The Land Stewardship Letter

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Antibiotics, Agriculture & *Resistance*

There is growing evidence that factory livestock farming produces more than cheap food—it also pumps out a bumper crop of antibiotic-resistant bacteria.

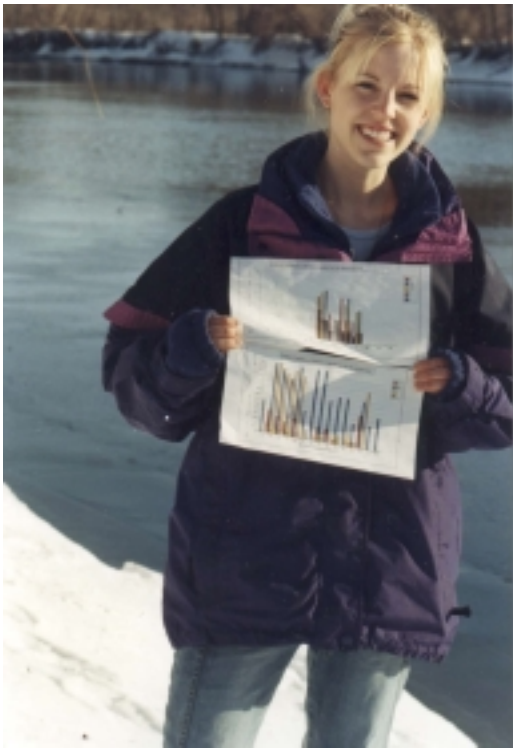
By Brian DeVore

"Wonder Drug Invades the Barnyard," proclaims the first frame of a 1950s-era newsreel. A pair of white-coated scientists is shown weighing an eight-week old chicken raised on regular feed: the bouncing needle on the hanging scale settles on one and a quarter pounds. Next comes a chicken that's received "wonder drugs"—antibiotics—in its feed. The needle arcs past the two-pound mark.

"Big news for farmers: antibiotics, the so-called wonder drugs, added to the diet of poultry and pigs, bring amazing results," pronounces the narrator in typical hyped-up newsreel fashion. "What a change it threatens to bring about."

Half a century later, that statement has turned out to be right on the mark in more ways than one. The use of antibiotics as growth promotants has revolutionized the livestock industry. These bacteria killers have made it possible to raise more animals in smaller spaces in a shorter amount of time. But the newsreel narrator's use of the word "threatens" has proven hauntingly relevant as well. Mounting evidence, much of it emerging in just the past few years, indicates that feeding low levels of antibiotics to livestock is putting at risk the very survival of these wonder drugs. Critics say the use of antibiotics in animal farming could return us to the "dark ages" when people died of simple infections due to a lack of effective bacteria killers.

These concerns are prompting calls for restrictions on the practice of adding antibiotics to feed. Would such restrictions throw meat, milk, egg and poultry production into a dark age of its own, a time when the livestock industry is slow, sloppy and feeds a lot fewer people? Or would they open the door to a more sustainable, family-farmer based food production system?



Wendy Halterman holds charts she has developed showing antibiotic-resistant bacteria trends on the Minnesota River. See page 14 for more on research related to the presence of superbugs in the environment. (*LSP photo*)

Putting on the pounds

Antibiotics—the term literally means "against life"— have had a relatively short, but very potent, career. Penicillin was first made available to the public in 1942, and it soon became clear this was a

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A note to readers

This special report on the development of antibiotic resistant bacteria in the livestock industry originally appeared in the March/April 2002 and May/June 2002 issues of the *Land Stewardship Letter*.

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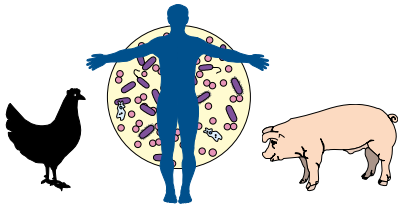
Antibiotics, Agriculture & *Resistance*



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major breakthrough in medical science: suddenly common infections that had been killing people for all of human history could be controlled. More antibiotics were developed and it didn't take long for scientists to figure out that these wonder drugs had other uses. In 1949, Thomas Jukes was working in a private laboratory when he and other scientists discovered by accident that feeding antibiotic residues to chicks increased weight gain 10 to 20 percent above normal. At first it wasn't clear how this boost came about. But now it is widely believed that, among other things, antibiotics suppress bacteria that reduce efficiency in the digestive system, thus increasing weight gain with less feed.

The antibiotics also help keep animals healthy enough to gain weight—that's particularly important in less than optimal living conditions. Confining animals their entire lives results in health problems galore. For example, dust in swine facilities—83 percent of sows are raised in total confinement, and 82 percent of small pigs are placed in total confinement nurseries, according to the USDA—contains particles of feed, feces, dried urine, swine dander, pollen, insect parts, mineral ash, mold and bacteria. This creates respiratory problems in hogs, resulting in a form of pneumonia in some cases. That's why respiratory diseases are the biggest cause of pig mortality. Feeding low levels of antibiotics like tetracycline can boost the immune systems of pigs, keeping them healthier and increasing their feed efficiency.

"It was the discovery of the effectiveness of the drugs as feed additives in these conditions which led to the concentration of the meat industry," said Jukes in a 1984 interview. "For the first time, farmers could confine a large number of animals and still keep them healthy."

Indeed, there's been a lot of debate in recent years as to what major technological innovation helped make large-scale, total confinement, factory farming possible. Lagoons, pits and pumps to handle millions of gallons of manure? Confinement buildings that use computer managed total climate control to create a yearlong spring inside? Yes, those and many other technologies have made confined animal feeding operations a reality. But it was the introduction of antibiotics—both as disease fighters and growth promoters—that made raising large numbers of animals in closed quarters consistently viable.

By 1954, U.S. farmers were using roughly 490,000 pounds of antibiotics a year in livestock feed. Six years later that figure was over one million pounds. In 1984, it was between 12 and 15 million pounds. Today, U.S. livestock are fed more than 24 million pounds of antibiotics for purposes other than treating disease, according to the Union of Concerned Scientists. Many of these drugs are the same, or are closely related to, antibiotics used in human medicine. For example, amoxicillin, ampicillin, erythromycin, neomycin, penicillin and tetracycline are all used to treat human infections, as well as in livestock farming. In some cases animal agriculture antibiotics are not used in human medicine, but hold the potential for treating people down the road—unless resistance destroys that potential.

The impacts on feed efficiency alone have been tremendous. In 1928, the average broiler chicken required 112 days and 48.4 pounds of feed to reach market weight. By 1990, broilers required 42 days and less than 8.8 pounds of feed. Other technological and management factors have played a part in speeding a broiler's trip to the supermarket, but there's no doubt antibiotics have been key, particularly as poultry operations become larger and more crowded.

In hogs, antibiotics can produce a 6 to 20 percent increase in growth from weaning through about 50 pounds, according to the University of Kentucky. Subtherapeutic antibiotics can add $1.26 per pig in profit, according to a University of Illinois study. That may not sound like much, but it adds up when a farmer is marketing several thousand pigs a year.

"The antibiotics are a great equalizer in the pig," says Tom Burkgren, Executive Director of the American Association of Swine Veterinarians.

Antibiotic use is present in all aspects of livestock production: poultry, dairy, beef and pork. In the swine industry alone, antibiotics are currently used in almost 90 percent of starter feeds, 75 percent of grower feeds and more than 50 percent of finishing feeds.

