although public health officials did a fine job of tracing the outbreak to its source, the recall proved less successful. By the time it was announced, about 25 million pounds of the ground beef had already been eaten.

an ideal system for new pathogens

EVERY DAY IN THE United States, roughly 200,000 people are sickened by a foodborne disease, 900 are hospitalized, and fourteen die. According to the Centers for Disease Control and Prevention (CDC), more than a quarter of the American population suffers a bout of food poisoning each year. Most of these cases are never reported to authorities or properly diagnosed. The widespread outbreaks that are detected and identified represent a small fraction of the number that actually occurs. And there is strong evidence not only that the incidence of food-related illness has risen in the past few decades, but also that the lasting health consequences of such illnesses are far more serious than was previously believed. The acute phase of a food poisoning — the initial few days of diarrhea and gastrointestinal upset — in many cases may simply be the most obvious manifestation of an infectious disease. Recent studies have found that many foodborne pathogens can precipitate long-term ailments, such as heart disease, inflammatory bowel disease, neurological problems, autoimmune disorders, and kidney damage.

Although the rise in foodborne illnesses has been caused by many complex factors, much of the increase can be attributed to recent changes in how American food is produced. Robert V. Tauxe, head of the Foodborne and Diarrheal Diseases Branch at the CDC, believes that entirely new kinds of outbreaks are now occurring. A generation ago, the typical outbreak of food poisoning involved a church supper, a family picnic, a wedding reception. Improper food handling or storage would cause a small group of people in one local area to get sick. Such traditional outbreaks still take place. But the nation's industrialized and centralized system of food processing has created a whole new sort of outbreak, one that can potentially sicken millions of people. Today a cluster of illnesses in one small town may stem from bad potato salad at a school barbecue — or it may be the first sign of an outbreak that extends statewide, nationwide, or even overseas.

Much like the human immunodeficiency virus (HIV) responsible for causing AIDS, the *E. coli* O157:H7 bacterium is a newly emerged pathogen whose spread has been facilitated by recent social and technological changes. *E. coli* O157:H7 was first isolated in 1982; HIV was discovered the following year. People who are infected with HIV can appear healthy for years, while cattle infected with *E. coli* O157:H7 show few signs of illness. Although cases of AIDS date back at least to the late 1950s, the disease did not reach epidemic proportions in the United States until increased air travel and sexual promiscuity helped transmit the virus far and wide. *E. coli* O157:H7 was most likely responsible for some human illnesses thirty or forty years ago. But the rise of huge feedlots, slaughterhouses, and hamburger grinders seems to have provided the means for this pathogen to become widely dispersed in the nation's food supply. American meat production has never before been so centralized: thirteen large packinghouses now slaughter most of the beef consumed in the United States. The meat-packing system that arose to supply the nation's fast food chains — an industry molded to serve their needs, to provide massive amounts of uniform ground beef so that all of McDonald's hamburgers would taste the same — has proved to be an extremely efficient system for spreading disease.

Although *E. coli* O157:H7 has received a good deal of public attention, over the past two decades scientists have discovered more than a dozen other new foodborne pathogens, including *Campylobacter jejuni*, *Cryptosporidium parvum*, *Cyclospora cayetanensis*, *Listeria monocytogenes*, and Norwalk-like viruses. The CDC estimates that more than three-quarters of the food-related illnesses and deaths in the United States are caused by infectious agents that have not yet been identified. While medical researchers have gained important insights into the links between modern food processing and the spread of dangerous diseases, the nation's leading agribusiness firms have resolutely opposed any further regulation of their food safety practices. For years the large meatpacking companies have managed to avoid the sort of liability routinely imposed on the manufacturers of most consumer products. Today the U.S. government can demand the nationwide recall of defective softball bats, sneakers, stuffed animals, and foam-rubber toy cows. But it cannot order a meatpacking company to remove contaminated, potentially lethal ground beef from fast food kitchens and supermarket shelves. The unusual power of the large meatpacking firms has been sustained by their close ties and sizable

donations to Republican members of Congress. It has also been made possible by a widespread lack of awareness about how many Americans suffer from food poisoning every year and how these illnesses actually spread.

The newly recognized foodborne pathogens tend to be carried and shed by apparently healthy animals. Food tainted by these organisms has most likely come in contact with an infected animal's stomach contents or manure, during slaughter or subsequent processing. A nationwide study published by the USDA in 1996 found that 7.5 percent of the ground beef samples taken at processing plants were contaminated with *Salmonella*, 11.7 percent were contaminated with *Listeria monocytogenes*, 30 percent were contaminated with *Staphylococcus aureus*, and 53.3 percent were contaminated with *Clostridium perfringens*. All of these pathogens can make people sick; food poisoning caused by *Listeria* generally requires hospitalization and proves fatal in about one out of every five cases. In the USDA study 78.6 percent of the ground beef contained microbes that are spread primarily by fecal material. The medical literature on the causes of food poisoning is full of euphemisms and dry scientific terms: coliform levels, aerobic plate counts, sorbitol, MacConkey agar, and so on. Behind them lies a simple explanation for why eating a hamburger can now make you seriously ill: There is shit in the meat.

the national dish

IN THE EARLY YEARS of the twentieth century, hamburgers had a bad reputation. According to the historian David Gerard Hogan, the hamburger was considered "a food for the poor," tainted and unsafe to eat. Restaurants rarely served hamburgers; they were sold at lunch carts parked near factories, at circuses, carnivals, and state fairs. Ground beef, it was widely believed, was made from old, putrid meat heavily laced with chemical preservatives. "The hamburger habit is just about as safe," one food critic warned, "as getting your meat out of a garbage can." White Castle, the nation's first hamburger chain, worked hard in the 1920s to dispel the hamburger's tawdry image. As Hogan notes in his history of the chain, *Selling 'Em by the Sack* (1997), the founders of White Castle placed their grills in direct view of customers, claimed that fresh ground beef was delivered twice a day, chose a name with connotations of purity, and even sponsored an ex-

periment at the University of Minnesota in which a medical student lived for thirteen weeks on "nothing but White Castle hamburgers and water."

The success of White Castle in the East and the Midwest helped to popularize hamburgers and to remove much of their social stigma. The chain did not attract a broad range of people, however. Most of White Castle's customers were urban, working class, and male. During the 1950s, the rise of drive-ins and fast food restaurants in southern California helped turn the once lowly hamburger into America's national dish. Ray Kroc's decision to promote McDonald's as a restaurant chain for families had a profound impact on the nation's eating habits. Hamburgers seemed an ideal food for small children — convenient, inexpensive, hand-held, and easy to chew.

Before World War II, pork had been the most popular meat in the United States. Rising incomes, falling cattle prices, the growth of the fast food industry, and the mass appeal of the hamburger later pushed American consumption of beef higher than that of pork. By the early 1990s, beef production was responsible for almost half of the employment in American agriculture, and the annual revenues generated by beef were higher than those of any other agricultural commodity in the United States. The average American ate three hamburgers a week. More than two-thirds of those hamburgers were bought at fast food restaurants. And children between the ages of seven and thirteen ate more hamburgers than anyone else.

