

# For the Record

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Straight talk about antibiotic use in food animal production presented by ALPHARMA Inc., Animal Health

## FOOD SCARE POLITICS: THE REAL RISKY BUSINESS

This just in: Sky Set to Fall. Film at 11...

**DON'T EAT THE BEEF!** The Obama Administration in mid-March boasted of “closing a loophole” that risked public health by allowing animals not obviously ill, but nevertheless unable to walk into the packing plant, to enter the food chain. USDA claimed it will keep animals infected with “mad cow” out of the food chain. (All four to seven of them, that is, theoretically hiding somewhere in the U.S. cattle herd, according to best estimates.)

**Just how risky?** In the United Kingdom, where mad cow disease did measurably exist in the cattle herd (unlike the U.S.) and where human disease linked to beef occurred, (unlike in the U.S.), the Centers for Disease Control estimates beef eaters there faced a 1 in 10 billion chance of getting the disease—roughly one-half of one thousandth of a percent of the likelihood Earth will be hit by an asteroid.

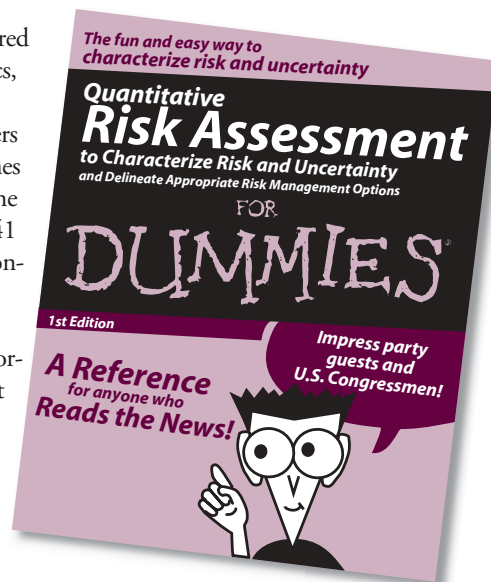
As one anonymous Internet pundit suggested, skipping meat to avoid BSE is sort of like moving to Antarctica to avoid Komodo Dragons.

**DON'T DRINK THE WATER!** The Associated Press in mid-2008 reported results of its own “investigation” of minute amounts of pharma-

ceuticals in U.S. drinking water, saying it had discovered traces of not only antibiotics, but also pain killers, anti-convulsants, mood stabilizers and sex hormones. Headlines splashed conclusions that the drinking water of “at least 41 million Americans” was “contaminated,” and that compounds “lurking” in their water were “heightening worries among scientists” about health consequences.

AP failed to add to its exposé that such reports date back nearly four decades now. But, according to Shane Snyder, PhD, Southern Nevada Water Authority, the reports are connected less to increasing contamination than they are to detection technology that's become so good it's now “possible to detect and quantify nearly any compound known to humankind at diminishingly minute concentrations in water.”

Dr. Snyder's recent scientific review of the issue showed that while some pharmaceuticals were indeed measurable in trace quantities in water supplies, none have occurred at levels relevant to human health. Their presence must be contextualized with those levels, he says. Otherwise, if mere presence becomes the litmus test for risk, we chance spending scarce resources and contributing to global warm-



ing by overtreating water unnecessarily.

**RISKY BUSINESS.** Farm antibiotics, too: “Each year we fail to take action on this critical issue increases the risk that drug-resistant bacteria will threaten the health of the American people,” according to Sen. Olympia Snowe, R-Maine, who in March co-sponsored yet another round of federal legislation to ban most antibiotic use on farms.

Meanwhile, scientists and product manufacturers have been doing the real heavy lifting behind the issue, conducting the science to determine whether any risk really exists, at what level, and whether the talk of risk amounts to anything of substance. See more inside.

### Also in this issue

- Scientists who have labored to quantify the risks that farm antibiotics could impact public health are yielding results that don't fit the political alarmism.
- What is it about farm antibiotic use that makes it such an attractive focus of public fear? A look into the psychology of panic.
- Why can't reasonable scientists agree on antibiotic risk?

