

What's in that pork?

We found antibiotic-resistant bacteria and traces of a veterinary drug

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Our analysis of pork-chop and ground-pork samples from around the U.S. found that *Yersinia enterocolitica*, a bacterium that can cause fever, diarrhea, and abdominal pain, was widespread. Some samples harbored other potentially harmful bacteria, including salmonella. And there are more reasons to be concerned about “the other white meat.”

Some of the bacteria we found in 198 samples proved to be resistant to antibiotics commonly used to treat people. The frequent use of low-dose antibiotics in pork farming may be accelerating the growth of drug-resistant “superbugs” that threaten human health.



About one-fifth of the 240 pork products we analyzed in a separate test harbored low levels of the drug ractopamine, which the U.S. approved in 1999 to promote growth and leanness in pigs. It's commonly used in pigs raised for food in the U.S. but is banned in the European Union, China, and Taiwan. Our food-safety experts say that no drugs should be used routinely in healthy animals to promote growth. Here are details from our tests:

- *Yersinia enterocolitica* was in 69 percent of the tested pork samples. It infects about 100,000 Americans a year, especially children. We found salmonella, *Staphylococcus aureus*, or *Listeria monocytogenes*, more common causes of foodborne illness, in 3 to 7 percent of samples. And 11 percent harbored enterococcus, which can indicate fecal contamination and can cause problems such as urinary-tract infections.
- Some of the bacteria we found were resistant to multiple drugs or classes of drugs. That's worrisome, because if those bugs make you sick, your doctor may need to prescribe more powerful (and expensive) antibiotics.
- Ground pork was more likely than pork chops to harbor pathogens. That's to be expected, since grinding meat provides another opportunity for contamination.
- Some antibiotic claims you'll see on packaging are misleading. And a “no hormones added” claim might be true but is meaningless, because hormones aren't allowed in pork production.

Read more about [antibiotics in meat](#).

Did you know?

Years ago, trichinosis was the main fear about eating pork. But the risk from that parasite was largely eradicated by changes in industry practices (legislation banned the feeding of certain raw foods to hogs) and public awareness of the risks of eating undercooked meat.

Bugs in pigs

All animals (humans included) have bacteria on their skin and in their gastrointestinal tract. Some are beneficial, including the probiotic kind, which help digestion. Others, such as salmonella, can be harmful to people, but affected animals might not become ill. Confining animals in less-than-clean quarters can allow bad bacteria to proliferate.

An animal's muscles (meat), blood, and brain are normally sterile. But during slaughter and processing, meat can become contaminated with bacteria from the animal's skin or gut and from workers, equipment, or the environment. Contamination is especially likely to occur if processing lines run too fast or if sanitary practices aren't followed. Once bacteria are on meat, improper storage can encourage them to multiply.

To minimize contamination, the federal government requires processors of meat, poultry, and seafood to create safety and inspection procedures collectively known as HACCP (pronounced hass-ip), which stands for Hazard Analysis & Critical Control Points. Implemented for meat and poultry plants in 1997, HACCP is officially the consumer's first line of protection against contaminated pork. But inspectors spot-test for a limited number of pathogens. *Yersinia enterocolitica*, for example, isn't among them. And the Department of Agriculture can't require a recall if HACCP plans fail to meet goals.

“Very low contamination levels in hog carcasses indicate that companies' practices are adequately controlling pathogens,” a USDA spokeswoman told us. But our tests showed that some harmful bacteria can make their way into your kitchen.

Moreover, the bacteria we found often continued to multiply even in the presence of some drugs designed to kill them or stop them from reproducing. Thirteen of 14 *Staphylococcus* samples we isolated from pork were resistant to one or more antibiotics. So were six of eight salmonella samples, 12 of 19 enterococcus samples, and 121 of 132 *Yersinia* samples. One sample was identified as MRSA, a drug-resistant and sometimes fatal staph.

