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October 3, 2009

The Burger That Shattered Her Life

By **MICHAEL MOSS**

Stephanie Smith, a children's dance instructor, thought she had a stomach virus. The aches and cramping were tolerable that first day, and she finished her classes.

Then her [diarrhea](#) turned bloody. Her kidneys shut down. [Seizures](#) knocked her unconscious. The [convulsions](#) grew so relentless that doctors had to put her in a [coma](#) for nine weeks. When she emerged, she could no longer walk. The affliction had ravaged her nervous system and left her paralyzed.

Ms. Smith, 22, was found to have a severe form of food-borne illness caused by E. coli, which Minnesota officials [traced](#) to the hamburger that her mother had grilled for their Sunday dinner in early fall 2007.

"I ask myself every day, 'Why me?' and 'Why from a hamburger?'" Ms. Smith said. In the simplest terms, she ran out of luck in a food-safety game of chance whose rules and risks are not widely known.

Meat companies and grocers have been barred from selling ground beef tainted by the virulent strain of E. coli known as O157:H7 since 1994, after an outbreak at Jack in the Box restaurants left four children dead. Yet tens of thousands of people are still sickened annually by this pathogen, federal health officials estimate, with hamburger being the biggest culprit. Ground beef has been blamed for 16 outbreaks in the last three years alone, including the one that left Ms. Smith paralyzed from the waist down. This summer, contamination led to the recall of beef from nearly 3,000 grocers in 41 states.

Ms. Smith's reaction to the virulent strain of E. coli was extreme, but tracing the story of her burger, through interviews and government and corporate records obtained by The New York Times, shows why eating ground beef is still a gamble. Neither the system meant to make the meat safe, nor the meat itself, is what consumers have been led to believe.

Ground beef is usually not simply a chunk of meat run through a grinder. Inst interviews show, a single portion of hamburger meat is often an amalgam of v



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meat from different parts of cows and even from different slaughterhouses. These cuts of meat are particularly vulnerable to *E. coli* contamination, food experts and officials say. Despite this, there is no federal requirement for grinders to test their ingredients for the pathogen.

The frozen hamburgers that the Smiths ate, which were made by the food giant Cargill, were labeled "American Chef's Selection Angus Beef Patties." Yet confidential grinding logs and other Cargill records show that the hamburgers were made from a mix of slaughterhouse trimmings and a mash-like product derived from scraps that were ground together at a plant in Wisconsin. The ingredients came from slaughterhouses in Nebraska, Texas and Uruguay, and from a South Dakota company that processes fatty trimmings and treats them with ammonia to kill bacteria.

Using a combination of sources — a practice followed by most large producers of fresh and packaged hamburger — allowed Cargill to spend about 25 percent less than it would have for cuts of whole meat.

Those low-grade ingredients are cut from areas of the cow that are more likely to have had contact with feces, which carries *E. coli*, industry research shows. Yet Cargill, like most meat companies, relies on its suppliers to check for the bacteria and does its own testing only after the ingredients are ground together. The United States Department of Agriculture, which allows grinders to devise their own safety plans, has encouraged them to test ingredients first as a way of increasing the chance of finding contamination.

Unwritten agreements between some companies appear to stand in the way of ingredient testing. Many big slaughterhouses will sell only to grinders who agree not to test their shipments for *E. coli*, according to officials at two large grinding companies. Slaughterhouses fear that one grinder's discovery of *E. coli* will set off a recall of ingredients they sold to others.

"Ground beef is not a completely safe product," said Dr. Jeffrey Bender, a [food safety](#) expert at the [University of Minnesota](#) who helped develop systems for tracing *E. coli* contamination. He said that while outbreaks had been on the decline, "unfortunately it looks like we are going a bit in the opposite direction."

Food scientists have registered increasing concern about the virulence of this pathogen since only a few stray cells can make someone sick, and they warn that federal guidance to cook meat thoroughly and to wash up afterward is not sufficient. A test by The Times found that the safe handling instructions are not enough to prevent the bacteria from spreading in the kitchen.

Cargill, whose \$116.6 billion in revenues last year made it the country's largest private company, declined requests to interview company officials or visit its facilities. "Cargill is not in a position to answer your specific questions, other than to state that we are committed to

continuous improvement in the area of food safety,” the company said, citing continuing litigation.