### For the record...

'Risk' has become the buzzword that implies political action must be taken. But real risk assessment is a discipline that seeks to balance costs and benefits of political action.

# SCIENTIFIC RISK OR POLITICAL RISK?

“The risks to public health are immense.... Congress should... eliminate the use of antibiotics in animal feed.”

*Akron Beacon Journal* Nov. 26, 2007.

“Congress must act now to [force accelerated reviews of existing antibiotics]. If it fails to do so, it risks passing a bill that compromises America’s public health.”

*Baltimore Sun*, July 10, 2008

“The nation is clearly at risk of an epidemic outbreak of food poisoning caused by drug-resistant bacteria....”

*Sen. Edward Kennedy*, Feb. 12, 2007

Clearly some politicians sense

there’s risk about antibiotic use in farm animals. But is it scientific risk or **political risk**?

## WHAT THE SCIENCE SAYS

Consider the case of penicillin, the 50-year-old poster child for the panic surrounding farm antibiotic use—panic as in: “Drugs such as penicillin and tetracycline, used routinely to treat respiratory disease and heart infections in humans, are also fed routinely to farm animals—not to treat diagnosed disease, but to promote growth and to compensate for the

overcrowded, stressful, unsanitary conditions on factory farms,” as penned in July’s *Baltimore Sun* by **the activists** Margaret Mellon and David Wallinga.

The fact is, according to manufacturer data compiled by the non-profit Animal Health Institute, the amount of penicillin sold to U.S. farmers is only a fraction of all such antibiotics, and the portion of that portion used solely to improve performance amounts to a rounding error on the tonnage of human antibiotics prescribed every year. The specific form of penicillin approved for anything other than disease prevention and treatment is not used at all in cattle, and USDA survey data show 99.5 percent in swine is given for disease treatment, control or prevention.

## IS HUMAN HEALTH AT RISK?

Still, it’s theoretically possible farm use of penicillin could impact effectiveness of penicillins in humans. So risk-assessment specialist and theoretical mathematician Tony Cox, PhD, and systems modeling specialist Douglas Popken, PhD, compiled the available numbers on hospital intensive care unit *Enterococcus* case loads and their rates of resistance to human penicillin. Then, using a set of better-safe-than-sorry estimates about other factors, they attempted to tease out which portion of deaths can correctly be attributed to an infection that likely came from animals, which was made harder to treat with penicillin because on-farm use of penicillin made it more resistant to the drug.

Drs. Cox and Popken’s **calculations predict** continuing use of penicillin risks leading to an additional 0.135 deaths per year in the entire U.S. population—or about one additional death every seven to eight years, if current conditions persist. Using less conservative assumptions, the estimated risk

## ANTIBIOTIC RISK ANALYSIS RESEARCH HIGHLIGHTS

### HOW EFFECTIVE IS A BAN?

Risk assessment expert and author Tony Cox, PhD, used existing data on treatment failures due to *Enterococcus faecium* resistant to the antibiotic vancomycin and worked back to use on farms of the related antibiotic virginiamycin. His model then predicted the **number of human treatment failures** that could have been prevented assuming the antibiotic were banned. The result? 1.8 cases in the entire population over five years following a ban, saving an estimated 0.29 lives.