It's important to differentiate between "therapeutic" and "subtherapeutic"—also called "nontherapeutic"—use of antibiotics. The former is when a farmer treats a specific disease for a short amount of time with a high dosage of antibiotics. In theory, once the animals get better, the drug is pulled. With subtherapeutic use, the animals receive low dosages for an extended period of time, often for months. Such low level, long term dosages are fed either as a prophylactic or as a growth promoter. But this is where things get fuzzy; sometimes it's hard to tell where the disease prevention traits of an antibiotic stop, and the growth boosting begins.

For example, U.S. pork producers are currently permitted to use 29 over-the-counter antibiotics in feed. Of these, five are listed only as growth promotants, while seven are listed as both for growth promotion and "various infections," and 17 only for infections, according to a 1999 report produced by the Center for Agricultural and Rural Development at Iowa State University.

And what was meant to be a short term treatment can turn into something else.

"Sometimes a farm has a disease problem and they add something to the feed and never get around to taking it out," says Bo Norby, a research associate at Michigan State University's College of Veterinary Medicine.

Antibiotics in feed have been a boon to large operations that are maximizing space and feed usage while relying on employees who don't have the time or training to deal with individual animals.

But subtherapeutic antibiotic use is not exclusive to mega-scale farms raising tens of thousands of animals. One southwest Minnesota farmer who produces just under 2,000 head of hogs a year says although he doesn't crowd the animals in total confinement, he feels the pressure to use subtherapeutic dosages because of the increased disease risk posed by larger, more concentrated operations in the area. Also, antibiotics help reduce feed usage and shorten the time it takes to get pigs to market.

"Time is money," he says.

Volume, volume, volume

In 1963 several British cattle operations developed *Salmonella* bacteria that antibiotics had a hard time killing. This

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and other incidents helped launch nearly four decades of investigation into whether the use of antibiotics in livestock was creating superbugs—bacteria that could not be eliminated with regular antibiotics.

There is a precedent: overuse of antibiotics by doctors treating humans has already created such a reservoir of resistant bacteria. As many as one-third of all prescriptions in this country are unnecessary. Prescribing an antibiotic for a cold, for example, doesn't help, since a cold is a viral, not a bacterial, illness. In addition, health care professionals are concerned about patients who don't take a full course of antibiotics, saving some for later when they medicate themselves. This results in bacteria being exposed to lower levels of antibiotics, providing ample opportunities for resistance to develop. Between 1989 and 1999, American adults visited doctors more than 6.5 million times complaining of a sore throat, according to a study published in 2001 in the *Journal of the American Medical Association*. In over 70 percent of those visits, the patient was treated with antibiotics, although only 5 percent to 17 percent of sore throats are caused by bacterial infections (antibiotics are only effective on bacterial infections). Then there's the antibacterial craze that's saturating the consumer goods market these days. People can now buy soaps, toys and telephone pads that contain the kind of antibacterials formerly found only in the hands of medical professionals.

The ubiquitous nature of antibiotics today is a recipe for developing superbugs. Resistance to antibiotics evolves when bacteria are exposed to chronic, low levels of antibiotics. Such exposure selects for bacteria that can resist being killed by antibiotics. Bacteria have a generation time that can be measured in minutes, and a single resistant bacterium can spawn more than a million progeny in less than a day. And bacteria jumps species barriers—from animals to humans, for example.

Hospitals, nursing homes and other health care facilities are finding old standby antibiotics like penicillin simply don't work. In 1974, 2 percent of *Staphylococcus aureus* (staph) bacteria in U.S. hospital patients were resistant to drugs. Now half resist being killed by antibiotics, according to the Centers for Disease Control and Prevention. This results in extra, expensive, measures such as the use of particularly potent microbe killers and limited contact between visitors and patients. But sometimes it's a losing battle. In the U.S. alone, some 14,000 people die annually from drug-resistant bacteria that infect them in hospitals.

"We take a lot of responsibility for this problem," says Brendan Cullinan, a family physician in the western Minnesota community of Montevideo, referring to the medical community. "I've had days when I had thought we're going to go back to the 1920s with all these superbugs. That's not all the time I think that. Those are my dark days."

The role of agriculture

But there is mounting evidence that antibiotic use in livestock is also to blame for drug resistance. The sheer volume of low-level antibiotic usage in livestock farming creates the perfect environment for the evolution of superbugs.

In January 2001, the Union of Concerned Scientists released *Hogging It: Estimates of Antimicrobial Abuse in Livestock* (http://www.ucsusa.org/food/hogging_exec.html). The study tried to accomplish what had not been done before: come up with an accurate assessment of the amount of antibiotics in this country that go to promote growth in livestock. What they determined is that every year U.S. livestock producers give 10.5 million pounds of subtherapeutic antibiotics to poultry, 10.3 million pounds to hogs, and 3.7 million pounds to cattle. That's compared to *three million pounds* of antibiotics that are used for human medicine. The Union of Concerned Scientists' estimates are almost 40 percent higher than previous tallies of antibiotic use in livestock. In 2000, the Animal Health Institute, a livestock pharmaceutical trade group, said that 17.8 million pounds of antibiotics are used in animals (this estimate included therapeutic as well as subtherapeutic antibiotics). However, the trade organization has not disputed *Hogging It*'s revised estimates.

Hogging It concludes that low-level, subtherapeutic use accounts for 70 percent of the total antibiotics given to livestock. The group also estimates that overall use of animal antibiotics for subtherapeutic uses has risen by 50 percent since 1985. (In March, the USDA's Centers for Epidemiology and Animal Health released a survey of hog farmers showing that 63.7 percent of antibiotics given to grower/finisher pigs were for growth promotion.)

The honeymoon is over

But do all those drugs produce antibiotic-resistant bacteria? Computer modeling shows that using antibiotics for livestock production is significantly shortening the "honeymoon period" when antibiotics are effective for humans, according to a University of Maryland paper published in April.

In 1999, the *New England Journal of Medicine* published the results of a Minnesota study where researchers concluded that the use of the antibiotic fluoroquinolone in poultry was creating a reservoir of resistance, making it difficult to treat with antibiotics a human ailment called *Campylobacter*—a common illness that causes diarrhea and a fever. In fact, the researchers found an eightfold increase in drug-resistant food poisoning among Minnesotans directly followed the approval, in 1995, of the drug for livestock. In Denmark, growing bacterial resistance to fluoroquinolone correlates with its use in the livestock industry there as well. The antibiotic is one of a family of drugs that have become physicians' first line of defense as penicillin loses its effectiveness. Fluoroquinolone is also very similar to Cipro, a drug that is used to treat human anthrax. Cipro's value has risen considerably in the wake of the Sept. 11 attacks. Back in 1995, health care officials, including the U.S. Centers for Disease Control and Prevention, opposed approval of the antibiotic for livestock use. But the poultry industry prevailed, saying they needed the powerful drug to treat their flocks for *Escherichia coli* (*E. coli*).