In January of 1993, doctors at a hospital in Seattle, Washington, noticed that an unusual number of children were being admitted with bloody diarrhea. Some were suffering from hemolytic uremic syndrome, a previously rare disorder that causes kidney damage. Health officials soon traced the outbreak of food poisoning to undercooked hamburgers served at local Jack in the Box restaurants. Tests of the hamburger patties disclosed the presence of *E. coli* O157:H7. Jack in the Box issued an immediate recall of the contaminated ground beef, which had been supplied by the Vons Companies, Inc., in Arcadia, California. Nevertheless, more than seven hundred people in at least four states were sickened by Jack in the Box hamburgers, more than two hundred people were hospitalized, and four died. Most of the victims were children. One of the first to become ill, Lauren Beth Rudolph, ate a hamburger at a San Diego Jack in the Box a week before Christmas. She was admitted to the hospital on Christmas

Eve, suffered terrible pain, had three heart attacks, and died in her mother's arms on December 28, 1992. She was six years old.

The Jack in the Box outbreak received a great deal of attention from the media, alerting the public to the dangers of *E. coli* O157:H7. The Jack in the Box chain almost went out of business amid all the bad publicity. But this was not the first outbreak of *E. coli* O157:H7 linked to fast food hamburgers. In 1982 dozens of children were sickened by contaminated hamburgers sold at McDonald's restaurants in Oregon and Michigan. McDonald's quietly cooperated with investigators from the CDC, providing ground beef samples that were tainted with *E. coli* O157:H7 — samples that for the first time linked the pathogen to serious illnesses. In public, however, the McDonald's Corporation denied that its hamburgers had made anyone sick. A spokesman for the chain acknowledged only "the possibility of a statistical association between a small number of diarrhea cases in two small towns and our restaurants."

In the eight years since the Jack in the Box outbreak, approximately half a million Americans, the majority of them children, have been made ill by *E. coli* O157:H7. Thousands have been hospitalized, and hundreds have died.

a bug that kills children

E. coli O157:H7 is a mutated version of a bacterium found abundantly in the human digestive system. Most *E. coli* bacteria help us digest food, synthesize vitamins, and guard against dangerous organisms. *E. coli* O157:H7, on the other hand, can release a powerful toxin — called a "verotoxin" or a "Shiga toxin" — that attacks the lining of the intestine. Some people who are infected with *E. coli* O157:H7 do not become ill. Others suffer mild diarrhea. In most cases, severe abdominal cramps are followed by watery, then bloody, diarrhea that subsides within a week or so. Sometimes the diarrhea is accompanied by vomiting and a low-grade fever.

In about 4 percent of reported *E. coli* O157:H7 cases, the Shiga toxins enter the bloodstream, causing hemolytic uremic syndrome (HUS), which can lead to kidney failure, anemia, internal bleeding, and the destruction of vital organs. The Shiga toxins can cause seizures, neurological damage, and strokes. About 5 percent of the chil-

dren who develop HUS are killed by it. Those who survive are often left with permanent disabilities, such as blindness or brain damage.

Children under the age of five, the elderly, and people with impaired immune systems are the most likely to suffer from illnesses caused by *E. coli* O157:H7. The pathogen is now the leading cause of kidney failure among children in the United States. Nancy Donley, the president of Safe Tables Our Priority (STOP), an organization devoted to food safety, says it is hard to convey the suffering that *E. coli* O157:H7 causes children. Her six-year-old son, Alex, was infected with the bug in July of 1993 after eating a tainted hamburger. His illness began with abdominal cramps that seemed as severe as labor pains. It progressed to diarrhea that filled a hospital toilet with blood. Doctors frantically tried to save Alex's life, drilling holes in his skull to relieve pressure, inserting tubes in his chest to keep him breathing, as the Shiga toxins destroyed internal organs. "I would have done anything to save my son's life," Donley says. "I would have run in front of a bus to save Alex." Instead, she stood and watched helplessly as he called out for her, terrified and in pain. He became ill on a Tuesday night, the night after his mother's birthday, and was dead by Sunday afternoon. Toward the end, Alex suffered hallucinations and dementia, no longer recognizing his mother or father. Portions of his brain had been liquefied. "The sheer brutality of his death was horrifying," Donley says.

As Lee Harding learned, adults in perfect health can be stricken by the pathogen, too. Six months after seemingly recovering from his bout of *E. coli* O157:H7 food poisoning, Harding began to urinate blood. He was diagnosed as having a kidney infection, one that he believes was facilitated by residual tissue damage from the Shiga toxins. Although the infection soon passed, Harding still experiences occasional pain three years after eating a Hudson Beef hamburger. Nevertheless, he considers himself lucky.

Antibiotics have proven ineffective in treating illnesses caused by *E. coli* O157:H7. Indeed the use of antibiotics may make such illnesses worse by killing off the pathogen and prompting a sudden release of its Shiga toxins. At the moment, little can be done for people with life-threatening *E. coli* O157:H7 infections, aside from giving them fluids, blood transfusions, and dialysis.

Efforts to eradicate *E. coli* O157:H7 have been complicated by the fact that it is an extraordinarily hearty microbe that is easy to trans-

mit. *E. coli* O157:H7 is resistant to acid, salt, and chlorine. It can live in fresh water or seawater. It can live on kitchen countertops for days and in moist environments for weeks. It can withstand freezing. It can survive heat up to 160 degrees Fahrenheit. To be infected by most foodborne pathogens, such as *Salmonella*, you have to consume a fairly large dose — at least a million organisms. An infection with *E. coli* O157:H7 can be caused by as few as five organisms. A tiny uncooked particle of hamburger meat can contain enough of the pathogen to kill you.

The heartiness and minute infectious dose of *E. coli* O157:H7 allow the pathogen to be spread in many ways. People have been infected by drinking contaminated water, by swimming in a contaminated lake, by playing at a contaminated water park, by crawling on a contaminated carpet. The most common cause of foodborne outbreaks has been the consumption of undercooked ground beef. But *E. coli* O157:H7 outbreaks have also been caused by contaminated bean sprouts, salad greens, cantaloupe, salami, raw milk, and unpasteurized apple cider. All of those foods most likely had come in contact with cattle manure, though the pathogen may also be spread by the feces of deer, dogs, horses, and flies.

Person-to-person transmission has been responsible for a significant proportion of *E. coli* O157:H7 illnesses. Roughly 10 percent of the people sickened during the Jack in the Box outbreak did not eat a contaminated burger, but were infected by someone who did. *E. coli* O157:H7 is shed in the stool, and people infected with the bug, even those showing no outward sign of illness, can easily spread it through poor hygiene. Person-to-person transmission is most likely to occur among family members, at day care centers, and at senior citizen homes. On average, an infected person remains contagious for about two weeks, though in some cases *E. coli* O157:H7 has been found in stool samples two to four months after an initial illness.

Some herds of American cattle may have been infected with *E. coli* O157:H7 decades ago. But the recent changes in how cattle are raised, slaughtered, and processed have created an ideal means for the pathogen to spread. The problem begins in today's vast feedlots. A government health official, who prefers not to be named, compared the sanitary conditions in a modern feedlot to those in a crowded European city during the Middle Ages, when people dumped their chamber pots out the window, raw sewage ran in the streets, and epidemics raged.