The meat industry treats much of its practices and the ingredients in ground beef as trade secrets. While the Department of Agriculture has inspectors posted in plants and has access to production records, it also guards those secrets. Federal records released by the department through the Freedom of Information Act **blacked out** details of Cargill's grinding operation that could be learned only through copies of the **documents** obtained from other sources. Those documents illustrate the restrained approach to enforcement by a department whose missions include ensuring meat safety and promoting agriculture markets.

Within weeks of the Cargill outbreak in 2007, U.S.D.A. officials swept across the country, conducting spot checks at 224 meat plants to assess their efforts to combat E. coli. Although inspectors had been monitoring these plants all along, officials found **serious problems** at 55 that were failing to follow their own safety plans.

“Every time we look, we find out that things are not what we hoped they would be,” said Loren D. Lange, an executive associate in the Agriculture Department's food safety division.

In the weeks before Ms. Smith's patty was made, federal inspectors had repeatedly found that Cargill was violating its **own safety procedures** in handling ground beef, but they imposed no fines or sanctions, records show. After the outbreak, the department threatened to withhold the seal of approval that declares “U.S. Inspected and Passed by the Department of Agriculture.”

In the end, though, the agency accepted Cargill's proposal to increase its scrutiny of suppliers. That agreement came early last year after contentious negotiations, records show. When Cargill defended its safety system and initially resisted making some changes, an **agency official wrote back**: “How is food safety not the ultimate issue?”

The Risk

On Aug. 16, 2007, the day Ms. Smith's hamburger was made, the **No.3 grinder** at the Cargill plant in Butler, Wis., started up at 6:50 a.m. The largest ingredient was beef trimmings known as “50/50” — half fat, half meat — that cost about **60 cents a pound**, making them the cheapest component.

Cargill bought these trimmings — fatty edges sliced from better cuts of meat — from Greater Omaha Packing, where some 2,600 cattle are slaughtered daily and processed in a plant the size of four football fields.

As with other slaughterhouses, the potential for contamination is present every step of the way,

according to workers and federal inspectors. The cattle often arrive with smears of feedlot feces that harbor the E. coli pathogen, and the hide must be removed carefully to keep it off the meat. This is especially critical for trimmings sliced from the outer surface of the carcass.

Federal inspectors based at the plant are supposed to monitor the hide removal, but much can go wrong. Workers slicing away the hide can inadvertently spread feces to the meat, and large clamps that hold the hide during processing sometimes slip and smear the meat with feces, the workers and inspectors say.

Greater Omaha vacuums and washes carcasses with hot water and lactic acid before sending them to the cutting floor. But these safeguards are not foolproof.

“As the trimmings are going down the processing line into combos or boxes, no one is inspecting every single piece,” said one federal inspector who monitored Greater Omaha and requested anonymity because he was not authorized to speak publicly.

The E. coli risk is also present at the gutting station, where intestines are removed, the inspector said

Every five seconds or so, half of a carcass moves into the meat-cutting side of the slaughterhouse, where trimmers said they could keep up with the flow unless they spot any remaining feces.

“We would step in and stop the line, and do whatever you do to take it off,” said Esley Adams, a former supervisor who said he was fired this summer after 16 years following a dispute over sick leave. “But that doesn’t mean everything was caught.”

Two current employees said the flow of carcasses keeps up its torrid pace even when trimmers get reassigned, which increases pressure on workers. To protest one such episode, the employees said, dozens of workers walked off the job for a few hours earlier this year. Last year, workers sued Greater Omaha, alleging that they were not paid for the time they need to clean contaminants off their knives and other gear before and after their shifts. The company is contesting the lawsuit.

Greater Omaha did not respond to repeated requests to interview company officials. In a statement, a company official said Greater Omaha had a “reputation for embracing new food safety technology and utilizing science to make the safest product possible.”

The Trimmings

In making hamburger meat, grinders aim for a specific fat content — 26.6 percent in the lot that

Ms. Smith's patty came from, company records show. To offset Greater Omaha's 50/50 trimmings, Cargill added leaner material from three other suppliers.