On Oct. 4, 2001, the *New England Journal of Medicine* yet again sounded alarm bells about antibiotic resistance. In this case, it reported that antibiotic-resistant *E. coli* had made it harder to treat urinary tract infections suffered by women in California, Michigan and Minnesota. The implications were that since the women were from three geographically diverse areas, the multi-drug resistant bacteria were spread via an environmental factor, such as contaminated food. On Oct. 18, 2001, the medical journal fired a three-study scientific broadside at the use of antibiotics as growth promotants in livestock. One study found that 84 percent of the isolated salmonella found in supermarket chickens was resistant to a potent combination of antibiotics, qualifying the bacterium as a superbug. Another study found resistant bacteria in 17 percent of chickens purchased in four states. The final study described how antibiotic-resistant organisms can survive human digestion

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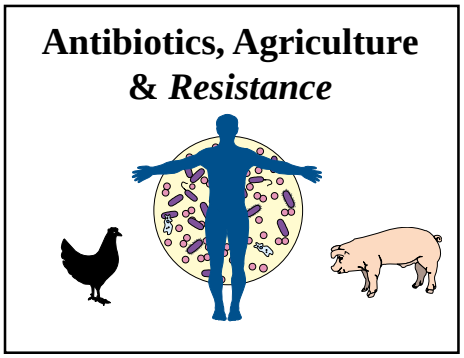
and even multiply.

The *New England Journal of Medicine* put an exclamation point on these studies with an editorial by Sherwood Gorbach of the Tufts University School of Medicine. He concluded that these and other studies are the "smoking gun" that the use of antibiotics as growth promotants are a threat to human health and should be banned. Professional health organizations such as the American Medical Association have joined in calling for such a ban.

Regulatory storm clouds

In some places, the concept of regulating the use of antibiotics in agriculture has gone beyond the editorializing stage. Several European countries have clamped down on the use of antibiotics as growth promoters. Among those nations restricting drugs in feeds is Denmark, which controls 40 percent of the world pork market.



The European Commission has proposed a permanent ban on the use of antibiotics as an ingredient in feed by 2006. In 2000, the World Health Organization announced a similar goal.

And how has government in this country responded? In the 1970s, efforts to regulate the use of antibiotic feed additives on a national level were stymied by pharmaceutical, feedstuffs and large-scale livestock interests. But concerned lawmakers keep trying. On Feb. 27, Rep. Sherrod Brown of Ohio introduced a bill in the U.S. House that would phase out the routine feeding of medically important antibiotics to healthy farm animals within two years.

This spring the U.S. Food and Drug Administration announced a hearing on a proposal to ban use of fluoroquinolone in livestock. Bayer, the sole remaining manufacturer, is fighting it.

In Minnesota, a proposal was introduced during this year's state legislative session that would have prohibited putting low levels of antibiotics into feed. The proposal, which was introduced by Rep. Phyllis Kahn, failed 75-59. The Minnesota Senate passed an amendment by Sen. Jane Krentz that directs the state to study ways to preserve the effectiveness of some antibiotics.

Such regulatory talk concerns the livestock industry, which maintains that antibiotic use doesn't just make livestock production easier—it has become critical in these times of shrinking resources and concerns about the environment. Mike Hannon, a senior technical services manager for Roche Animal Health, a pharmaceutical company, says antibiotics cut the amount of feed needed to produce a market weight hog by 24 pounds. If 100 million pigs are marketed annually in the U.S., that's a whole lot of feed saved, which translates into fewer acres needed for corn and soybeans, and 500 million pounds less manure produced each year, according to Hannon.

But arguments against any restrictions on antibiotic use are beginning to wear thin in the face of the mounting evidence, says Margaret Mellon, director of the food and environment program for the Union of Concerned Scientists.

"The industry is going to have to make some changes," she says.

One sign that it sees change on the horizon is that the U.S. livestock industry is starting to ask itself a hard question: can livestock be produced without subtherapeutic drugs?

"Sure we can produce hogs without antibiotics—we did it 50 years ago. Fortunately I wasn't around back then," quips the American Association of Swine Veterinarians' Tom Burkgren.

But Michigan State's Bo Norby isn't as quick to see the loss of growth promoting drugs as a lifetime sentence to the Island of Archaic Agriculture. The veterinarian believes calls for the banning of subtherapeutic antibiotics in livestock go too far. However, he says it's time the industry took proactive steps to deal with a problem that could get out of hand. One key step would be to take alternative farming systems seriously.

Norby is in the middle of a research project that is comparing the amount of antibiotic-resistant bacteria present on conventional hog farms with those that use no antibiotics. Through his research, Norby has been on farms that are producing hogs without antibiotics, and doing it in an economically and environmentally sound manner. He says the key to reducing antibiotic use is doing something that on the face of it may appear simple: decrease the density of the facilities. But even giving animals more room means major management adjustments on the farm, says Norby.

"Sometimes it's easier to put antibiotics in feed, rather than change the way you do things." ❒

Bacterial backwaters

Antibiotics & resistant microbes are emerging from rivers & streams

Wendy Halterman loves the Minnesota River, and explores it by boat or foot any chance she gets. The 18-year-old resident of the western Minnesota community of Montevideo, which lies near the top of the river's watershed, knows where the good fishing spots are, how to find the bald eagles, and which stretches offer the best canoeing. But she recently gained an even deeper insight into what the river offers, and it isn't pleasant. Halterman has done a high school science fair experiment that indicates the river is home to bacteria that don't die when exposed to various antibiotics. And, perhaps even more troubling, the bacteria seem to become even more resistant the further downstream one goes.

In her experiment, Halterman grew bacilli bacteria from the water and sediment samples she had collected from seven spots along the length of the river. Once fuzzy bacterial growths were thriving in petri dishes, she exposed them to eight commonly used antibiotics—from human drugs to antibiotics used in livestock agriculture to triclosan, an ingredient used in household hand soaps. The antibiotics should have killed the bacteria Halterman was growing. But it didn't always work that way. In fact, sometimes the antibiotics had little impact at all on the bacteria.

"The overall data seemed to indicate that there was a small decrease in the effectiveness of the antibiotics as you go

Water *see page 5…*

…Water *from page 4*

downstream," the young woman says in the careful language of a scientist.

Halterman wants to be a science teacher someday, and the bacterial resistance experiment won her a trip to the International Science and Engineering Fair in California last year. But she doesn't have a college degree, much less a Ph.D., so it would be easy to pick her work apart as lacking a scientific edge. However, Halterman's research is in good company these days. Studies here and in Europe are finding many of our waterways are carrying a heavy load of antibiotic-resistant bacteria. Such research has major implications as the livestock industry, a major user of antibiotics (and a big source of water pollution), struggles with ways to alleviate public concern over antibiotic resistance. These studies show not only that antibiotics are reaching our environment through various means, but also that the resistant bacteria they spawn have some staying power. And the longer they hang around, the more of a threat they pose to human health.

Rx rivers

In March, the U.S. Geological Survey released the results of the first nationwide study of various medicines and household substances in waterways. Researchers checked 139 streams in 30 states (including Iowa and Minnesota) during 1999 and 2000, and found more than two dozen human or veterinary antibiotics in the water. The survey even found triclosan, the key ingredient in antibacterial soaps that Wendy Halterman tested on bacilli samples in Minnesota.

That antibiotics are being found in our waterways is not surprising, considering how inefficient an animal's gut is at absorbing drugs—25 percent to 75 percent of the antibiotics given to animals can be excreted unaltered through feces. Consider that U.S. livestock facilities produce 180 million tons of manure waste annually, and animal agriculture's potential for sending resistant bacteria into the environment is staggering.

In North Carolina, researchers have found three antibiotics used in pork production in streams near hog lagoons. They also found them in the nearby Neuse River and in tap water on one of the swine farms.

But the livestock industry maintains such studies only show that antibiotics are in our water; it doesn't prove those antibiotics are in consistent enough concentrations for resistance to evolve.