The cattle now packed into feedlots get little exercise and live amid pools of manure. "You shouldn't eat dirty food and dirty water," the official told me. "But we still think we can give animals dirty food and dirty water." Feedlots have become an extremely efficient mechanism for "recirculating the manure," which is unfortunate, since *E. coli* O157:H7 can replicate in cattle troughs and survive in manure for up to ninety days.

Far from their natural habitat, the cattle in feedlots become more prone to all sorts of illnesses. And what they are being fed often contributes to the spread of disease. The rise in grain prices has encouraged the feeding of less expensive materials to cattle, especially substances with a high protein content that accelerate growth. About 75 percent of the cattle in the United States were routinely fed livestock wastes — the rendered remains of dead sheep and dead cattle — until August of 1997. They were also fed millions of dead cats and dead dogs every year, purchased from animal shelters. The FDA banned such practices after evidence from Great Britain suggested that they were responsible for a widespread outbreak of bovine spongiform encephalopathy (BSE), also known as "mad cow disease." Nevertheless, current FDA regulations allow dead pigs and dead horses to be rendered into cattle feed, along with dead poultry. The regulations not only allow cattle to be fed dead poultry, they allow poultry to be fed dead cattle. Americans who spent more than six months in the United Kingdom during the 1980s are now forbidden to donate blood, in order to prevent the spread of BSE's human variant, Creutzfeldt-Jakob disease. But cattle blood is still put into the feed given to American cattle. Steven P. Bjerklie, a former editor of the trade journal *Meat & Poultry*, is appalled by what goes into cattle feed these days. "God-damn it, these cattle are ruminants," Bjerklie says. "They're designed to eat grass and, maybe, grain. I mean, they have four stomachs for a reason — to eat products that have a high cellulose content. They are not designed to eat other animals."

The waste products from poultry plants, including the sawdust and old newspapers used as litter, are also being fed to cattle. A study published a few years ago in *Preventive Medicine* notes that in Arkansas alone, about 3 million pounds of chicken manure were fed to cattle in 1994. According to Dr. Neal D. Bernard, who heads the Physicians Committee for Responsible Medicine, chicken manure may contain dangerous bacteria such as *Salmonella* and *Campylobacter*, parasites

such as tapeworms and *Giardia lamblia*, antibiotic residues, arsenic, and heavy metals.

The pathogens from infected cattle are spread not only in feedlots, but also at slaughterhouses and hamburger grinders. The slaughterhouse tasks most likely to contaminate meat are the removal of an animal's hide and the removal of its digestive system. The hides are now pulled off by machine; if a hide has been inadequately cleaned, chunks of dirt and manure may fall from it onto the meat. Stomachs and intestines are still pulled out of cattle by hand; if the job is not performed carefully, the contents of the digestive system may spill everywhere. The increased speed of today's production lines makes the task much more difficult. A single worker at a "gut table" may eviscerate sixty cattle an hour. Performing the job properly takes a fair amount of skill. A former IBP "gutter" told me that it took him six months to learn how to pull out the stomach and tie off the intestines without spillage. At best, he could gut two hundred consecutive cattle without spilling anything. Inexperienced gutters spill manure far more often. At the IBP slaughterhouse in Lexington, Nebraska, the hourly spillage rate at the gut table has run as high as 20 percent, with stomach contents splattering one out of five carcasses.

The consequences of a single error are quickly multiplied as hundreds of carcasses quickly move down the line. Knives are supposed to be cleaned and disinfected every few minutes, something that workers in a hurry tend to forget. A contaminated knife spreads germs to everything it touches. The overworked, often illiterate workers in the nation's slaughterhouses do not always understand the importance of good hygiene. They sometimes forget that this meat will eventually be eaten. They drop meat on the floor and then place it right back on the conveyer belt. They cook bite-sized pieces of meat in their sterilizers, as snacks, thereby rendering the sterilizers ineffective. They are directly exposed to a wide variety of pathogens in the meat, become infected, and inadvertently spread disease.

A recent USDA study found that during the winter about 1 percent of the cattle at feedlots carry *E. coli* O157:H7 in their gut. The proportion rises to as much as 50 percent during the summer. Even if you assume that only 1 percent are infected, that means three or four cattle bearing the microbe are eviscerated at a large slaughterhouse every hour. The odds of widespread contamination are raised exponentially when the meat is processed into ground beef. A generation ago, lo-

cal butchers and wholesalers made hamburger meat out of leftover scraps. Ground beef was distributed locally, and was often made from cattle slaughtered locally. Today large slaughterhouses and grinders dominate the nationwide production of ground beef. A modern processing plant can produce 800,000 pounds of hamburger a day, meat that will be shipped throughout the United States. A single animal infected with *E. coli* O157:H7 can contaminate 32,000 pounds of that ground beef.

To make matters worse, the animals used to make about one-quarter of the nation's ground beef — worn-out dairy cattle — are the animals most likely to be diseased and riddled with antibiotic residues. The stresses of industrial milk production make them even more unhealthy than cattle in a large feedlot. Dairy cattle can live as long as forty years, but are often slaughtered at the age of four, when their milk output starts to decline. McDonald's relies heavily on dairy cattle for its hamburger supplies, since the animals are relatively inexpensive, yield low-fat meat, and enable the chain to boast that all its beef is raised in the United States. The days when hamburger meat was ground in the back of a butcher shop, out of scraps from one or two sides of beef, are long gone. Like the multiple sex partners that helped spread the AIDS epidemic, the huge admixture of animals in most American ground beef plants has played a crucial role in spreading *E. coli* O157:H7. A single fast food hamburger now contains meat from dozens or even hundreds of different cattle.

all we care to pay

"THIS IS NO FAIRY STORY and no joke," Upton Sinclair wrote in 1906; "the meat would be shoveled into carts, and the man who did the shoveling would not trouble to lift out a rat even when he saw one — there were things that went into the sausage in comparison with which a poisoned rat was a tidbit." Sinclair described a long list of practices in the meatpacking industry that threatened the health of consumers: the routine slaughter of diseased animals, the use of chemicals such as borax and glycerine to disguise the smell of spoiled beef, the deliberate mislabeling of canned meat, the tendency of workers to urinate and defecate on the kill floor. After reading *The Jungle* President Theodore Roosevelt ordered an independent investigation

of Sinclair's charges. When it confirmed the accuracy of the book, Roosevelt called for legislation requiring mandatory federal inspection of all meat sold through interstate commerce, accurate labeling and dating of canned meat products, and a fee-based regulatory system that made meatpackers pay the cost of cleaning up their own industry.

The powerful magnates of the Beef Trust responded by vilifying Roosevelt and Upton Sinclair, dismissing their accusations, and launching a public relations campaign to persuade the American people that nothing was wrong. "Meat and food products, generally speaking," J. Ogden Armour claimed in a *Saturday Evening Post* article, "are handled as carefully and circumspectly in large packing houses as they are in the average home kitchen." Testifying before Congress, Thomas Wilson, an executive at Morris & Company, said that blame for the occasional sanitary lapse lay not with the policies of industry executives, but with the greed and laziness of slaughterhouse workers. "Men are men," Wilson contended, "and it is pretty hard to control some of them." After an angry legislative battle, Congress narrowly passed the Meat Inspection Act of 1906, a watered-down version of Roosevelt's proposals that made taxpayers pay for the new regulations.

