

For the Record

Straight talk about antibiotic use in food-animal production

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INSIGHTS ON THE ISSUE

The long, familiar pedigree behind the movement to ban antibiotics

"No food, one problem. Much food, many problems."

—Anonymous

It's helpful to put the recent movement to ban antibiotic use in farm animals into some historical perspective. Today's antibiotic opponents are another link in a long tradition of anti-technology activists, including:

- Protestors who picketed research on the first polio vaccine, fearful the virus might escape its restraints.
- Panicked claimants that pasteurization was dangerous and would cause disease in milk-drinking children.
- Opponents of public water-fluoridation to prevent dental disease.
- Today's alarmists opposing irradiation of food and biotechnology.

All these heirs to England's Luddites—early 19th century weavers and craftsmen who burned factories to stave off loss of their jobs to the coming Industrial Revolution—share an over-romanticized longing for a simpler time. It's no accident that most also support organic farming, non-confined livestock rearing, strict environmentalism and centralized market control.

Familiar as their alarms may seem, though, we dismiss them at our own risk. Where being a Luddite 200 years ago could get you hanged; 50 years ago, laughed off as quaint, today it is acceptable, even fashionable, to proudly wear the mantle of anti-progress. New-age scholars are rewriting history to interpret anti-progress as a noble resistance against depersonalization

and loss of individual power. Their anti-technology isn't held to any test of either practicality or effectiveness, either—in fact, eliminating food-animal antibiotic feeding only promises to embolden them to attack other technologies that help ensure a safe, plentiful and affordable food

supply. In today's affluent society, where food is more plentiful, cheaper and safer than at any time in history, more and more people are willing to indulge a feel-good movement that concerns itself not with the consequences of its cause, but merely the glory of the political struggle.

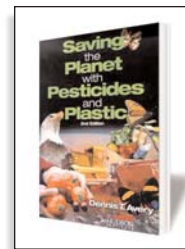
Do we starve the world to appease dietary fashion?

Aside from a few cents per pound added to your cost of production, where's the harm in letting the anti-technology, organic-farming advocates drive us back to simpler farming, before chemicals, antibiotics, confinement barns and other intensive tools?

Here's the problem, writes Dennis Avery, author of *Saving the Planet with Pesticides and Plastic: The Environmental Triumph of High-Yield Farming*:

- To maintain soil fertility, the 11 million tons of industrially created nitrogen that US farmers use each year would have to be replaced by manure from approximately 1 billion additional cattle. They would require another 2 billion acres to feed—roughly the entire continental United States.
- At the same time, per-acre productivity would fall at least 20 percent—that according to organic advocates themselves—and more likely by 40 to 50 percent by most reasonable estimates.
- Moving the confined US hog herd back outside would require putting into production idle land roughly the size of Pennsylvania. The chicken flock would take New Jersey. Meanwhile, about 20 percent more land would need to go into feed production to make up for the accompanying loss of feed efficiency.

The unfashionable truth, Avery writes, is that today's technological agriculture has doubled the world's food supply in 50 years, increased Third World per-capita calories by more than 30 percent, reduced soil erosion per ton of food to the lowest in history and saved 16 million square miles of wildlands from being diverted into low-yield farming to feed growing populations. Cambridge University chemist John Emsley framed the issue bluntly: Worldwide conversion to organic farming would spell the immediate starvation of 2 billion people.



Also in this issue:

- The search for 'the smoking gun' that links animal use of antibiotics to human resistance
- The myth of organic and natural food as alternatives to antibiotics
- Where to find more information

For the record

Relative affluence and abundant food supplies afford today's consumers the ironic luxury of attacking the very methods that produce that plenty.

The tortured search for the smoking gun

For the record

Advocates of banning food-animal antibiotics can offer only theory and circumstantial evidence to support their case.

For the record

The appeal of organic, all-natural and vegetarian diets as an alternative to animal protein is a non-starter. So-called 'natural' dietary choices are not safer, and in many cases can be less nutritious, than conventional meat-based diet options.