*Cox LA, Popken DA. Quantifying human health risks from virginiamycin used in chickens. Risk Analysis, 2004; 24(1):271–288.*

**RARE RISKS.** Iowa State veterinary epidemiologist Scott Hurd, DVM, PhD, **modeled the risk** of continuing to use macrolide antibiotics in the U.S. His study shows that even using conservative estimates, the estimated risk of compromised treatment outcomes are vanishingly low:

**ANNUAL RISK OF A POORER OUTCOME DUE TO MACROLIDE USE IN...**

	CHICKEN (C. COLI)	CHICKEN (C. JENUUNI)	CATTLE
SWINE	1 IN 82	1 IN 6.2	1 IN 2.4
MILLION BILLION	608 MILLION	608 MILLION	608 MILLION

*Hurd HS, Malladi S. A stochastic assessment of the public health risks of the use of macrolide antibiotics in food animals. Risk Anal. 2008 Jun;28(3):695–710.*

### RISK IN NOT MEDICATING.

Other work by Dr. Cox estimates ending the use of virginiamycin in animals would likely cause an additional 6,660 human illnesses per year caused by *Campylobacter*. Since the number of illnesses avoided by not using the antibiotic would be less than two per year, **the model demonstrates** that withdrawing animal antibiotics can cause far more human illness-days than it would prevent.

*Cox LA Jr. Potential human health benefits of antibiotics used in food animals: a case study of virginiamycin. Environ Int. 2005 May;31(4):549–63.*

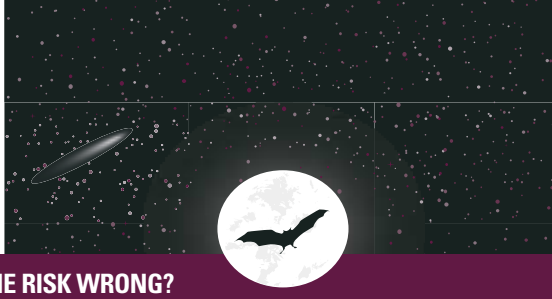
### BAN CAUSED DISEASE? Dr.

Cox again draws on existing human health data to predict that ending use of the fluoroquinolone enrofloxacin (which FDA mandated in 2005) and macrolides in U.S. broiler production would be **expected to cause** an added 1,000 cases of *Campylobacter*-related illness for every one case it avoided.

**ESTIMATED SICK DAYS PREVENTED FOR EVERY SICK DAY CAUSED BY CONTINUING TO USE...**

ENROFLOXACIN	703 PER YEAR
MACROLIDES	4,500 PER YEAR

*Cox LA Jr, Popken DA. Quantifying potential human health impacts of animal antibiotic use: enrofloxacin and macrolides in chickens. Risk Anal. 2006 Feb;26(1):135–46.*



## WHAT LEADS THE PUBLIC TO INSIST ON GETTING THE RISK WRONG?

The human brain, writes **statistician Maia Szalavitz** in *Psychology Today*, evolved ancient mechanisms to make snap decisions based on quick risk assessment. That mechanism served us well in the prehistoric world of predators and natural disaster. Unfortunately, it is poorly suited to the **modern world** of assessing risk communicated by statistics, media and politicians. And unfortunately for agriculture, the antibiotic resistance issue is tailor-made to trip several of those ancient triggers. Here's why:

**SUBCONSCIOUS FEARS RULE.** Fear is the natural reaction to the odds of injury from ancient threats. That often makes modern reaction to subconscious fears—like risk of dying by eating contaminated food, a real risk in the days before modern food preservation—out of proportion to the **real risk it poses.**

**DRAMA ENHANCES FEAR.** In other words, Szalavitz writes, the more spectacular, the more we fear, no matter the odds. Such dramatic fear could explain the preoccupation, for instance, with “flesh-eating” MRSA in food, despite zero scientific evidence it is related to antibiotic use on farms.

**CONTROL SOOTHES US.** If we're able choose the risk we assume, we worry less about it, according to Szalavitz. Two reasons underlie the effect, she says. First, if we assume the risk voluntarily, we feel power to manage the outcome; second, choosing risk assumes we think through potential benefits. That theory implies approaching consumers with a “take it or leave it” attitude about farm antibiotics—without explaining their benefits—works against us.



**HUMANS 'RISK SWAP'** The classic example, cited by Szalavitz, is eating heart-unhealthy ice cream because you had a (healthy) diet soda with lunch. People tend to have a set level of risk which remains constant, as they assume higher risk even while they reduce it somewhere else, which could explain the absolute illogic of “organic cigarettes.”