"There's a lot of interesting things that they found, but what do they mean scientifically?" asks Tom Burkgren, Executive Director of the American Association of Swine Veterinarians.

At the 1999 meeting of the American Society for Microbiology, research was presented that shows the extent to which antibiotic resistant bacteria is present in the environment. One researcher sampled waterborne bacteria from more than a dozen rivers in the U.S., including the Mississippi, Missouri, Ohio and Colorado. He tested the microbes' resistance to ampicillin, a synthetic penicillin. At each of the 21 sites examined, ampicillin failed to kill between 5 and 50 percent of the bacteria.

Yet another study presented at the conference showed geese living year-round in Chicago's suburbs had bacteria in their feces that was resistant to streptomycin, erythromycin, vancomycin, tetracycline and penicillin-type drugs.

A drainage ditch flows near a large-scale hog operation in Renville County, Minn. Twenty-five percent to 75 percent of the antibiotics given to animals are excreted unaltered through feces. (*LSP photo*)

Resistance rates ranged from 2 percent to 100 percent, depending on the microbe and the antibiotic tested. Since the geese had little direct contact with humans or farms, they must have picked up the resistance through the general environment, say researchers.

Perhaps the most troubling research is coming out of Illinois. Animal scientists there found bacteria that were resistant to the antibiotic tetracycline in two swine manure lagoons. The study, which was published in the April 2001 issue of *Applied and Environmental Microbiology*, found resistant bacteria in water under the lagoons. The superbugs were also found in water as much as 820 feet downstream from the lagoons (the plume may have extended further, but there were no test wells beyond that point).

But of even bigger concern is that the scientists found genes resistant to tetracycline in soil bacteria near the lagoons. That means the resistant genes might have been transferred from one type of bacterium to another, or that the soil bacteria had evolved resistance after being exposed to the tetracycline antibiotic. If the resistant gene is adapting to the local soil biota, that means its chances of surviving, thriving and moving outside of an animal's gut are greatly increased.

What these and other studies show is that antibiotics are now so persistent in the environment that our rivers and streams (and perhaps even soil) are becoming reservoirs for cultivating and supporting the evolution of resistance.

But does all this pose a danger to human health? It could if those resistant bacteria are resilient enough to make it into our guts through drinking water. In the U.S., groundwater is the source of 40 percent of the water used for public supplies, and 97 percent of the rural population's drinking water. Even if one doesn't intend to drink the water—say a person accidentally swallows a few drops during a fishing trip or while wading a stream—that bacteria could make it into the gut. People who have ingested those resistant bacteria may run into trouble down the road when they are being given antibiotics to treat an infection. Bacteria that evolved resistance to penicillin or tetracycline in farm country would present a formidable challenge when exposed to those same drugs later in a doctor's office.

Scientists say more research needs to be done before a direct connection between antibiotic use in livestock, resistant bacteria in the environment, and human illnesses that resist drug treatments can be made.

Back in western Minnesota, Wendy Halterman has tried to follow up her research by pinpointing what antibiotics are present in the Minnesota River. Due to technical difficulties, that experiment didn't work out. However, she's convinced that the clock is ticking in a race between humans and bacteria.

"The evolution of a life threatening antibiotic-resistant bacteria is not just a theme for a science fiction movie," says Halterman. "If bacteria can develop faster than we can develop new antibiotics then I think the health costs in the world and our nation will rise dramatically." ❐

Reviews

The Antibiotic Paradox

How the Misuse of Antibiotics Destroys Their Curative Powers

By Stuart B. Levy
2002 (2nd edition); 320 pages
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Reviewed by Brian DeVore

Writing a book that sounds the kind of alarm bells that prompt effective action is more about timing than anything. Absent the right societal infrastructure to make use of the information it presents, an important book can get a flash of attention, perhaps a headline or two, and then quickly fade. But if the timing is right, if politicians, activists and the average citizen happen to be paying attention—what some call a "teachable moment"—then a publication can have impacts far beyond the paper it's written on. Rachel Carlson's *Silent Spring* was such a book. So was Upton Sinclair's *The Jungle*.

So far, Stuart Levy's *The Antibiotic Paradox: How the Misuse of Antibiotics Destroys Their Curative Powers* has had no such luck. First released in 1992, this highly readable book is a well researched primer on how antibiotic resistant bacteria threaten to undermine one of the greatest medical advances of all time, and how the health industry and agribusiness are contributing to this destruction. Levy launches his work by setting the stage for just how much of a public benefit an antibiotic like penicillin was when it became available in 1942: "Penicillin earned the accolade 'miracle drug' because of its unique and rapid control of infectious bacteria that, before penicillin's discovery, had been fully expected to kill the patient."

Levy's book caused a minor hubbub 10 years ago, but in general the author, a renowned authority on antibiotic use and resistance, was ignored. He shouldn't feel too bad: *Modern Meat: Antibiotics, Hormones and the Pharmaceutical Farm*, a book written in 1984 by journalist Orville Schell, executed an even more direct hit on one aspect of antibiotic resistance, and, like *Silent Spring*, was even excerpted in the *New Yorker* magazine. But these days the only place to find Schell's tome is at a well-stocked library.

During most of the 1990s, Levy's book and related articles were known only to a handful of consumer activists, science writers and, of course, pharmaceutical company officials. But the author, a medical doctor, biologist and Director of the Center for Adaptation Genetics and Drug Resistance at the Tufts University School of Medicine, just went back to work, continuing research he had been doing for decades. For example, during the 1970s his laboratory group showed that the feeding of tetracycline to chickens created antibiotic resistant *E. coli*.

Earlier this year a new edition of *The Antibiotic Paradox* was published, and this time it comes at a very teachable moment. The evidence is mounting as to just how dire the problem of antibiotic resistance really is. Major poultry companies are rethinking their use of certain antibiotics. The threat terrorism poses to public health and our food supply has made effective antibiotics a security issue. Lawmakers are seriously considering restricting the use of antibiotics as growth promotants. Just as importantly, farmers have more alternatives available for raising livestock with fewer drugs.

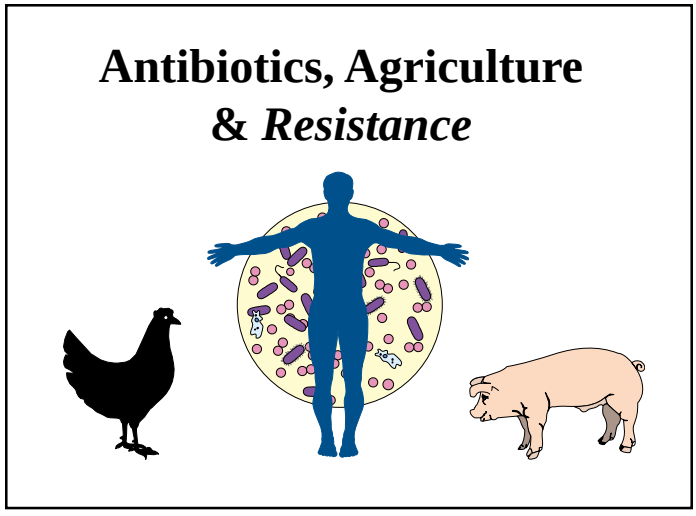
This new edition reflects the troubling, and yet more aware, times we live in. Levy provides an update on the latest scientific evidence related to antibiotic resistance, including an entire section on how the use of antibiotics in the fruit industry is of increasing concern. Levy also strengthens his argument that this is an issue that must be resolved both through individual and societal action.