Somewhere between the research reports that use language like “antibiotic use in animals may be associated with” human disease and the news headlines reporting “farmers are making your antibiotics ineffective,” something gets lost in the translation. Today’s Holy Grail of research is the definitive study that uncovers the “smoking gun” to squarely place the blame on animal use of antibiotics for the development of human resistance. So far, it’s no go: ■ Much of the current round of debate on this 40-year-old issue was re-ignited by the FDA’s approval of fluoroquinolones, first in poultry and then in cattle. In urging the manufacturer to pull this class of human drugs from farm use, the American Medical Association and others cited its best evidence for the cause: A “clearly documented temporal relation” between the introduction of fluoroquinolones for use in food animals and quinolone resistance in two human organisms. In plain English, that’s akin to saying you were clearly documented to have been in the bank 10 minutes before it was robbed; therefore, you robbed the bank.

■ Oregon State researchers sampling 50 bunkers on 12 different dairy farms in western Oregon found that 42 percent were positive for *Salmonella* contamination. Of those, 100 percent of the contaminated samples classed as *Enterobacteriaceae*—the family that includes both *Salmonella* and *E. coli*—were resistant to ampicillin, tetracycline or streptomycin, drugs used in calves. Yet, the study’s lead researcher pointed out that the organisms also showed resistance to ciprofloxacin, a drug never approved for use in dairy cattle, and chloramphenicol, which has been widely unavailable for years. She says that suggests the resistance could just as likely be starting off the farm.

■ Kansas State researchers, expressly sensitive to the assumed connection between using antibiotics in swine and human resistance, studied the antibiotic history and productivity of over 24,000 growing

pigs in three multisite operations. They ultimately concluded that subtherapeutic antibiotics should be limited solely to use in the nursery.

Yet, credentials of the researchers and the large number of animals notwithstanding, this study demonstrates the complexity of the issue and the dangers of leaping to blanket recommendations based on single studies. The Kansas State work’s main flaw is that it looks backward, rather than builds the study from the start to control confounding factors, like disease, combining antibiotics, a large variety of feeds, even sex of the test animals. It overlooks or discards some suspect data, changes its results based on the statistical analysis it uses, fails to take into account the effect of antibiotic use by individual groups on the entire study’s population, and never really accomplishes its stated aim: to assess whether pigs never fed antibiotics from the nursery to finisher in segregated systems perform as well as those that are.

■ Research by both the World Health Organization and the National Research Council have demonstrated a link between antibiotics in food animals and the development of resistant bacteria in those animals, calling it a cause for concern in human disease. Still, according to a 1998 National Research Council report, “the incidence of such disease is very low.”

■ To boost public support for bills in the US House and Senate to ban some use of antibiotics in animal production, a Tufts University-based group called the Alliance for the Prudent Use of Antibiotics issued a 77-page report earlier this year. Although its stated aim was to call on some of the top researchers to “provide an objective, scientific review and analysis of available data,” the report illustrates that most of these studies still support their conclusions through association, assumption and conjecture. From excerpts of the report’s language itself:

- “There is considerable evidence that antimicrobial use in animals

(Continued on page 4)

The broken chain of evidence

In their defense, researchers have recognized that proving that animal use of antibiotics causes human disease faces a tough row to hoe. It must prove a long chain of evidence:

- Sub-therapeutic use of antibiotics in animals causes selection for resistant bacteria in animals, bacteria that persist in the animal or the environment.
- Those resistant populations survive in the meat or animal products made from those infected animals.
- Those resistant bacteria make it through the food safety system to eventually infect humans—or infect humans directly from their environment.
- Those infected humans develop disease and spread the resistant bacteria in the human community.

Though the ban advocates have all the pieces of that puzzle, few to no studies (depending on your tolerance for assumptions in the research) have put all four pieces together to create that direct evidence of cause and effect. At the same time, the observed stable or downward trend in the resistance rates for the important food-related microorganisms—*Salmonella* and *Campylobacter*—absent any significant change in the subtherapeutic use of antibiotics, presents a strong counter-argument that something else has been responsible for increasing the resistance hazard levels in food.

The myth of organic food alternatives

Citing concerns about not only antibiotics, but also hormones, pesticides, fertilizer, irradiation and genetic modification, 71 percent of consumers told a recent Roper Starch Worldwide poll that organic food is appealing to them. Almost two in three believe organics are better for them than their non-organic counterparts.

Yet in that same poll, over 6 in 10 knew little or nothing about how USDA defines an organic food, and 75 percent thought (wrongly) that organic was the same as “all-natural.”