**VALUES IMPACT.** Statistically speaking, smoking marijuana is safer than playing high school sports. Yet it would be absurd to argue parents should urge their children to give up the latter for the former. Values count, which explains why people like the **PEW Commission**, who criticize intensive farming, easily discard scientific proof of low risk of antibiotic resistance when it doesn't fit their values. To change the risk acceptance, you have to change the values.

**NATURAL MUST BE SAFER.** The familiar and natural is seen as less risky than the unnatural and synthetic. That offers another explanation for the obvious illogic of choosing “**raised without antibiotics**” when research shows such products are more likely—not less—to carry disease-causing bacteria.

*Source: Based on Szalavitz M. 10 Reasons We Get the Odds Wrong. Psychology Today. 2008 Jan/Feb;41(1):96-102.*

falls to about 0.04 excess deaths annually, or about one every quarter century. Assuming the average American lives 80 years, that means he faces an increased risk that's about 3,600 times lower than the risk normally considered acceptable for cancer-causing compounds in the environment. And since Drs. Cox and Popken modeled the risk for all penicillin uses, the risk attributable solely to low level use in feed is almost certainly even lower.

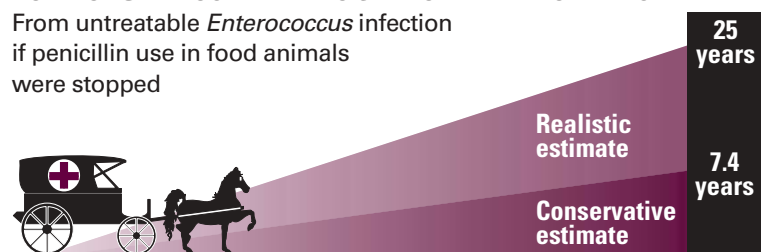
that make a difference, Dr. Cox says.

“Scientists who want to affect policy have an obligation to do much more than raise potential threats. They should have an obligation to say something useful about the magnitude of those potential threats,” he says.

“Providing only a little information, charged with emotional triggers, but without quantitative risk information that helps clarify basis for effective action, can manipulate people into wasting limited resources in ways that do very little or no good.”

## HOW LONG IT WOULD TAKE TO SAVE ONE ADDITIONAL HUMAN LIFE

From untreatable *Enterococcus* infection if penicillin use in food animals were stopped



*Source: Cox LA, Popken DA, Mathers, JJ. Human Health Risk Assessment of Penicillin/Aminopenicillin Resistance in Enterococci Due to Penicillin Use in Food Animals, Risk Anal 2009 In Press.*

## GETTING BEYOND BLAME

Such careful, quantifiable risk assessments are a necessity if we're going to move from simply blaming to developing management strategies

## Principal Points

**The real risky business: Leaping to legislation without first assessing the risk**  
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- Newly re-introduced legislation to ban farm antibiotics bases its case on the belief that using farm antibiotics puts the health of consumers at risk. However, such calls for action seldom, if ever, quantify that risk.
- When scientists actually calculate the risk that a specific antibiotic might increase the chances that a specific human disease will be more difficult to cure, in most cases they find the risk of continuing to use the antibiotic is tiny, if not zero.
- One such careful risk analysis, just released in late March, predicts continuing to use penicillin in poultry and pork production may contribute to one potential excess death every seven to eight years, using conservative assumptions. Adjust the base case values with more likely values, and the incidence drops to about one potential excess death every 25 years. Actual risks could be zero.
- Regulators and politicians should respect the scientific process of careful risk assessment and risk management.

**For the Record**, sponsored by a grant from ALPHARMA Inc., Animal Health, is designed to help unite the industry and provide a unified, rational message on behalf of producers whose freedom to use safe, effective, economical production methods is at stake. Working together, we can set the record straight on antibiotics.