Records show that some came from a Texas slaughterhouse, Lone Star Beef Processors, which specializes in dairy cows and bulls too old to be fattened in feedlots. In a [form letter](#) dated two days before Ms. Smith's patty was made, Lone Star recounted for Cargill its various safety measures but warned "to this date there is no guarantee for pathogen-free raw material and we would like to stress the importance of proper handling of all raw products."

Ms. Smith's burger also contained trimmings from a slaughterhouse in Uruguay, where government officials insist that they have never found E. coli O157:H7 in meat. Yet audits of Uruguay's meat operations conducted by the U.S.D.A. have found sanitation problems, including improper testing for the pathogen. Dr. Hector J. Lazaneo, a meat safety official in Uruguay, said the problems were corrected immediately. "Everything is fine, finally," he said. "That is the reason we are exporting."

Cargill's final source was a supplier that turns fatty trimmings into what it calls "fine lean textured beef." The company, Beef Products Inc., said it bought meat that averages between 50 percent and 70 percent fat, including "[any small pieces of fat](#) derived from the normal breakdown of the beef carcass." It warms the trimmings, removes the fat in a centrifuge and treats the remaining product with ammonia to kill E. coli.

With seven million pounds produced each week, the company's product is widely used in hamburger meat sold by grocers and fast-food restaurants and served in the federal school lunch program. Ten percent of Ms. Smith's burger came from Beef Products, which charged Cargill about \$1.20 per pound, or 20 cents less than the lean trimmings in the burger, billing records show.

An [Iowa State University study](#) financed by Beef Products found that ammonia reduces E. coli to levels that cannot be detected. The Department of Agriculture accepted the research as proof that the treatment was effective and safe. And Cargill told the agency after the outbreak that it had [ruled out](#) Beef Products as the possible source of contamination.

But federal school lunch officials found E. coli in Beef Products material in 2006 and 2008 and again in August, and stopped it from going to schools, according to Agriculture Department records and interviews. A Beef Products official, Richard Jochum, said that last year's contamination stemmed from a "minor change in our process," which the company adjusted. The company did not respond to questions about the latest finding.

In combining the ingredients, Cargill was following a common industry practice of mixing trim

from various suppliers to hit the desired fat content for the least money, industry officials said.

In all, the ingredients for Ms. Smith's burger cost Cargill about \$1 a pound, company records show, or about 30 cents less than industry experts say it would cost for ground beef made from whole cuts of meat.

Ground beef sold by most grocers is made from a blend of ingredients, industry officials said. Agriculture Department regulations also allow hamburger meat labeled ground chuck or sirloin to contain trimmings from those parts of the cow. At a chain like [Publix Super Markets](#), customers who want hamburger made from whole cuts of meat have to buy a steak and have it specially ground, said a Publix spokeswoman, Maria Brous, or buy a product like Bubba Burgers, which boasts on its labeling, "100% whole muscle means no trimmings."

To finish off the Smiths' ground beef, Cargill added bread crumbs and spices, fashioned it into patties, froze them and packed them 18 to a carton.

The listed ingredients revealed little of how the meat was made. There was just one meat product listed: "Beef."

Tension Over Testing

As it fed ingredients into its grinders, Cargill watched for some unwanted elements. Using metal detectors, workers snagged stray nails and metal hooks that could damage the grinders, then warned suppliers to make sure it did not happen again.

But when it came to E. coli O157:H7, Cargill did not screen the ingredients and only tested once the grinding was done. The potential pitfall of this practice surfaced just weeks before Ms. Smith's patty was made. A company spot check in May 2007 found E. coli in finished hamburger, which Cargill [disclosed](#) to investigators in the wake of the October outbreak. But Cargill told them it could not determine which supplier had shipped the tainted meat since the ingredients had already been mixed together.

"Our finished ground products typically contain raw materials from numerous suppliers," Dr. Angela Siemens, the technical services vice president for Cargill's meat division, [wrote](#) to the U.S.D.A. "Consequently, it is not possible to implicate a specific supplier without first observing a pattern of potential contamination."