But the 2002 edition of his book also contains a thread of hope not present before. Levy discusses how consumers are becoming more aware of the problem and are making buying choices based on those concerns. He also devotes a section to progress made by the commercial catfish industry as it attempts to reduce its reliance on antibiotics. Finally, Levy seems quite pleased with the increasing role of nonprofit groups, professional organizations such as the American Medical Association and even governmental agencies in bringing the issue to the forefront. I talked to Levy over the telephone shortly after this new edition was published, and absent was that "lone voice in the wilderness" trait that dogs so many alarm sounders.

"It's so refreshing to have people shake their head and see what we were saying was right," Levy told me. "When we wrote this book in 1992, no one was interested."

People are interested now. And books can produce significant action in roundabout ways. For example, after writing *Modern Meat*, Orville Schell went on to co-found Niman Ranch, which has emerged as one of the nation's leading antibiotic-free meat companies. Let's hope Levy's book can take the antibiotic resistance issue beyond promotion of a niche market, and convince society that antibiotics are a public good we cannot afford to take for granted. ❒

Brian DeVore is the editor of the Land Stewardship Letter.



Daring to Drop Drugs

Industrial ag says ending the use of antibiotics as livestock growth-promotants would bring about radical changes in farming. Guess what? Industrial ag is right.

It's an overcast, unseasonably cool July morning in the northwest corner of Iowa, with stop and go rain showers delaying the small grains harvest yet again on the Wilson farm. Such weather can bring a lot of frustration and stress to the land, as farmers watch the value of their crop diminish with every falling raindrop. But Colin Wilson seems to be unconcerned about the rotten weather as he stands in a roomy shed holding a speckled baby pig. Other piglets, along with their mothers, are sleeping, feeding or playing in the deep-straw bedding that covers the building's floor. The shed is full of contented, muffled sounds. Stress and frustration aren't present in this particular scene, and, Wilson explains to a visitor, that's a major reason these baby pigs will not need antibiotics during their lifetime on the farm. Less stress means less of a need for drugs that can help keep pigs healthy and productive.

"Our philosophy is that if that sow is real comfortable and content, she'll do a good job of taking care of her pigs, raising pigs, and that's been proven out," says Wilson as he returns the piglet to its mother.

This scene isn't just fodder for an Americanized James Herriot story. It's proof that through good genetics, revamped housing and management based on solid animal husbandry, hogs can be raised without pharmaceuticals.

The Wilson pigs certainly are not the norm. During the past 50 years, antibiotics have nothing short of revolutionized meat, poultry and dairy production (see March/April 2002 *Land Stewardship Letter*). Large-scale total confinement livestock production is possible because of the development of pharmaceuticals that can be administered to animals living under less than optimal conditions. This isn't just a case of treating sick animals for specific illnesses. U.S. livestock are fed more than 24 million pounds of antibiotics annually for purposes other than to treat disease, according to the Union of Concerned Scientists. These "subtherapeutic" dosages are being used to increase feed efficiency and put pounds of meat on faster. Physicians, scientists and, increasingly, consumers are raising serious concerns that the massive amounts of low-level subtherapeutic antibiotics used in livestock farming are creating a reservoir of resistant bacteria which threaten human health.

Large livestock producers, along with the feedstuffs and pharmaceutical industries, respond that even minimal antibiotic restrictions would lead to the demise of animal farming, as we know it.

But a growing number of farmers across the country are now producing pork, beef, poultry and milk without putting subtherapeutic dosages of antibiotics in the feed to promote growth. In the case of Colin Wilson, many of his pigs are raised with no antibiotics—therapeutic or subtherapeutic.

How do these farmers do without a tool that some think is as integral to livestock production as tractors are to grain farming?

It all goes back to that quiet scene in the Wilson farrowing shed and everything the farmer has done to relieve the animals' stress levels (the ventilation fans are even placed in such a way to reduce mechanical noise, leaving more acoustic room for "pig noises"). It sounds simple. But when one examines what has to be done to reduce that stress, it becomes apparent that, indeed, the livestock industry at large may be right: animal farming cannot be done without the use of antibiotics. Animal farming that requires total confinement on a large scale, that is. Smaller-scale, management-intensive operations able to respond more to the needs of the animals have an edge when it comes to drug-free production. Nowhere is that being seen more clearly than in the hog industry, which is second only to poultry in the amount of antibiotics it uses.

Colin Wilson is among a growing group of farmers who are dropping antibiotics in their livestock production enterprises. (*LSP photo*)

Reversing the wash cycle

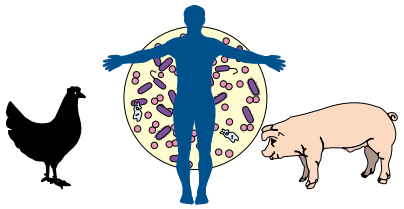
Colin Wilson, along with his brother Dan, use between 300 and 350 sows to produce about 3,000 market pigs a year, and more than 80 percent of them never receive drugs during their lifetime. They've been raising pigs using antibiotic-free methods for more than five years. All of those drug-free pigs are marketed for a premium through Niman Ranch Pork Company, a California-based drug-free meat company that services white tablecloth restaurants and natural food stores across the country. When it first started marketing natural pork, Niman allowed producers to use antibiotics for therapeutic purposes. However, partly because of the confusion consumers have when it comes to the difference between therapeutic and subtherapeutic drug dosages, the company now disallows all antibiotic use.

Paul Willis, an Iowa hog farmer who also serves as a field coordinator for Niman, says the biggest challenge for farmers considering drug-free production is overcoming "the brainwashing they've had over the years." Any problem, any shortcoming in management, can be fixed with a pharmaceutical, goes this old way of thinking. But Willis is careful not to make dropping drugs sound too easy.

"We hardly ever find a farmer who

Drug Dare *see page 8…*

Antibiotics, Agriculture & *Resistance*



…Drug Dare *from page 7*

meets all of our criteria right away," says Willis. "There almost always is a transition period."

Niman only buys animals that are raised in a low-stress, humane, environment. That means they have to be raised on pasture or in deep-straw systems and given plenty of room to move around and do all the things pigs love to do. The company also requires that the pigs be raised on small and medium sized family farms. The company's producers range in size from five to 500 sows.

Even top-notch hog farmers who have long toyed with alternative production methods find it's difficult to go antibiotic-free right away. Indeed, for the Wilsons there was a significant period of transition, even though the family had never used a whole lot of antibiotics in their swine enterprise. To go totally drug-free, the brothers had to make significant adjustments to their genetics. Hogs bred for confinement lack many of the traits needed to do well in a more natural environment.

"For example, it takes a sow that's very sensitive to the pigs around her," says Wilson, adding that it took about three years for them to get their genetics right. What they found was that sows bred for confinement relied on narrow farrowing crates to keep from crushing their pigs. The Wilsons needed sows that knew how to keep their pigs alive in the more open environment found in a straw-bedded building or pasture hut. "You can't just go out and buy new genetics, you have to develop it."

That calm atmosphere in the farrowing shed on the rainy July day is a sign that one aspect of their transition into drug-free production has succeeded. These sows fairly ooze with maternal instinct, even as they get along well with the other sows in the communal housing.