Questions or comments? E-mail Steve Kopperud at [skopperud@poldir.com](mailto:skopperud@poldir.com) or editor Mike Smith at [CustomMedia@Food360.com](mailto:CustomMedia@Food360.com). Read past issues or link to more information on this issue at [www.AntibioticTruths.com](http://www.AntibioticTruths.com).

# WHY CAN'T WE ALL AGREE?

DR. SCOTT HURD, DVM, FORMER USDA DEPUTY UNDER SECRETARY FOR FOOD SAFETY, ASSOCIATE PROFESSOR, IOWA STATE UNIV. INSTITUTE FOR FOOD SAFETY AND SECURITY

As a risk analyst specializing in food-borne illness, I often find myself asking, "How can conscientious public health officials and conscientious scientists so diametrically disagree on whether food animal use of antibiotics is causing risk of human disease?" I think there are three reasons.

First, I don't think the public health community understands it's a long, long way from the farm to the fork. And a number of interventions take place along the way to keep people from getting sick from food-borne pathogens—antibiotic-resistant or not.

Second, I think folks forget that if you argue for taking antibiotics away from the farm, then you should meet the burden to establish a specific causal pathway—linked all the way from the farm to the sick individual. Certainly, when you look at the microbiology of resistance, we know in a general sense that most bacteria when grown in the presence of an antibiotic will develop resistance mechanisms. But a lot of people have taken that understanding of microbes in the test tube and leapt to make national policy. The problem is the data don't support the pathway of cause and effect.

Consider Denmark, where growth-promoting antibiotics were removed from pig production. The World Health Organiza-

tion (WHO) studied the issue about four years after the ban, and it found little to no improvement in public health. In fact, WHO suggested the possibility of some *increased* risk to public health because of the ban.

The third and related reason I believe thoughtful parties can't come to consensus is that any such causal pathway is going to vary by which antibiotic and which bacteria you're looking at. So it really has to be addressed on a case-by-case basis—there are no shortcuts. When you do that, looking at the few risk assessments that have been published for specific drugs, you find they show an extremely low risk that people are going to have any extra illness because of farm antibiotic use.

The FDA has said we need to assess risk on a case-by-case basis, and drug sponsors have responded. A broad based ban like Europe's and the one proposed in Congress, aimed at entire classes of antibiotics based simply on the way they're used, short-circuits that scientific risk-assessment process. It's throwing out the baby with the bath water.

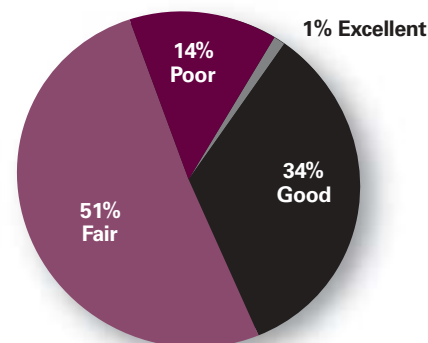


## CAN WE RELY ON THE MEDIA TO REPORT IT RIGHT?

Lawmakers, too, read the media, (both House and Senate bills to ban farm antibiotics, for instance, quote the supermarket checkout magazine *Consumer Reports*). So it's worth asking: Do they get it right when it comes to reporting on health risks? Minnesota journalism professor Gary Schwitzer, PhD, reviews health journalism research, surveys health care journalists and interviews journalists for his **annual report** on the state of health reporting. His conclusion this year: Financial stress in the media has contributed to some "troubling" trends. They include "quick hit" stories, often based on summarized medical studies, which tend to sacrifice quality, fewer in-depth or complex stories,

especially about health policy, and more lifestyle and consumer health-related fluff stories.

**Health reporters grade themselves: "How would you rate the news media for its coverage of health care?"**



Source: Schwitzer G. *The State Of Health Journalism In The U.S.* Menlo Park, Calif.: Henry J. Kaiser Foundation, 2009.