The meatpacking industry's response to *The Jungle* established a pattern that would be repeated throughout the twentieth century, whenever health concerns were raised about the nation's beef. The industry has repeatedly denied that problems exist, impugned the motives of its critics, fought vehemently against federal oversight, sought to avoid any responsibility for outbreaks of food poisoning, and worked hard to shift the costs of food safety efforts onto the general public. The industry's strategy has been driven by a profound antipathy to any government regulation that might lower profits. "There is no limit to the expense that might be put upon us," the Beef Trust's Wilson said in 1906, arguing against a federal inspection plan that would have cost meatpackers less than a dime per head of cattle. "[Our] contention is that in all reasonableness and fairness we are paying all we care to pay."

During the 1980s, as the risks of widespread contamination increased, the meatpacking industry blocked the use of microbial testing in the federal meat inspection program. A panel appointed by the National Academy of Sciences warned in 1985 that the nation's meat in-

spection program was hopelessly outdated, still relying on visual and olfactory clues to find disease while dangerous pathogens slipped past undetected. Three years later, another National Academy of Sciences panel warned that the nation's public health infrastructure was in serious disarray, limiting its ability to track or prevent the spread of newly emerging pathogens. Without additional funding for public health measures, outbreaks and epidemics of new diseases were virtually inevitable. "Who knows what crisis will be next?" said the chairman of the panel.

Nevertheless, the Reagan and Bush administrations cut spending on public health measures and staffed the U.S. Department of Agriculture with officials far more interested in government deregulation than in food safety. The USDA became largely indistinguishable from the industries it was meant to police. President Reagan's first secretary of agriculture was in the hog business. His second was the president of the American Meat Institute (formerly known as the American Meat Packers Association). And his choice to run the USDA's Food Marketing and Inspection Service was a vice president of the National Cattleman's Association. President Bush later appointed the president of the National Cattleman's Association to the job.

Two months after the threat of deadly new outbreaks was outlined by the National Academy of Sciences, the USDA launched the Streamlined Inspection System for Cattle (SIS-C). The program was designed to reduce the presence of federal inspectors in the nation's slaughterhouses, allowing company employees to assume most of the food safety tasks. According to the Reagan administration, the Streamlined Inspection System for Cattle would help the USDA shrink its budget and deploy its manpower more efficiently. Freed from the hassles of continuous federal inspection, SIS-C also enabled meatpacking companies to increase their line speeds. Despite the fact that IBP and Morrell had just a year earlier been caught falsifying safety records and keeping two sets of injury logs, the meatpacking industry was given the authority to inspect its own meat. SIS-C was launched in 1988 as a pilot program at five major slaughterhouses that supplied about one-fifth of the beef consumed in the United States. The USDA hoped that within a decade the new system would extend nationwide and that the number of federal meat inspectors would be cut by half.

A 1992 USDA study of the Streamlined Inspection System for Cattle concluded that beef produced under the program was no dirtier than beef produced at slaughterhouses fully staffed by federal inspec-

tors. But the accuracy of that study was thrown into doubt by the revelation that meatpacking firms had sometimes been told in advance when USDA investigators would be arriving at SIS-C slaughterhouses. The Monfort beef plant in Greeley, Colorado, was one of the original participants in the program. According to federal inspectors there, the meat produced under the Streamlined Inspection System "had never been filthier." At SIS-C slaughterhouses, visibly diseased animals — cattle infected with measles and tapeworms, covered with abscesses — were being slaughtered. Poorly trained company inspectors were allowing the shipment of beef contaminated with fecal material, hair, insects, metal shavings, urine, and vomit.

The Streamlined Inspection System for Cattle was discontinued in 1993, following the Jack in the Box outbreak. Cutbacks in federal inspection seemed difficult to justify, when hundreds of children had been made seriously ill by tainted hamburgers. Although the precise source of *E. coli* O157:H7 contamination was never identified, some of the beef used by Jack in the Box came from an SIS-C plant — a Monfort slaughterhouse. The meatpacking industry's immediate reaction to the outbreak was an attempt to shift the blame elsewhere. As children continued to be hospitalized after eating Jack in the Box hamburgers, J. Patrick Boyle, the head of the American Meat Institute said, "This recent outbreak sheds light on a nationwide problem: inconsistent information about proper cooking temperatures for hamburger." The meat industry's allies at the USDA also seemed remarkably laissez-faire, noting that the contaminated hamburger patties had not violated any federal standards. According to Dr. Russell Cross, head of the USDA's Food Safety and Inspection Service, "The presence of bacteria in raw meat, including *E. coli* O157:H7, although undesirable, is unavoidable, and not cause for condemnation of the product." Members of the newly elected Clinton administration disagreed. Dr. Cross, a Bush appointee, resigned. On September 29, 1993, his replacement, Michael R. Taylor, announced that *E. coli* O157:H7 would henceforth be considered an illegal adulterant, that no ground beef contaminated with it could be sold, and that the USDA would begin random microbial testing to remove it from the nation's food supply. The American Meat Institute immediately filed a lawsuit in federal court to prevent the USDA from testing any ground beef for *E. coli* O157:H7. Judge James R. Rowlin, a conservative and a cattleman, dismissed the meatpacking industry's arguments and allowed the testing to proceed.

a matter of will

WHILE THE MEATPACKING INDUSTRY sought to block implementation of a science-based inspection system, the owner of the Jack in the Box chain, Foodmaker, Inc., struggled to recover from the bad publicity surrounding the outbreak. Robert Nugent, the president of Foodmaker, had waited a week before acknowledging that Jack in the Box bore some responsibility for the illnesses. His first instinct had been to blame the chain's ground beef supplier and Washington State health officials. He claimed that Jack in the Box had never received a thorough explanation of why hamburgers needed to be fully cooked. Nugent soon recruited Jody Powell, President Jimmy Carter's former press secretary, to help improve the company's image and hired David M. Theno, a prominent food scientist, to prevent future outbreaks.

Theno had previously helped Foster Farms, a family-owned poultry processor in California, eliminate most of the *Salmonella* from its birds. He was a strong advocate of Hazard Analysis and Critical Control Points (HACCP) programs, embracing a food safety philosophy that the National Academy of Sciences had promoted for years. The essence of a HACCP program is prevention; it attempts to combine scientific analysis with common sense. The most vulnerable steps in a food production system are identified and then monitored. Stacks and stacks of records are kept in order to follow what went where. Theno quickly realized after arriving at Jack in the Box that the chain relied upon the safety standards of its suppliers — instead of imposing its own. He created the first HACCP plan in the fast food industry, a “farm-to-fork” policy that scrutinized threats to food safety at every level of production and distribution. Assuring Jack in the Box customers that their food was safe not only seemed the right thing to do, it seemed essential for the chain's survival. In the years since the Jack in the Box outbreak, David Theno has emerged as a fast food maverick, applauded by consumer groups and considered “the Antichrist,” he says, by many in the meatpacking industry.