Testing has been a point of contention since the 1994 ban on selling ground beef contaminated with E. coli O157:H7 was imposed. The department moved to require some bacterial testing of ground beef, but the industry argued that the cost would unfairly burden small producers, industry officials said. The Agriculture Department opted to carry out its own tests for E. coli,

but it acknowledges that its 15,000 spot checks a year at thousands of meat plants and groceries nationwide is not meant to be comprehensive. Many slaughterhouses and processors have voluntarily adopted testing regimes, yet they vary greatly in scope from plant to plant.

The retail giant Costco is one of the few big producers that tests trimmings for *E. coli* before grinding, a practice it adopted after a New York woman was sickened in 1998 by its hamburger meat, prompting a recall.

Craig Wilson, Costco's food safety director, said the company decided it could not rely on its suppliers alone. "It's incumbent upon us," he said. "If you say, 'Craig, this is what we've done,' I should be able to go, 'Cool, I believe you.' But I'm going to check."

Costco said it had found *E. coli* in foreign and domestic beef trimmings and pressured suppliers to fix the problem. But even Costco, with its huge buying power, said it had met resistance from some big slaughterhouses. "Tyson will not supply us," Mr. Wilson said. "They don't want us to test."

A Tyson spokesman, Gary Mickelson, would not respond to Costco's accusation, but said, "We do not and cannot" prohibit grinders from testing ingredients. He added that since Tyson tests samples of its trimmings, "we don't believe secondary testing by grinders is a necessity."

The food safety officer at American Foodservice, which grinds 365 million pounds of hamburger a year, said it stopped testing trimmings a decade ago because of resistance from slaughterhouses. "They would not sell to us," said Timothy P. Biela, the officer. "If I test and it's positive, I put them in a regulatory situation. One, I have to tell the government, and two, the government will trace it back to them. So we don't do that."

The surge in outbreaks since 2007 has led to finger-pointing within the industry.

Dennis R. Johnson, a lobbyist for the largest meat processors, has said that not all slaughterhouses are looking hard enough for contamination. He told U.S.D.A. officials last fall that those with aggressive testing programs typically find *E. coli* in as much as 1 percent to 2 percent of their trimmings, yet some slaughterhouses implicated in outbreaks had failed to find any.

At the same time, the meat processing industry has resisted taking the onus on itself. An Agriculture Department survey of more than 2,000 plants taken after the Cargill outbreak showed that half of the grinders did not test their finished ground beef for *E. coli*; only 6 percent said they tested incoming ingredients at least four times a year.

In October 2007, the agency issued a notice recommending that processors conduct at least a

few tests a year to verify the testing done by slaughterhouses. But after resistance from the industry, the department allowed suppliers to run the verification checks on their own operations.

In August 2008, the U.S.D.A. issued a [draft guideline](#) again urging, but not ordering, processors to test ingredients before grinding. "Optimally, every production lot should be sampled and tested before leaving the supplier and again before use at the receiver," the draft guideline said.

But the department received critical comments on the guideline, which has not been made official. Industry officials said that the cost of testing could unfairly burden small processors and that slaughterhouses already test. In an October 2008 letter to the department, the American Association of Meat Processors said the proposed guideline departed from U.S.D.A.'s strategy of allowing companies to devise their own safety programs, "thus returning to more of the agency's 'command and control' mind-set."

Dr. Kenneth Petersen, an assistant administrator with the department's Food Safety and Inspection Service, said that the department could mandate testing, but that it needed to consider the impact on companies as well as consumers. "I have to look at the entire industry, not just what is best for public health," Dr. Petersen said.

Tracing the Illness

The Smiths were slow to suspect the hamburger. Ms. Smith ate a mostly [vegetarian diet](#), and when she grew increasingly ill, her mother, Sharon, thought the cause might be spinach, which had been tied to a recent E. coli outbreak.

Five days after the family's Sunday dinner, Ms. Smith was admitted to St. Cloud Hospital in excruciating pain. "I've had women tell me that E. coli is more painful than childbirth," said Dr. Phillip I. Tarr, a pathogen expert at [Washington University](#) in St. Louis.

The vast majority of E. coli illnesses resolve themselves without complications, according to the [Centers for Disease Control and Prevention](#). Five percent to 10 percent develop into a condition called hemolytic uremic syndrome, which can affect kidney function. While most patients recover, in the worst cases, like Ms. Smith's, the toxin in E. coli O157:H7 penetrates the colon wall, damaging blood vessels and causing clots that can lead to seizures.