But the Wilsons also had to relearn what they knew about such basics as housing and pig movement. Dan Wilson went to Sweden six years ago to check out the deep straw system farmers use to raise pigs during the winter. He learned how the Swedes grouped litters so that so much labor and time wasn't spent moving pigs. To supplement their pasturing farrowing enterprise, the Wilsons established deep straw systems in a pole shed and built a "hoop house"—a Quonset hut-shaped structure constructed of metal arches and fabric. On a per pig basis, the Wilsons' deep straw system cost them about a third of what it would to build a total confinement operation.

Today, the Wilsons are consistently producing pigs throughout the year without the use of antibiotics. Still, it's not without its hitches. Last summer they ended up treating a whole hoop house full of pigs with antibiotics after the animals came down with a couple of different intestinal and respiratory bugs. The sickness came at a time when the family did not have the time or labor available to treat individual pigs as they have in the past (treated pigs are tagged, separated out and marketed through conventional channels when it comes time to ship a batch off to Niman). That means the whole batch was ineligible to receive the Niman price premium.

"So that was a case where a broad spectrum antibiotic pretty much took care of it," says Colin. "But you're going to have situations like that. And you're going to have to make a judgment call as to which direction you're going to go."

The real cost of a ban

Still, in general the Wilsons are experiencing consistent success at drug-free production, and they're doing it on a farm that, with a few exceptions, resembles scores of other family operations across the country. Companies like Niman can't keep up with the demand for antibiotic-free pork, but have a hard time finding producers who can meet their criteria. Why aren't more farmers dropping drugs in their systems?

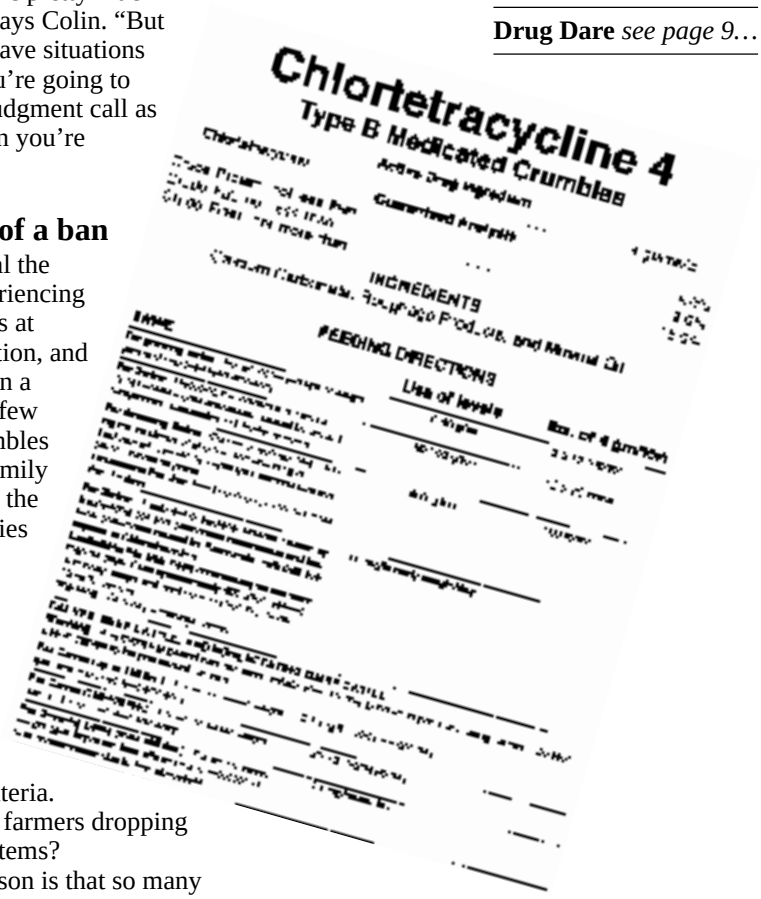
Part of the reason is that so many producers feel their only choice is to stop using antibiotics within the framework of current production systems. Faced with that choice, drug-free production doesn't look so attractive.

Banning over-the-counter antibiotics for swine farming would increase production costs per pig by $6.05 initially, and by $5.25 at the end of 10 years, according to a 1999 Iowa State University analysis. That's a major hit, particularly with pork prices at record lows.

However, the analysis, which was funded by the National Pork Producers Council, assumed antibiotic-free hogs would still be raised in total confinement. For total confinement to pay, it must make the most use of every square inch. That's because it is so expensive to build such facilities and to manage the liquid waste they produce. The Iowa State researchers concluded that the way to produce hogs without subtherapeutic antibiotics in total confinement was to provide more space. Just adding 10 percent more floor space would cost $115 per head in a nursery and $165 per head for a finishing facility, according to the analysis.

But there's one thing wrong with this scenario: it does not consider the Dan and Colin Wilsons of the world. What would

Drug Dare *see page 9…*



…Drug Dare *from page 8*

happen if hogs were raised in an alternative system that utilized deep-bedded straw and pasture farrowing, for example? The Wilsons do not use confinement crates, so their sows are running in an area of 30 to 35 square feet, about double the space found in a confinement operation. Because of their low infrastructure costs, the brothers can get away with not treating space as such a dear commodity.

More research

One reason the livestock industry panics at the thought of even cutting antibiotic use by a little is the lack of alternatives available. However, more research into sustainable systems is being done at land grant universities, albeit it is still dwarfed by work on how to maintain and perpetuate total confinement factory farming. Iowa State University is doing cutting edge research on hoop houses. At the University of Minnesota-Morris, a special alternative swine research facility is now in operation (see March/April 2002 *LSL*, page 7).

University of Illinois researchers recently found that feeding five different antibiotic-free rations produced rates of gain equal to what can be gotten with medicated rations. A scientist in the United Kingdom has reported that adding a sugar found in pig's milk to feed promotes the growth of beneficial flora in a pig's gut. As a result, the pigs do just as well as if they were fed antibiotics, but no resistant bacteria develop.

Wilson is excited that more private companies, seeing the market potential farmers like him offer, are developing probiotics and other products that promote naturally healthy animals, thus reducing the need for medication.

"Because of programs like Niman I can now buy commercial pig starter that has no animal by-products in it. So some of the smaller feed companies are starting to gear up because they've found a market. If we're going to be sustainable that's what we've gotta have. All the way down the chain you've got to have people working together."

Not just another niche

But will antibiotic-free production save the independent family livestock farm? Not by itself. Let's face it: if regulatory pressure becomes great, and/or shoppers show a willingness to pay extra, large-scale livestock companies will figure out how to cut enough drugs to quell the concerns of consumers and the health care community. After all, when organics evolved from funky niche to profitable retail trend, agribusiness began producing chemical-free fruits and vegetables in an industrialized system. If antibiotic-free production somehow becomes industrialized, the livestock sector will be back to square one: fewer drugs but all the other problems associated with factory farming: environmental contamination, empty Main Streets and a food supply controlled by a few powerful interests.

"I guess I hope we don't get to the point where it's antibiotic free and that's it. That's the only distinction. Everything else is the same," says Wilson.

His swine production enterprise isn't a benefit to society simply because of the lack of drugs. It is part of an integrated system that focuses on minimizing other environmental impacts as much as possible. For example, the straw bedding is made from small grains straw. Small grains such as barley and oats reduce soil erosion while naturally breaking up pest cycles in crop rotations. Between batches of pigs, the Wilsons push the straw bedding, which is now mixed with manure, out of the buildings for further composting. That compost is later used to fertilize the crops the family raises on 800 acres of farmland. Studies show composed manure improves soil quality while cutting erosion rates. And all of this is part of a diverse farming operation that supports two families.