Theno insisted that every Jack in the Box manager attend a food safety course, that every refrigerated delivery truck have a record-keeping thermometer mounted inside it, that every kitchen grill be calibrated to ensure an adequate cooking temperature, and that every grill person use tongs to handle hamburger patties instead of bare hands. An almost fanatical devotion to microbial testing, however, be-

came the key to Theno's food safety program. He discovered that the levels of contamination varied enormously in ground beef supplied by different meatpacking companies. Some slaughterhouses did a fine job; others were adequate; and a few were appalling. The companies that manufactured hamburger patties for Jack in the Box were required to test their beef every fifteen minutes for a wide range of dangerous microbes, including *E. coli* O157:H7. Slaughterhouses that continued to ship bad meat were eliminated as suppliers.

Jack in the Box now buys all of its ground beef from two companies: SSI, a subsidiary of the J. R. Simplot Company, and Texas-American, a subsidiary of the family-owned American Food Service Corporation. Theno gave me a tour of the Texas-American plant in Fort Worth that makes hamburger patties for Jack in the Box. We were accompanied by the plant manager, Tim Biela. Much of Biela's work involved testing things repeatedly and maintaining records of the tests. “You can't manage what you don't measure,” he said more than once. His records contain not only the date and time when a case of hamburger patties was produced, but also which employees worked that shift, which slaughterhouse provided that beef, and which feedlots sent cattle to the slaughterhouse that day. The hamburger patty plant looked new and clean. I saw huge vats of beef scraps — some shipped all the way from Australia — stacked high in a cooler. The beef was dumped from the vats into shiny stainless steel machines. It was ground into fine particles by giant augers, mixed into exact proportions of lean meat and fat, stamped into patties, perforated, frozen, passed through metal detectors and then sealed in plastic wrap. The frozen hamburger patties that came out of the machines looked like little pink waffles.

David Theno would like the meatpacking industry to adopt a system of “performance-based grading.” Slaughterhouses that produced consistently clean meat would receive a grade A. Plants that performed moderately well would receive a grade B, and so on. Microbial testing would determine the grades, and the marketplace would reward companies that ranked highest. Plants that earned only a C or a D would have to do better — or stick to making dog food.

Some people in the fast food industry resent the idea that Jack in the Box, which was involved in such a large outbreak of food poisoning, has assumed the mantle of leadership on the issue of food safety. Theno's support for tough food safety legislation in California made him unpopular with the state's restaurant association. The meatpack-

ing industry is not fond of him, either. Theno says that the industry's long-standing resistance to microbial testing is a form of denial. "If you don't know about a problem," he explained, "then you don't have to deal with it." He thinks that the problem of *E. coli* O157:H7 contamination in ground beef can be solved. He has an optimistic faith in the power of science and reason. "If you put in a score-keeping system and profile these meatpacking companies," Theno says, "you can fix this problem. You can actually fix this problem in six months . . . This is a matter of will, not technology." Despite the meatpacking industry's claims, the solution need not be enormously expensive. The entire Jack in the Box food safety program raises the cost of the chain's ground beef by about one penny per pound.

a lack of recall

THE CLINTON ADMINISTRATION'S EFFORTS to implement a tough, science-based food inspection system received an enormous setback when the Republican Party gained control of Congress in November of 1994. Both the meatpacking industry and the fast food industry have been major financial supporters of the Republican Party's right wing. Speaker of the House Newt Gingrich's Contract With America, stressing government deregulation and opposition to an increased minimum wage, fit perfectly with the legislative agenda of the large meatpackers and fast food chains. A study of campaign contributions between 1987 and 1996, conducted by the Center for Public Integrity, found that Gingrich received more money from the restaurant industry than any other congressman. Among the top twenty-five House recipients of restaurant industry funds, only four were Democrats. The meatpacking industry also directed most of its campaign contributions to conservative Republicans, providing strong support in the Senate to Mitch McConnell of Kentucky, Jesse Helms of North Carolina, and Orrin Hatch of Utah. Between 1987 and 1996, Phil Gramm, a Republican from Texas, received more money from the meatpacking industry than any other U.S. senator. Gramm is a member of the Senate Agriculture Committee, and his wife, Wendy Lee, sits on the board of IBP.

The meatpacking industry's allies in Congress worked hard in the 1990s to thwart modernization of the nation's meat inspection system.

A great deal of effort was spent denying the federal government any authority to recall contaminated meat or impose civil fines on firms that knowingly ship contaminated products. Under current law, the USDA cannot demand a recall. It can only consult with a company that has shipped bad meat and suggest that it withdraw the meat from interstate commerce. In extreme cases, the USDA can remove its inspectors from a slaughterhouse or processing plant, for all intents and purposes shutting down the facility. That step is rarely taken, however — and can be challenged by a meatpacker in federal court. In most cases, the USDA conducts negotiations with a meatpacking company over the timing and the scale of a proposed recall. The company has a strong economic interest in withdrawing as little meat as possible from the market (especially if the meat is difficult to trace) and in limiting publicity about the recall. And every day the USDA and the company spend discussing the subject is one more day in which Americans risk eating contaminated meat.

The Hudson Foods outbreak revealed many of the flaws in the current USDA policies on recall. Officials at Hudson Foods were informed late in July of 1997 that its frozen hamburger patties had infected Lee Harding with *E. coli* O157:H7. Because Harding had saved the box, Hudson Foods knew the exact lot number and production code of the tainted meat. The company made no effort to warn the public or to recall the frozen patties for another three weeks, until the USDA found a second box of Hudson Foods patties contaminated with *E. coli* O157:H7. On August 12 the company announced that it was voluntarily recalling 20,000 pounds of ground beef, an amount determined through negotiations with the USDA. The recall seemed surprisingly small, considering that the Hudson Foods plant in Columbus, Nebraska, could produce as much as 400,000 pounds of ground beef in a single shift — and that tainted patties had been manufactured, according to the product codes on their boxes, on at least three separate days in June. As food safety advocates and reporters began to question the size of the recall, it started to expand, reaching 40,000 pounds on August 13, 1.5 million pounds on August 15, and 25 million pounds on August 21. The recall eventually extended to 35 million pounds of ground beef, most of which had already been eaten.

The USDA had not only been forced to negotiate the Hudson Foods recall, it had to rely on company officials for information about how much meat needed to be recalled. Two of those officials suggested that

just a few small lots of ground beef might have been contaminated. In reality, Hudson Foods had for months been using "rework" — ground beef left over from the previous day of production — as part of its routine processing supply. It had shipped hamburger meat potentially contaminated with the same strain of *E. coli* O157:H7 from at least May of 1997 until the third week of August, when the company voluntarily agreed to shut the plant. Brent Wolke, the manager of the Hudson Foods plant in Columbus, and Michael Gregory, the company director of customer relations and quality control, were indicted in December of 1998. Federal prosecutors claimed that the pair had deliberately misled USDA inspectors and had falsified company documents to minimize the scale of the recall. Both men were later found innocent.