To control Ms. Smith's seizures, doctors put her in a coma and flew her to the [Mayo Clinic](#), where doctors worked to save her.

"They didn't even think her brain would work because of the seizing," her mother said.

"Thanksgiving Day, I was sitting there holding her hand when a group of doctors came in, and

one looked at me and just walked away, with nothing good to say. And I said, 'Oh my God, maybe this is my last Thanksgiving with her,' and I stayed and prayed."

Ms. Smith's illness was linked to the hamburger only by chance. Her aunt still had some of the frozen patties, and state health officials found that they were contaminated with a powerful strain of *E. coli* that was genetically identical to the pathogen that had sickened other Minnesotans.

Dr. Kirk Smith, who runs the state's food-borne illness outbreak group and is not related to Ms. Smith, was quick to finger the source. A 4-year-old had fallen ill three weeks earlier, followed by her year-old brother and two more children, state records show. Like Ms. Smith, the others had eaten Cargill patties bought at Sam's Club, a division of [Wal-Mart](#).

Moreover, the state officials discovered that the hamburgers were made on the same day, Aug. 16, 2007, shortly before noon. The time stamp on the Smiths' box of patties was 11:58.

On Friday, Oct. 5, 2007, a Minnesota Health Department warning led local news broadcasts. "We didn't want people grilling these things over the weekend," Dr. Smith said. "I'm positive we prevented illnesses. People sent us dozens of cartons with patties left. It was pretty contaminated stuff."

Eventually, health officials tied 11 cases of illness in Minnesota to the Cargill outbreak, and altogether, federal health officials estimate that the outbreak sickened 940 people. Four of the 11 Minnesota victims developed hemolytic uremic syndrome — an unusually high rate of serious complications.

In the wake of the outbreak, the U.S.D.A. reminded consumers on its Web site that hamburgers had to be cooked to 160 degrees to be sure any *E. coli* is killed and urged them to use a thermometer to check the temperature. This reinforced Sharon Smith's concern that she had sickened her daughter by not cooking the hamburger thoroughly.

But the pathogen is so powerful that her illness could have started with just a few cells left on a counter. "In a warm kitchen, *E. coli* cells will double every 45 minutes," said Dr. Mansour Samadpour, a microbiologist who runs IEH Laboratories in Seattle, one of the meat industry's largest testing firms.

With help from his laboratories, The Times prepared three pounds of ground beef dosed with a strain of *E. coli* that is nonharmful but acts in many ways like O157:H7. Although the safety instructions on the package were followed, *E. coli* remained on the cutting board even after it was washed with soap. A towel picked up large amounts of bacteria from the meat.

Dr. James Marsden, a meat safety expert at [Kansas State University](#) and senior science adviser for the North American Meat Processors Association, said the Department of Agriculture needed to issue better guidance on avoiding cross-contamination, like urging people to use [bleach](#) to sterilize cutting boards. “Even if you are a scientist, much less a housewife with a child, it’s very difficult,” Dr. Marsden said.

Told of The Times’s test, Jerold R. Mande, the deputy under secretary for food safety at the U.S.D.A., said he planned to “look very carefully at the labels that we oversee.”

“They need to provide the right information to people,” Mr. Mande said, “in a way that is readable and actionable.”

Dead Ends

With Ms. Smith lying comatose in the hospital and others ill around the country, Cargill announced on Oct. 6, 2007, that it was recalling 844,812 pounds of patties. The mix of ingredients in the burgers made it almost impossible for either federal officials or Cargill to trace the contamination to a specific slaughterhouse. Yet after the outbreak, Cargill had new incentives to find out which supplier had sent the tainted meat.

Cargill got hit by multimillion-dollar claims from people who got sick.

Shawn K. Stevens, a lawyer in Milwaukee working for Cargill, began investigating. Sifting through state health department records from around the nation, Mr. Stevens found the case of a young girl in Hawaii stricken with the same E. coli found in the Cargill patties. But instead of a Cargill burger, she had eaten raw minced beef at a Japanese restaurant that Mr. Stevens said he traced through a distributor to Greater Omaha.