That's why Niman Ranch has as part of its criteria that the hogs are raised by independent family farmers using humane methods. The Midwest Food Alliance, a sustainable seal of approval developed by the Land Stewardship Project and Cooperative Development Services, has similar stipulations.

Niman's Willis says that consumers respond to the idea that their meat is being raised by family farmers who are treating the animals well. However, there's something even more practical behind the criteria: Food writers for such respected publications as the *New York Times* have raved about the outstanding taste of Niman pork. And it's quality based on well-rounded sustainable production that will keep consumers coming back even when the factory farm producers figure out how to cut drugs.

"Our criteria are good welfare, antibiotic-free and family farmer raised," says Willis. "In combination these things happen to produce a good tasting product. I think it's more than a coincidence." ❒

Opportunities Resources

Antibiotics legislation

Citizens have an opportunity to have an impact on how livestock drugs are used. Two bills have been introduced in the U.S. Congress—one in the Senate (S. 2508) and one in the House (H.R. 3804)—that would phase out the nontherapeutic use of specific, medically important antibiotics. These bills would also end the use of Cipro-like drugs in poultry. Such proposals have already been endorsed by health care heavyweights like the American Medical Association.

Contact your Senators and Representatives today and tell them to co-sponsor these bills. You can get their numbers from the capitol switchboard operator at 202-224-3121. For more information on the proposed legislation, call 612-870-3418 or log onto www.keepantibioticsworking.com. ❒

Hog alternatives

Profitable Pork: Alternative Strategies for Hog Producers is a new 16-page bulletin from the USDA's Sustainable Agriculture Network.

For a free copy, log onto www.sare.org/bulletin/hogs. You can also get a copy by calling 301-504-6422, or e-mailing aadeyemi@nal.usda.gov. ❒

Natural pork feeding

Designing Feeding Programs for Natural and Organic Pork Production is an 18-page bulletin on standards of organic pork production, management of organically raised pigs, energy and protein sources, alternative feeds and use of forage and pasture. It has tables with diet formulations for early and late grower and early and late finisher swine growth stages, as well as sow gestation and lactation.

This publication is available for a nominal cost at University of Minnesota Extension Service county offices. It can also be ordered by calling 800-876-8636 or 612-624-4900. When ordering, ask for item 07736-BU. ❒

More sustainable, less resistance?

Do farms that use little or no antibiotics produce fewer antibiotic-resistant bacteria? The industry argues that cutting the use of subtherapeutic drug dosages will only make the animals sicker, meaning farmers will have to turn to stronger therapeutic dosages of drugs just to keep them alive.

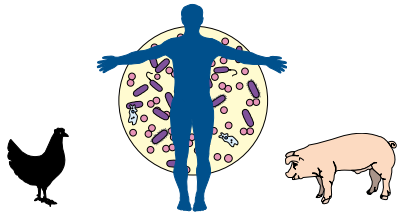
"You can go a few cycles minimizing antibiotic use and then things creep up on you," says Dan Jacobson, a spokesman for Gold'n Plump, the largest chicken producer in the Upper Midwest. "The bottom line is, is it a safer food product" without subtherapeutic antibiotics?

Whether it is a safer food product may be open for debate. However, there is evidence that antibiotic-free production can make the environment in general safer by reducing resistance. In Denmark, where growth-promoting antibiotics have not been given to hogs, chickens or cattle for more than three years, the presence of drug-resistant bacteria has dropped, and the health of the animals has not been affected, according to the Danish Veterinary Institute in Copenhagen. For example, one type of superbug, which was carried by 80 percent of chickens, is now present in just 10 percent, according to a report in the *Washington Post*. Because Danish farmers are saving money they would normally spend on drugs, retail meat prices have not been affected, says the Veterinary Institute.

In this country, a University of Tennessee study of swine herds found that hogs not exposed to drugs produced fewer *Escherichia coli* (*E. coli*) pathogens that resisted antibiotics like ampicillin and oxytetracycline. Bo Norby, a research associate at Michigan State University's College of Veterinary Medicine, says "in the field" research is lacking that compares resistance levels on farms that don't use antibiotics with more conventional operations. Part of the reason is that antibiotic use has so thoroughly permeated the livestock industry that it's been difficult for researchers to find antibiotic-free herds in the field. However, with organic and natural foods consumers demanding more antibiotic-free meat, an increasing number of alternative operations have popped up in recent years. In fact, Iowa State University recently estimated that one million hogs a year are raised in that state using deep-straw systems in hoop houses. That's only 4 percent of Iowa's annual swine production, but that growth has happened in just five years. Norby has taken advantage of this recent mini-boom in alternative swine production and is comparing resistance levels on Midwestern farms that don't use antibiotics with their more conventional counterparts. The study, which involves 70 farms, is using fecal samples to isolate three main pathogens—*E. coli*, *Salmonella* and *Campylobacter*. The researchers are then exposing the bacterium to 15 to 20 antibiotics to see how much they resist being killed. Norby won't have reportable results until next year, and he cautions that even a real-world study like this has its limitations, given all the other factors that contribute to the evolution of superbugs.

"Just because you go in and find resistance doesn't necessarily prove it's the antibiotics that did it. It's a strong indicator, but not necessarily proof." ❐

Antibiotics, Agriculture & *Resistance*



When the giants respond to a public pinprick

In February, two of the biggest names in poultry—Perdue and Tyson—announced that they were no longer using a key antibiotic in their production systems. The antibiotic, fluoroquinolone, is one of a family of drugs that have become medicine's first line of defense as penicillin loses its effectiveness. Studies showing bacterial resistance related to fluoroquinolone are starting to cast long shadows over the poultry industry, which has been using the drug since 1995. The last straw came when it was widely reported in late 2001 that fluoroquinolone is very similar to Cipro, a drug that is used to treat human anthrax.

The "we've dropped fluoroquinolone" announcement was a public relations coup for Perdue and Tyson, as well as the fast food chains they supply, like McDonald's and Kentucky Fried Chicken.

"From the standpoint of us in the field, this is a significant admission from the poultry companies that they can do without" certain antibiotics, says Stuart Levy, Director of the Center for Adaptation Genetics and Drug Resistance at the Tufts University School of Medicine.

The announcements prove that public pressure can prompt industrial agriculture to tweak its production methods. However, they also raise the question of whether any real changes are being made to produce animals, or whether companies are simply playing musical chairs with different antibiotics.

And not everyone is thrilled with the poultry giants' announcement. Representatives of the hog industry, for one, are concerned this will put more pressure on them to drop antibiotics that are important to human medicine. As the total confinement of hogs has become increasingly prevalent, the pork industry has become more reliant on human drugs like tetracycline and penicillin to keep the pigs productive and healthy.

Tom Burkgren, Executive Director of the American Association of Swine Veterinarians, says the swine industry does not have one key fluoroquinolone-like drug that it absolutely cannot do without, but still, "any loss of drugs can really affect the mortality of pigs."

Smaller poultry companies are also concerned about the repercussions of having two of the biggies drop fluoroquinolone. Dan Jacobson, a public relations specialist with Minnesota-based Gold'n Plump, says his company uses the drug "very sparingly," but that it is an important tool for keeping chickens healthy. (Fluoroquinolone is used to treat respiratory problems in poultry, which are common in the large confinement barns used by the industry.)

"It's highly effective and that's one of the reasons we like to use it."