Once a company has decided voluntarily to pull contaminated meat from the market, it is under no legal obligation to inform the public — or even state health officials — that a recall is taking place. During the Jack in the Box outbreak, health officials in Nevada did not learn from the company that contaminated hamburger patties had been shipped there; they got the news when people noticed trucks pulling up to Jack in the Box restaurants in Las Vegas and removing the meat. Once the investigators realized that tainted ground beef had reached Nevada, a number of cases of severe food poisoning that might otherwise have been wrongly diagnosed were linked to *E. coli* O157:H7. In 1994, Wendy's tried to recall about 250,000 pounds of ground beef without officially notifying state health officials, the USDA, or the public. The meat had been shipped to Wendy's restaurants in Illinois, Michigan, Minnesota, Missouri, and Wisconsin. When news of the recall leaked, Wendy's issued a press release claiming that only 8,000 pounds was being withdrawn, because it "had not been fully tested." The press release failed to mention that some ground beef from the same lot had indeed been tested — and had tested positive for *E. coli* O157:H7.

A subsequent investigation by Cox News Service reporters Elliot Jaspin and Scott Montgomery found that the USDA does not inform the public when contaminated meat is recalled from fast food restaurants. "We live in a very litigious society," Jacque Knight, a USDA spokesperson explained; if every meat recall was publicly announced, companies would face problems from "everybody with a stomachache." Between 1996 and 1999, the USDA didn't tell the public about

more than one-third of the Class I recalls, cases in which consumers faced a serious and potentially lethal threat. The USDA now informs the public about every Class I recall, but will not reveal exactly where contaminated meat is being sold (unless it is being distributed under a brand name at a retail store). State health officials have attacked the USDA policy, arguing that it makes outbreaks much more difficult to trace and puts victims of food poisoning at much greater risk. Someone infected with *E. coli* O157:H7, unsure about what has caused his or her symptoms and unaware of a local outbreak, may take over-the-counter medications that make the illness much worse.

Both the USDA and the meatpacking industry argue that details about where a company has distributed its meat must not be revealed in order to protect the firm's "trade secrets." In February of 1999, when IBP recalled 10,000 pounds of ground beef laced with small pieces of glass, the company would disclose only that the meat had been shipped to stores in Florida, Indiana, Michigan, and Ohio. Neither IBP, nor the USDA, would provide the names of those stores. "It's very frustrating for us," an Indiana health official told a reporter, explaining why the beef containing broken glass could not easily be removed from supermarket shelves. "If they don't give [the information] to us, there's not much we can do."

In addition to letting meatpacking executives determine when to recall ground beef, how much needs to be recalled, and who should be told about it, for years the USDA allowed these companies to help write the agency's own press releases about the recalls. After the Hudson Foods outbreak, Secretary of Agriculture Dan Glickman ended the policy of submitting USDA recall announcements to meatpacking companies for prior approval. Two years later, however, USDA officials proposed that the agency stop issuing any press releases about meat recalls, leaving that task entirely to the meatpacking industry. That proposal was never adopted. In January of 2000, the USDA decided to announce every meat recall with an official press release; the recalls are also noted on the agency's Web site. The new policy, however, has not made it any easier to learn where contaminated meat has been sold. "Press releases will not identify the specific recipients of product," the USDA directive says, "unless the supplier chooses to release the information to the public."

A recent IBP press release, announcing the recall of more than a quarter of a million pounds of ground beef possibly tainted with *E.*

coli O157:H7, suggests that the industry's needs and those of consumers are not always the same. "In an abundance of caution, IBP is conducting this voluntary recall," the release said on June 23, 2000, implying that the move had been prompted mainly by a spirit of corporate generosity and good will. Hamburger meat potentially contaminated with the lethal pathogen had been shipped to wholesalers, distributors, and grocery stores in twenty-five states. At times, the press release reads more like an advertisement for IBP than an urgent health warning. It devotes more space to a description of the company's food safety program — with its "Triple Clean" slaughterhouse system and its "approved and accredited laboratories" — than to the details of how IBP managed to distribute nationwide enough suspect meat to make at least a million life-threatening hamburgers. Nowhere does the press release mention, for example, that the *E. coli* O157:H7 in IBP's ground beef was first detected not by one of the firm's own accredited laboratories, not by employees at the Geneseo, Illinois, IBP plant where the meat was produced, not by USDA inspectors — but by investigators from the Arkansas Department of Health, who found the pathogen in a package of IBP ground beef at Tiger Harry's restaurant in El Dorado, Arkansas. Thirty-six people who'd recently eaten at Tiger Harry's had been sickened by *E. coli* O157:H7. Despite the discovery of tainted ground beef in the restaurant freezer, the Arkansas Department of Health could not conclusively link IBP meat to the El Dorado *E. coli* O157:H7 outbreak. "There have been no illnesses associated with this product," the company's press release brashly asserted. IBP's voluntary recall was issued about six weeks after the ground beef's production date. By then, almost all of the questionable meat had been eaten.

In the aftermath of the Jack in the Box outbreak, the Clinton administration backed legislation to provide the USDA with the authority to demand meat recalls and impose civil fines on meatpackers. Republicans in Congress failed to enact not only that bill, but also similar legislation introduced in 1996, 1997, 1998, and 1999. The inability of the USDA to seek monetary damages from the meatpacking industry is highly unusual, given the federal government's power to use fines as a means of regulatory enforcement in the airline, automobile, mining, steel, and toy industries. "We can fine circuses for mistreating elephants," Secretary of Agriculture Dan Glickman complained in 1997, "but we can't fine companies that violate food-safety standards."

our friend the atom

SURROUNDED BY PARENTS WHOSE children had died after eating hamburgers tainted with *E. coli* O157:H7, President Clinton announced in July of 1996 that the USDA would finally adopt a science-based meat inspection system. Under the new regulations, every slaughterhouse and processing plant in the United States would by the end of the decade have to implement a government-approved HACCP plan and submit meat to the USDA for microbial testing. Clinton's announcement depicted the changes as the most sweeping reform of the federal government's food safety policies since the days of Theodore Roosevelt. The USDA plan, however, had been significantly watered down during negotiations with the meatpacking industry and Republican members of Congress. The new system would shift many food safety tasks to company employees. The records compiled by those employees — unlike the reports traditionally written by federal inspectors — would not be available to the public through the Freedom of Information Act. And meatpacking plants would not be required to test for *E. coli* O157:H7, a pathogen whose discovery might lead to immediate condemnation of their meat. Instead, they could test for other bacteria as a broad measure of fecal contamination levels; the results of those tests would not have to be revealed to the government; and meat containing whatever organisms the tests found could still be sold to the public.

Many federal meat inspectors opposed the Clinton administration's new system, arguing that it greatly diminished their authority to detect and remove contaminated meat. Today the USDA's Food Safety and Inspection Service is demoralized and understaffed. In 1978, before the first known outbreak of *E. coli* O157:H7, the USDA had 12,000 meat inspectors; now it has about 7,500. The federal inspectors I interviewed felt under enormous pressure from their USDA superiors not to slow down the line speeds at slaughterhouses. "A lot of us are feeling beaten down," one inspector told me. Job openings at the service are going unfilled for months. Federal inspectors warn that the new HACCP plans are only as good as the people running them — and that in the wrong hands HACCP stands for Have a Cup of Coffee and Pray. The Hudson Foods plant in Columbus, Nebraska, was operating under a HACCP plan in 1997 when it shipped 35 million pounds of potentially tainted meat.