The healthy and natural foods movement—rooted in romantic notions of idealized farm life and often marketed as a safe and wholesome alternative to the “tainted” foods produced by the modern food industry—continues to gain momentum. Yet the truth about the shadowy claims made by the natural food peddlers, and some downright dangers posed by “natural” foods are numerous:

- “Sustainable” farming practices supported by organic proponents are actually wasteful of resources because of their comparative inefficiency. A 21-year Swiss study just published in *Science* compares two types of organic farming with two types of conventional agriculture. The organic plots were on average 20 percent less productive than conventional plots, even while the organic crops were neither healthier nor safer than conventional or genetically modified products. The comparative inefficiency is reflected in the average higher prices organic and natural food products command—high prices that are also inflated by marketing campaigns that convince consumers of their superiority.
- Because organic systems typically replace commercial fertilizer with manure, the theoretical risk of contamination is actually higher in organic fruits and vegetables than conventionally raised ones. And because antibiotics are not used in organic food animals, levels of disease in the population may actually be higher than in

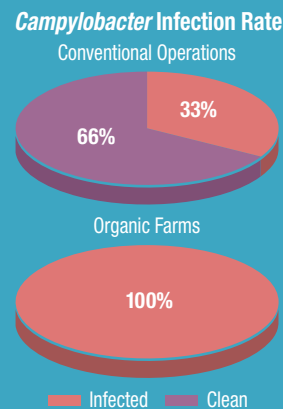
those controlled by effective antibiotics. Recent studies, for example, show organic chickens are more contaminated with dangerous bacteria than conventionally raised chicken.

- The non-profit Center for Global Food Issues tracked monthly food and supplement recalls by the U.S. Food and Drug Administration and the Food Inspection Agency of Health Canada over a nine-month period. It found that products marketed as organic or “all natural” were significantly more likely to be recalled or warned by the regulators than conventional foods. The top reasons cited were failure to label ingredients that could cause allergic reactions, mislabeling and bacterial contamination.

Even though organic products make up under 1 percent of the total marketplace in North America, they accounted for more than 8 percent of all recalls, reported Alex Avery, research director for the Center for Global Food Issues.

Organic doesn't mean germ-free

Veterinary researchers in Denmark found that 100 percent of the 22 organic broiler operations they sampled in 2001 were infected with the organism *Campylobacter*—the most common cause of food poisoning in Europe. By contrast, only a third of the 79 conventionally run operations were infected.



For more information

www.cdc.gov/drugresistance/

A comprehensive backgrounder from the US Centers for Disease Control on the antibiotic resistance issue.

www.alpha.com/ahd/For_The_Record

Previous issues of For the Record.

www.keepantibioticsworking.com

A consortium of environmental and advocacy groups supporting legislation to limit or ban antibiotic use in food animals.

www.healthy-poultry.com

Facts about the use of fluoroquinolones in US food animals and resistance rates of *Campylobacter*.

Appeal of vegetarianism waning?

The December *Journal of Adolescent Health* reports that adolescents who classify themselves as vegetarians are more likely to suffer eating disorders and unhealthy eating practices like abusing diet pills, laxatives and self-induced vomiting than adolescents who eat meat.

The study of 5,000 Minnesota teenagers found that of the 6 percent who said they didn't eat meat, the No. 1 reason was to lose weight. Almost 75 percent of the respondents were female.

Meanwhile, another study by nutrition professors at the University of British Columbia interviewed 193 women aged 18 to 50 about their eating habits. The roughly half who said they were vegetarians or were trying to practice vegetarianism said they did so out of concern, in part, to be healthier and control their weight.

Yet, when the researchers analyzed their diets, they found the meat-eating women were just as lean as the vegetarians, and that their caloric and fat intakes were nearly identical.

And finally, a recent study reported in the *American Journal of Clinical Nutrition* found that teenaged vegans—those who avoid not only meat but all animal products—suffered dietary intakes lower than the average requirements of riboflavin, vitamin B-12, vitamin D, calcium and selenium. Even when the vegans included vitamin pills in diets—a common and virtually mandatory practice in order to try to supply the missing nutrients a balanced diet provides—calcium and selenium intakes were still below recommendations.

The tortured search for the smoking gun *(continued from page 2)*

selects for resistance. . . . However, other studies (on-farm and experimental) failed to show an association between antimicrobial use and resistance, suggesting that the development of resistance is a complex process. . . .”