“Potentially, it could let Cargill shift all the responsibility,” Mr. Stevens said. In March, he sent his findings to William Marler, a lawyer in Seattle who specializes in food-borne disease cases and is handling the claims against Cargill.

“Most of the time, in these outbreaks, it’s not unusual when I point the finger at somebody, they try to point the finger at somebody else,” Mr. Marler said. But he said Mr. Stevens’s finding “doesn’t rise to the level of proof that I need” to sue Greater Omaha.

It is unclear whether Cargill presented the Hawaii findings to Greater Omaha, since neither company would comment on the matter. In December 2007, in a move that Greater Omaha said was unrelated to the outbreak, the slaughterhouse [informed](#) Cargill that it had taken 16 “corrective actions” to better protect consumers from E. coli “as we strive to live up to the performance standards required in the continuation of supplier relationship with Cargill.”

Those changes included better monitoring of the production line, more robust testing for *E. coli*, intensified plant sanitation and added employee training.

The U.S.D.A. efforts to find the ultimate source of the contamination went nowhere. Officials examined production records of Cargill's three domestic suppliers, but they yielded no clues. The Agriculture Department contacted Uruguayan officials, who said they found nothing amiss in the slaughterhouse there.

In examining Cargill, investigators discovered that their own inspectors had **lodged complaints** about unsanitary conditions at the plant in the weeks before the outbreak, but that they had failed to set off any alarms within the department. Inspectors had found "large amounts of patties on the floor," grinders that were gnarly with old bits of meat, and a worker who routinely dumped inedible meat on the floor close to a production line, records show.

Although none were likely to have caused the contamination, federal officials said the conditions could have exacerbated the spread of bacteria. Cargill vowed to correct the problems. Dr. Petersen, the federal food safety official, said the department was working to make sure violations are tracked so they can be used "in real time to take action."

The U.S.D.A. found that Cargill had not followed its own safety program for controlling *E. coli*. For example, Cargill was supposed to obtain a certificate from each supplier showing that their tests had found no *E. coli*. But Cargill did not have a certificate for the Uruguayan trimmings used on the day it made the burgers that sickened Ms. Smith and others.

After four months of negotiations, Cargill agreed to increase its scrutiny of suppliers and their testing, including audits and periodic checks to determine the accuracy of their laboratories.

A recent industry test in which spiked samples of meat were sent to independent laboratories used by food companies found that some missed the *E. coli* in as many as 80 percent of the samples.

Cargill also said it would notify suppliers whenever it found *E. coli* in finished ground beef, so they could check their facilities. It also agreed to increase testing of finished ground beef, according to a U.S.D.A. official familiar with the company's operations, but would not test incoming **ingredients**.

Looking to the Future

The spate of outbreaks in the last three years has increased pressure on the Agriculture Department and the industry.

James H. Hodges, executive vice president of the American Meat Institute, a trade association, said that while the outbreaks were disconcerting, they followed several years during which there were fewer incidents. "Are we perfect?" he said. "No. But what we have done is to show some continual improvement."

Dr. Petersen, the U.S.D.A. official, said the department had adopted additional procedures, including enhanced testing at slaughterhouses implicated in outbreaks and better training for investigators.

"We are not standing still when it comes to E. coli," Dr. Petersen said.

The department has held a series of meetings since the recent outbreaks, soliciting ideas from all quarters. Dr. Samadpour, the laboratory owner, has said that "we can make hamburger safe," but that in addition to enhanced testing, it will take an aggressive use of measures like meat rinses and safety audits by qualified experts.

At these sessions, Felicia Nestor, a senior policy analyst with the consumer group Food and Water Watch, has urged the government to redouble its effort to track outbreaks back to slaughterhouses. "They are the source of the problem," Ms. Nestor said.

For Ms. Smith, the road ahead is challenging. She is living at her mother's home in Cold Spring, Minn. She spends a lot of her time in [physical therapy](#), which is being paid for by Cargill in anticipation of a legal claim, according to Mr. Marler. Her kidneys are at high risk of failure. She is struggling to regain some basic life skills and deal with the anger that sometimes envelops her. Despite her determination, doctors say, she will most likely never walk again.

Gabe Johnson contributed reporting.