"We give no serious validity to company-generated records," a long-time federal inspector told me. "There's a lot of falsification going on." His view was confirmed by other inspectors, and by former meatpacking workers who were in charge of quality control. According to Judy, a former "QC" at one of IBP's largest slaughterhouses, the HACCP plan at her plant was terrific on paper but much less impressive in real life: senior management cared much more about production than food safety. The quality control department was severely understaffed. A single QC had to keep an eye on two production lines simultaneously. "I had to check the sterilizer temperature, I had to check the Cryovac temperature, I had to look at packaging, I had to note the vats — did they have foreign objects in them or not? — I had to keep an eye on workers, so they wouldn't cheat," Judy said. "I was overwhelmed with work, it was just impossible to keep up with it all." She routinely falsified her checklist, as did the other QCs. The HACCP plan would have been "fantastic" if three people had been employed doing her job. There was no way that one person could get all the tasks on the list properly done.

Though the meatpacking industry has fought almost every federal effort to mandate food safety, it has also invested millions of dollars in new equipment to halt the spread of dangerous pathogens. IBP, for example, has installed expensive steam pasteurization cabinets at all of its beef slaughterhouses. Sides of beef enter the new contraption, which blow-dries them, bathes them in 220-degree steam for eight seconds, and then sprays them with cold water. When used properly, steam pasteurization cabinets can kill off most of the *E. coli* O157:H7 and reduce the amount of bacteria on the meat's surface by as much as 90 percent. But an IBP internal corporate memo from 1997 suggests that the company's large investment in such technologies has been motivated less by a genuine concern for the health and well-being of American consumers than by other considerations.

"We have been informed that carcasses in your plant are occasionally being delayed for extended periods of time on the USDA out-trail for final disposition (up to 6 hours)," the IBP memo began. It was sent by the company's vice president for quality control and food safety to the plant manager at the Lexington, Nebraska, slaughterhouse. It warned that the longer a carcass remains on the out-trail, the harder it is to clean. With every passing minute, bacteria grows more firmly attached and difficult to kill. "This delayed carcass deposition,"

the memo emphasized, "is of concern and is cause for extraordinary actions regarding such affected carcasses." When carcasses sat for half an hour on the out-trail, supervisors were instructed to find the cause for the delay. When carcasses sat for an hour, supervisors were told to spray the meat with a special acid wash. Carcasses that sat for longer than two hours, that were at highest risk for bacterial contamination, were not to be destroyed, or sent to rendering, or set aside for processing into precooked meats. "Such carcasses," IBP's top food safety executive advised, "are to be designated for outside (non-IBP) carcass sale." The dirtiest meat was to be shipped out and sold for public consumption — but not with an IBP label on it.

Instead of focusing on the primary causes of meat contamination — the feed being given to cattle, the overcrowding at feedlots, the poor sanitation at slaughterhouses, excessive line speeds, poorly trained workers, the lack of stringent government oversight — the meatpacking industry and the USDA are now advocating an exotic technological solution to the problem of foodborne pathogens. They want to irradiate the nation's meat. Irradiation is a form of bacterial birth control, pioneered in the 1960s by the U.S. Army and by NASA. When microorganisms are zapped with low levels of gamma rays or x-rays, they are not killed, but their DNA is disrupted, and they cannot reproduce. Irradiation has been used for years on some imported spices and domestic poultry. Most irradiating facilities have concrete walls that are six feet thick, employing cobalt 60 or cesium 137 (a waste product from nuclear weapons plants and nuclear power plants) to create highly charged, radioactive beams. A new technique, developed by the Titan Corporation, uses conventional electricity and an electronic accelerator instead of radioactive isotopes. Titan devised its SureBeam irradiation technology during the 1980s, while conducting research for the Star Wars antimissile program.

The American Medical Association and the World Health Organization have declared that irradiated foods are safe to eat. Widespread introduction of the process has thus far been impeded, however, by a reluctance among consumers to eat things that have been exposed to radiation. According to current USDA regulations, irradiated meat must be identified with a special label and with a radura (the internationally recognized symbol of radiation). The Beef Industry Food Safety Council — whose members include the meatpacking and fast food giants — has asked the USDA to change its rules and make the

labeling of irradiated meat completely voluntary. The meatpacking industry is also working hard to get rid of the word "irradiation," much preferring the phrase "cold pasteurization."

One slaughterhouse engineer that I interviewed — who has helped to invent some of the most sophisticated food safety equipment now being used — told me that from a purely scientific point of view, irradiation may be safe and effective. But he is concerned about the introduction of highly complex electromagnetic and nuclear technology into slaughterhouses with a largely illiterate, non-English-speaking workforce. "These are not the type of people you want working on that level of equipment," he says. He also worries that the widespread use of irradiation might encourage meatpackers "to speed up the kill floor and spray shit everywhere." Steven Bjerklie, the former editor of *Meat & Poultry*, opposes irradiation on similar grounds. He thinks it will reduce pressure on the meatpacking industry to make fundamental and necessary changes in their production methods, allowing unsanitary practices to continue. "I don't want to be served irradiated feces along with my meat," Bjerklie says.

what kids eat

FOR YEARS SOME OF the most questionable ground beef in the United States was purchased by the USDA — and then distributed to school cafeterias throughout the country. Throughout the 1980s and 1990s, the USDA chose meat suppliers for its National School Lunch Program on the basis of the lowest price, without imposing additional food safety requirements. The cheapest ground beef was not only the most likely to be contaminated with pathogens, but also the most likely to contain pieces of spinal cord, bone, and gristle left behind by Automated Meat Recovery Systems (contraptions that squeeze the last shreds of meat off bones). A 1983 investigation by NBC News said that the Cattle King Packing Company — at the time, the USDA's largest supplier of ground beef for school lunches and a supplier to Wendy's — routinely processed cattle that were already dead before arriving at its plant, hid diseased cattle from inspectors, and mixed rotten meat that had been returned by customers into packages of hamburger meat. Cattle King's facilities were infested with rats and cockroaches. Rudy "Butch" Stanko, the owner of the company, was later tried and convicted for selling tainted meat to the federal govern-

ment. He had been convicted just two years earlier on similar charges. That earlier felony conviction had not prevented him from supplying one-quarter of the ground beef served in the USDA school lunch program.

More recently, an eleven-year-old boy became seriously ill in April of 1998 after eating a hamburger at his elementary school in Danielsville, Georgia. Tests of the ground beef, which had been processed by the Bauer Meat Company, confirmed the presence of *E. coli* O157:H7. Bauer Meat's processing plant in Ocala, Florida, was so filthy that on August 12, 1998, the USDA withdrew its inspectors, a highly unusual move. Frank Bauer, the company's owner, committed suicide the next day. The USDA later declared Bauer's meat products "unfit for human consumption," ordering that roughly 6 million pounds be detained. Nearly a third of the meat had already been shipped to school districts in North Carolina and Georgia, U.S. military bases, and prisons. Around the same time, a dozen children in Finley, Washington, were sickened by *E. coli* O157:H7. Eleven of them had eaten undercooked beef tacos at their school cafeteria; the twelfth, a two-year-old, was most likely infected by one of the other children. The company that had supplied the USDA with the taco meat — Northern States Beef, a subsidiary of ConAgra — had in the previous eighteen months been cited for 171 "critical" food safety violations at its facilities. A critical violation is one likely to cause serious contamination and to harm consumers. Northern States Beef was also linked to a 1994 outbreak of *E. coli* O157:H7 in Nebraska that sickened eighteen people. Nevertheless, the USDA continued to do business with the ConAgra subsidiary, buying about 20 million pounds of its meat for use in American schools.