Pigs on drugs

Some 80 percent of all antibiotics sold in the U.S. are given to animals raised for food. Often, those drugs aren't used to treat infections but are fed continuously in low doses to promote growth and prevent infections that can spread in the cramped quarters in which most farm animals live. A single barn from a large hog-production facility can hold 2,000 or more pigs, creating ideal conditions for the spread of antibiotic-resistant bacteria.

"When you give low-dose antibiotics for growth promotion or for prophylaxis of infection, you end up killing off the susceptible bacteria, whether they're E. coli, salmonella, campylobacter, or other bacteria," says Robert S. Lawrence, M.D., director of the Center for a Livable Future at the Johns Hopkins Bloomberg School of Public Health in Baltimore. "And you continue to select for those bacteria that, through spontaneous mutations or transfer of genes from other resistant bacteria, allow them to be resistant to antibiotics." Lawrence cited recent laboratory research at Boston University suggesting that the continual exposure to low doses of antibiotics causes enough stress in bacteria to increase the rate of spontaneous mutations that render the bugs resistant to drugs, a process known as mutagenesis.

Mutant bacteria in animals can cause not only foodborne illness but also other treatment-resistant problems, such as infections of the skin or urinary tract. That's because the bugs don't just end up in the meat you buy; they can also wind up in fertilizer or contaminate the environment. And they can spread from person to person.

Another drug fed to animals, ractopamine, is given to as many as 60 to 80 percent of pigs raised in the U.S., by one estimate. It was originally developed (but never approved) as an asthma treatment for humans and was later found to boost pigs' growth and lean muscle mass.

The U.S. pork industry says ractopamine is safe. "Ractopamine is approved and used in 26 other countries, including some of the Asian countries," says Dave Warner, director of communications for the National Pork Producers Council, an industry group. "The issues with China and Taiwan have nothing to do with the safety of the product. Countries that have banned pork or meat from animals fed ractopamine are doing it to protect their domestic pork industries. This is not about food safety."

The European Food Safety Authority, which advises the European Union on food policy, concluded that it couldn't establish a safe level for ractopamine in food after reviewing the only study of its effect on humans (involving just six men). But it noted that drugs like ractopamine can cause restlessness, anxiety, a fast heart rate, and other conditions. And FDA documents show that it increases the risk of injury and lameness in pigs.

Warner emphasized that the U.S. pork industry uses ractopamine at levels that meet FDA and international food-safety standards. Indeed, although we found the drug at detectable levels in about 20 percent of our 240 pork samples, all had less than 5 parts per billion. That's well below the FDA's limit of 50 ppb in muscle tissue and the international limit of 10 ppb adopted in July 2012 by the Codex Alimentarius Commission, a program of the United Nations.

We asked three of the nation's largest pork producers—Smithfield Foods, Tyson, and JBS USA, which makes the Swift Premium and Swift Premium Natural brands—about their use of ractopamine. Keira Lombardo, vice president of investor relations and corporate communications at Smithfield, called it "a safe and effective FDA-approved feed supplement that has been widely used in the hog-farming industry for many years." Lombardo and a JBS spokeswoman, Margaret McDonald, told us their companies produce pork with and without ractopamine according to their customers' specifications.

Some food companies, including Chipotle Mexican Grill, Niman Ranch, and Whole Foods, say they don't sell any meat from pigs raised with ractopamine. Consumers Union, the policy and advocacy arm of Consumer Reports, has pressed for a ban of the drug, citing insufficient evidence that it's safe.

What you can do

These steps can help you minimize the risk of foodborne illness or discourage the routine use of antibiotics in agriculture:

- When cooking pork, use a meat thermometer to ensure that it reaches the proper internal temperature, which kills potentially harmful bacteria: at least 145° F for whole pork and 160° F for ground pork. (See our [buying guide to meat thermometers](#).)
- As with other meats, keep raw pork and its juices separate from other foods, especially those eaten raw, such as salad.
- Wash your hands thoroughly after handling raw meat.
- Choose pork and other meat products that were raised without drugs. One way to do that is to buy [certified organic pork](#), from pigs raised without antibiotics or ractopamine. Another option is to buy from Whole Foods, which requires that producers not use either type of drug.
- Look for a clear statement regarding antibiotic use. "No antibiotics used" claims with a USDA Process Verified shield are more reliable than those without verification. Labels such as "Animal Welfare Approved" and "Certified Humane" indicate the prudent use of antibiotics to treat illness.
- Watch out for misleading labels. "Natural" has nothing to do with antibiotic use or how an animal was raised. We found unapproved claims, including "no antibiotic residues," on packages of Sprouts pork sold in California and Arizona, and "no antibiotic growth promotants" on Farmland brand pork sold in several states. We reported those to the USDA in June 2012, and the agency told us it's working with those companies to take "appropriate actions." When we checked in early November, Sprouts had removed the claim from its packages. (See our [guide to food labels](#).)
- If your local supermarket doesn't carry pork from pigs raised without antibiotics, consider asking the store to

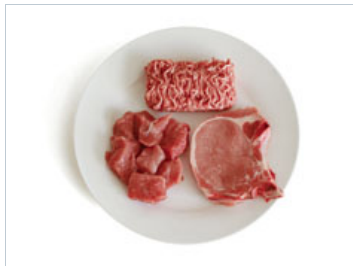


Photo by: Sean Gallup

carry it. To find meat from animals that were raised sustainably—humanely and without drugs—go to [eatwellguide.org](#). To learn about the Consumers Union campaign aimed at getting stores to sell only antibiotic-free meat, go to [NotinMyFood.org](#).

Germ count

Levels of contamination in the U.S. is about 50 pounds per year, based on 2009 Department of Agriculture data.

We tested 148 samples of meat from pork chops and 50 from ground pork, and found that almost 70 percent tested positive for yersinia enterocolitica, which can infect people who eat raw or undercooked pork.

Enterococcus, staphylococcus aureus, salmonella, and listeria monocytogenes were less common in the samples we tested. Twenty-three percent of the samples harbored none of the tested bacteria.

The pork samples we analyzed came from many brands, but we lacked enough samples within each brand to say whether one was more or less contaminated than another.

Big brands we tested: Denmark, Farmer John, Farmer John California Natural, Farmland, Hempler's, Hormel, Hormel Natural Choice, Nature's Promise, Nature's Rancher, Northwest Finest, Roseland, Smithfield, Swift Premium, and Tender Choice.

Store brands we tested: Angelo Caputo's, Bashas', Bristol Farms, Butera, Dominick's, Edmar, El Toreo Market, Food 4 Less, Fred Meyer, Fresh & Easy, The Fresh Market, Giant, Meijer, PCC Natural Markets, Publix, Ralphs, Safeway, Save-a-Lot, Sprouts Farmers Market and Farmers Market Old Tyme, Ultra Foods, Viet Wah, Vons, Walmart, Wegmans, Weis, Whole Foods, and Winn Dixie.

Levels of contamination	
Bacterium	Samples testing positive
Yersinia enterocolitica	69%
Enterococcus	11
Staphylococcus aureus	7
Salmonella	4
Listeria monocytogenes	3

How resistant to antibiotics?

Some antibiotics used to treat infections in people are also fed to pigs to speed their growth or prevent illness. But bacteria may evolve to become immune to antibiotics, at which point the drugs become less effective in treating people infected by those bugs. We tested whether samples of salmonella, staphylococcus aureus, enterococcus, and yersinia enterocolitica that we isolated from pork chops and ground pork could survive exposure to up to 13 antibiotics at levels that are usually effective against those bacteria. The antibiotics we used differed with each bug but included amoxicillin, penicillin, tetracycline, streptomycin, and others.

Bugs immune to drugs			
Bacterium	Samples tested	Samples resistant to one or more antibiotics	Details
Yersinia enterocolitica	132	121	Fifty-two of those were resistant to two or three antibiotics.
Staphylococcus aureus	14	13	Nine of those were resistant to two to four antibiotics.
Enterococcus	19	12	—
Salmonella	8	6	Three of those were resistant to five antibiotics.

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