Jacobson says his company feels there is no direct scientific evidence linking the antibiotic to resistant bacteria in humans, and that his company is not considering dropping it at this time. One

Giants *see page 11…*

…Giants *from page 10*

concern within the industry is that if a powerful drug like fluoroquinolone is completely dropped, it will be replaced by a handful of less effective drugs, in effect actually increasing antibiotic use in poultry. Antibiotic use in poultry is particularly problematic because if a few birds get sick, the whole flock must be treated. It's impossible to separate out sick birds and treat them individually.

Jacobson concedes that even if his company does not believe there is enough scientific evidence to warrant dropping a drug, ultimately consumers will decide what production systems are used. Tyson and Perdue felt particularly pressured to drop the drug because they supply the public-relations sensitive fast food industry. A company like Gold'n Plump markets more to retailers and institutions. So far, there has been no call from those customers for a reduction in antibiotic use, says Jacobson.

"Right now it's a PR war. But it's more important to be scientific than to do it for good PR," he says, adding that if his company ever does drop a drug like fluoroquinolone, it won't try to make public relations hay out of such a change. "We'd probably make that decision quietly. We don't see the need to be boisterous about it."

For Iowa farmer Bill Welsh, who has been raising chickens without antibiotics for more than a dozen years, the dropping of one drug by a few food giants only highlights the difference between his operation and the industrial sector of the poultry industry. Welsh houses his birds at half the rate of the conventional operations, and provides them access to the outdoors (he and his son Gary raise 40,000 birds annually). He also makes sure they receive organic feed and close attention, particularly early in their life. They market their chickens through the Organic Valley label, as well as right off the farm. Bill and Gary encourage customers to visit the farm, and they've shipped frozen birds to every state but Hawaii. It's impossible to say if there's a direct connection, but the publicity created by Perdue and Tyson's February announcement certainly didn't hurt business for the Welsh family.

"In the month of March we had 15 new customers," says Bill. "What the consumer wants is a connection with the producer." ❒

Getting strung-out on confusing drug-free labels

As the use of antibiotics in livestock production attracts increasingly negative publicity, food companies are trying to figure out how to capitalize on consumer concerns. Be prepared for an acceleration of the old name game where harried consumers are peppered with engaging, but sometimes misleading, advertising slogans like "all natural," "no sulfa residues," "hormone-free" and "extended withdrawal times."

"I think we are going to see people making claims that are going to be confusing to the consumer," says Margaret Mellon, Food and Environment Program Director for the Union of Concerned Scientists.

For example, Premium Standard Farms makes the claim that it "does not use sulfa antibiotics" to produce its pork. That may sound impressive, but that's just one tiny portion of a drug-laced diet, says David Wallinga, Director of the Institute for Agriculture and Trade Policy's Antibiotic Resistance Project.

"That means they don't use one of 17 classes of growth promoters," he says. "It's deceptive to consumers."

What about claims by Farmland that its "All Natural" pork is produced under conditions where antibiotics are removed from the hog "three times earlier than the USDA requires"?

That may help eliminate residues in the meat when the consumer eats it, but does not eliminate the bigger problem of using subtherapeutic doses early in a pig's life.

"Direct consumption of antibiotics in the meat is a problem, but the much larger problem is the generation of resistant bacteria by the antibiotics in the first place," says Mellon. "We want it out of the pigs, out of the environment, out of the manure, out of the water."

Some of the roiled waters created by labels related to antibiotic use mirrors the confusion over "growth hormones" in meat. Pick up just about any chicken or pork product from the freezer case at the store and you will find the phrase "no added hormones" on the label. That's certainly the 100 percent truth, since hormones have not been legally used in pork and poultry production for several years. A hormone-free claim on pork and poultry is legal as long as it's followed by this statement: "Federal regulations prohibit the use of hormones." On the product itself, that rule is followed. However, in other venues, such as on company Web sites, copy writers sometimes forget to include the government's caveat about the ban on hormones.

"It amazes me that a company can get away with basing an advertising campaign on saying they are hormone free. It's outrageous when in fact all chicken or pork is hormone free," says Pam Saunders, who coordinates the meat pool for Organic Valley, a Wisconsin-based organic foods cooperative owned by family farms.

And don't be fooled by the old "all natural" standby. It has nothing to do with the use or nonuse of antibiotics. According to the USDA's Food Safety and Inspection Service, that wording just means the product does not "contain any artificial flavor or flavoring, coloring ingredient, chemical preservative or any other artificial or synthetic ingredient; and the product and its ingredients are not more than minimally processed (ground, for example)." Under these guidelines, Premium Standard Farms can legally claim its pork chops are "all natural," but that tells the consumer nothing about the company's use of antibiotics, or its reputation as one of the largest polluters in the Midwest for that matter.

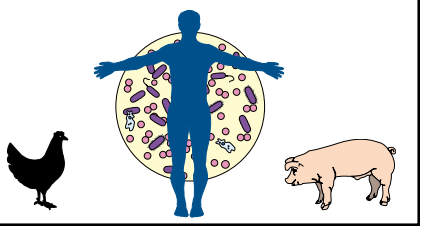
Mellon says at the least consumers should be looking for labeling that in some way tells them the meat producer is not using antibiotics that are important to human medicine.

According to the USDA, meat produced without the use of any antibiotics cannot use the term "antibiotic-free" on the label. Instead, terms like "no antibiotics used in raising" are allowed. But how does the consumer really know an animal has been raised without antibiotics? Matthew Baun, a staff member with the USDA's Food Safety and Inspection Service, says when making such claims, meat companies have to provide affidavits and protocols. However, when questioned as to how the USDA insures that companies are adhering to their paper claims, he says, "The issue is confusing in that there is multi-jurisdiction."

That's further proof that the labeling system for meat and poultry in this country is a mess, say Mellon, Wallinga,

Labels *see page 12…*

Antibiotics, Agriculture & *Resistance*



…Labels *from page 11*

and other critics of subtherapeutic use of antibiotics.

"Eventually the long term thing people need to do is demand better labeling," says Wallinga. "In the meantime, it's kind of buyer beware."

On the positive side, aware buyers today can buy meat and poultry direct from farmers they know personally and whom they can query about production methods. In addition, organically certified meat and poultry cannot be raised with antibiotics. Companies like Niman Ranch have based their reputation on producing pork that's raised without antibiotics by environmentally sound family farmers. Sustainable food labeling initiatives like the Midwest Food Alliance have strict, third-party enforced guidelines related to antibiotic use. ❒

Want livestock products raised without antibiotics?

• **Midwest Food Alliance—**This is a third party certified sustainable food label that currently has products in select Minnesota grocery stores. It is a joint initiative of the Land Stewardship Project and Cooperative Development Services. Call 651-265-3682 or log onto www.landstewardshipproject.org.

• **Stewardship Food Network—**This is a listing of LSP members who direct market food produced using sustainable methods such as limited or zero use of antibiotics. Call 651-653-0618 or log onto www.landstewardshipproject.org.

• ***Eat Well, Eat Antibiotic-Free*—**This is an on-line guide developed by the Institute for Agriculture and Trade Policy that helps consumers identify and understand the different labels used for meat raised without antibiotics. The guide includes information on local, regional and national meat producers who sell their products directly to the public. It also lists by state those retailers, coops or Community Supported Agriculture networks that sell meat raised without antibiotics. Log onto http://www.iatp.org/foodsec/library/admin/uploadedfiles/Eat_Well_Eat_Antibiotic-Free_2.htm, or call 612-870-0453.

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