In the summer and fall of 1999, a ground beef plant in Dallas, Texas, owned by Supreme Beef Processors failed a series of USDA tests for *Salmonella*. The tests showed that as much as 47 percent of the company's ground beef contained *Salmonella* — a proportion five times higher than what USDA regulations allow. Every year in the United States food tainted with *Salmonella* causes about 1.4 million illnesses and 500 deaths. Moreover, high levels of *Salmonella* in ground beef indicate high levels of fecal contamination. Despite the alarming test results, the USDA continued to purchase thousands of tons of meat from Supreme Beef for distribution in schools. Indeed, Supreme Beef Processors was one of the nation's largest suppliers to the school meals program, annually providing as much as 45 percent

of its ground beef. On November 30, 1999, the USDA finally took action, suspending purchases from Supreme Beef and removing inspectors from the company's plant, effectively shutting it down.

Supreme Beef responded the next day by suing the USDA in federal court, claiming that *Salmonella* was a natural organism, not an adulterant. With backing from the National Meat Association, Supreme Beef challenged the legality of the USDA's science-based testing system and contended that the government had no right to remove inspectors from the plant. A. Joe Fish, a federal judge in Texas, heard Supreme Beef's arguments and immediately ordered USDA inspectors back into the plant, pending final resolution of the lawsuit. The plant shut-down — the first ever attempted under the USDA's new science-based system — lasted less than one day. A few weeks later, USDA inspectors detected *E. coli* O157:H7 in a sample of meat from the Supreme Beef plant, and the company voluntarily recalled 180,000 pounds of ground beef that had been shipped to eight states. Nevertheless, just six weeks after that recall, the USDA resumed its purchases from Supreme Beef, once again allowing the company to supply ground beef for the nation's schools.

On May 25, 2000, Judge Fish issued a decision in the Supreme Beef case, ruling that the presence of high levels of *Salmonella* in the plant's ground beef was not proof that conditions there were "unsanitary." Fish endorsed one of Supreme Beef's central arguments: a ground beef processor should not be held responsible for the bacterial levels of meat that could easily have been tainted with *Salmonella* at a slaughterhouse. The ruling cast doubt on the USDA's ability to withdraw inspectors from a plant where tests revealed excessive levels of fecal contamination. Although Supreme Beef portrayed itself in the case as an innocent victim of forces beyond its control, much of the beef used at the plant had come from its own slaughterhouse in Ladonia, Texas. That slaughterhouse had repeatedly failed USDA tests for *Salmonella*.

Not long after the ruling, Supreme Beef failed another *Salmonella* test. The USDA moved to terminate its contract with the company and announced tough new rules for processors hoping to supply ground beef to the school lunch program. The rules sought to impose the same sort of food safety requirements that fast food chains demand from their suppliers. Beginning with the 2000–2001 school year, ground beef intended for distribution to schools would be tested for pathogens; meat that failed the tests would be rejected; and "downers"

— cattle too old or too sick to walk into a slaughterhouse — could no longer be processed into the ground beef that the USDA buys for children. The meatpacking industry immediately opposed the new rules.

your kitchen sink

DURING THE 1990s, the federal government (which is supposed to ensure food safety) applied standards to the meat it purchased for schools that were much less stringent than the standards applied by the fast food industry (which is responsible for much of the current threat to food safety). Having played a central role in the creation of a meatpacking system that can spread bacterial contamination far and wide, the fast food chains are now able to avoid many of the worst consequences. Much like Jack in the Box, the leading chains have in recent years forced their suppliers to conduct frequent tests for *E. coli* O157:H7 and other pathogens. More importantly, the enormous buying power of the fast food giants has given them access to some of the cleanest ground beef. The meatpacking industry is now willing to perform the sort of rigorous testing for fast food chains that it refuses to do for the general public.

Anyone who brings raw ground beef into his or her kitchen today must regard it as a potential biohazard, one that may carry an extremely dangerous microbe, infectious at an extremely low dose. The current high levels of ground beef contamination, combined with the even higher levels of poultry contamination, have led to some bizarre findings. A series of tests conducted by Charles Gerba, a microbiologist at the University of Arizona, discovered far more fecal bacteria in the average American kitchen sink than on the average American toilet seat. According to Gerba, "You'd be better off eating a carrot stick that fell in your toilet than one that fell in your sink."

Although the fast food chains have belatedly made food safety a priority, their production and distribution systems remain vulnerable to newly emerging foodborne pathogens. A virus that carries the gene to produce Shiga toxins is now infecting previously harmless strains of *E. coli*. Dr. David Acheson, an associate professor of medicine at Tufts University Medical School, believes the spread of that virus is being encouraged by the indiscriminate use of antibiotics in cattle feed. In addition to *E. coli* O157:H7, approximately sixty to one hundred other mutant *E. coli* organisms now produce Shiga toxins. Perhaps a third of

them cause illnesses in human beings. Among the most dangerous are *E. coli* O103, O111, O26, O121, and O145. The standard tests being used to find *E. coli* O157:H7 do not detect the presence of these other bugs. The CDC now estimates that roughly 37,000 Americans suffer food poisoning each year from non-O157 strains of *E. coli*, about 1,000 people are hospitalized, and about 25 die.

No matter how well executed the HACCP plan, no matter how highly automated the grills, no matter how many bursts of gamma radiation are fired at the meat, the safety of the food at any restaurant ultimately depends upon the workers in its kitchen. Dr. Patricia Griffin, one of the CDC's leading experts on *E. coli* O157:H7, believes that food safety classes should be mandatory for fast food workers. "We place our lives in their hands," she says, "in the same way we entrust our lives to the training of airline pilots." Griffin worries that a low-paid, unskilled workforce composed of teenagers and recent immigrants may not always be familiar with proper food handling procedures.

Dr. Griffin has good reason to worry. A 1997 undercover investigation by KCBS-TV in Los Angeles videotaped local restaurant workers sneezing into their hands while preparing food, licking salad dressing off their fingers, picking their noses, and flicking their cigarettes into meals about to be served. In May of 2000, three teenage employees at a Burger King in Scottsville, New York, were arrested for putting spit, urine, and cleaning products such as Easy-Off Oven Cleaner and Comet with Bleach into the food. They had allegedly tampered with the Burger King food for eight months, and it was served to thousands of customers, until a fellow employee informed the management.

The teenage fast food workers I met in Colorado Springs, Colorado, told me other horror stories. The safety of the food seemed to be determined more by the personality of the manager on duty than by the written policies of the chain. Many workers would not eat anything at their restaurant unless they'd made it themselves. A Taco Bell employee said that food dropped on the floor was often picked up and served. An Arby's employee told me that one kitchen worker never washed his hands at work after doing engine repairs on his car. And several employees at the same McDonald's restaurant in Colorado Springs independently provided details about a cockroach infestation in the milk-shake machine and about armies of mice that urinated and defecated on hamburger rolls left out to thaw in the kitchen every night.