- “Although the evidence [of certain specific diseases in humans caused by animal antibiotic use] is circumstantial, several types of observations link food products and subsequent development of disease involving steps in meat and poultry production. . . .”
- “Because the majority of human *Salmonella* infections are food-borne, the emergence of new

resistance patterns among human isolates is likely to result from agricultural practices.”

- “The assessment of human health risk associated with antimicrobial use in animals is fraught with pitfalls, most notably the lack of specific data. . . , the inherent complexity of the issues, and the choice of appropriate outcomes to consider.”
- “The nature of the risk to human health due to antimicrobial use in animal husbandry is inherently indirect. Without measurements of direct exposure, it is not possible to estimate directly the associated risk of possible outcomes. . . . However, an evaluation of the risk,

although not scientifically elegant, can indeed be carried out.”

Not scientifically elegant? The bottom line: After almost a half century of research, the link between animal antibiotic use and the reduced effectiveness of human antibiotics remains no less circumstantial and theoretical than it was when FDA first approved the practice in 1951. At the same time, evidence that’s at least as strong—if not stronger—exists that overuse of human drugs by humans is causing the vast majority of cases of human treatment failures, and in fact could be a cause of resistance in animals.

For the record

ALPHARMA

sponsors this

informational series

to balance the

anti-technology

bias behind the

movement to ban

food-animal

antibiotics with

the true science.

That science is our

best hope to protect

your ability to grow

safe and healthy

food. Questions

or comments?

Contact [sandy.flick@](mailto:sandy.flick@alpharma.com)

[alpharma.com](mailto:sandy.flick@alpharma.com)

SPEAK UP YOUR ROLE IN THE ISSUE

Why we sponsor For the Record

Our experience in Europe, as is the case with many other agricultural issues, should provide a wake up call for the world’s livestock industry. In recent years the European Union authorities convinced themselves that much of the antibiotic resistance in man was associated with antibiotic use in livestock. For this reason, they banned certain products used for growth promotion and now propose to phase out the remaining products used in this way.

What has been the result of this dangerous use of the “precautionary principle?”

■ Since the ban on the first of those products, avoparcin, the level of resistance in man to its human analog, vancomycin, has actually increased by almost 40 percent. Vancomycin resistance has recently been reported in Swedish livestock, as well, where all growth promotants have been banned for 16 years. And the highest rate of human vancomycin resistance in the world is in hospital patients in the United States, where avoparcin has never been approved nor used in food animals. At the farm level, this misdirected focus on avoparcin

left certain infections that were previously controlled by this antibiotic out of control, requiring high levels of therapeutic antibiotics to treat.

■ After Denmark banned the use of all growth promoters in 1999, disease increased, mainly in the swine population. That increased disease, according to figures released by the Danish authorities in July, increased use of therapeutic antibiotics by 30 percent in 2000; 17 percent in 2001.

That unintended decrease in the health status of Europe’s livestock hasn’t been the only consequence of this unfortunate experience. This scenario has also put Europe’s livestock farmers at a competitive disadvantage. The result: Increasing quantities of livestock products being imported into Europe from countries outside.

In Europe the buzz word is “sustainable” agriculture. As usual, there are those who grab the term and state that of course this means organic farming. We have witnessed a worrisome trend toward policy recommendations directing research toward low or no-drug farming systems, implying no room for animal medicines in sustainable farming. But is this right?

More than 350 million people now live in the European Union. When other eastern European countries join

the EU in the near future, that number will be increased by more than 100 million. All this population will require adequate supplies of food from healthy livestock. To achieve this we need to be certain that we can sustain these animals by using antibiotics in a responsible manner.

Even those countries in Europe that are organically oriented, such as Austria, are now finding that it doesn’t always pay off, and there has been a reduction of 10 percent of organic farmers in the last year.

The animal health industry was the first to develop global guidelines for the responsible use of antibiotics and has done much to implement these in practice in recent years.

Food is now safer than at any time in history, thanks to the development of the appropriate animal drugs. Let’s give very careful consideration to all the facts before we talk about banning certain critical drugs. According to risk analysis expert Dr. Tony Cox of Denver, food preparation is far more important than resistance from antibiotics that have been used for the animals. With the skills of the modern professional livestock producer, together we can make a difference and maybe continue to remind the politicians on both sides of the pond that healthy food comes from healthy animals!



Dr. Tony Mudd,
Independent Animal
Health Consultant