Testimony Before the
House Committee on Rules
on
The Preservation of Antibiotics for Medical Treatment Act
H.R. 1549

Presented by

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My name is Margaret Mellon. I am the Director of the Food and Environment Program at the Union of Concerned Scientists (UCS). UCS is a leading science-based nonprofit working for a healthy environment and a safer world. I am here today on behalf of UCS and Keep Antibiotics Working (KAW), a coalition of health, consumer, agricultural, environmental, humane and other advocacy groups, of which UCS is a member. Keep Antibiotics Working, whose organizations have more than ten million members, is dedicated to eliminating a major cause of antibiotic resistance: the inappropriate use of antibiotics in food animals.

We appreciate the opportunity to submit testimony before the House Committee on Rules on what the Centers for Disease Control has long considered one of the "most pressing public health problems:"[1] the urgent food safety and public health crisis of antibiotic resistance. KAW advocates that Congress at long last address this crisis, and, in particular, support the scientifically sound approach found in H.R. 1549, The Preservation of Antibiotics for Medical Treatment Act. We are grateful for Chairwoman Slaughter's long standing efforts to address this critical issue.

Diseases resistant to antibiotics: major threats to food safety and public health

As is well known to the medical community, we face an urgent crisis of antibiotic resistance. Once considered miracle drugs, antibiotics are becoming less and less effective at treating infections and disease. Many Americans, including, I would guess, some in this room, have experienced this problem first hand. Sometimes when drugs

[1] Centers for Disease Control (CDC). 2004. Background on antibiotic resistance. Online at www.cdc.gov/getsmart.

don't work, it means several days of unnecessary pain and suffering while doctors figure out that another drug is needed. But increasingly, resistance leads to more dire consequences. Treating a patient with an ineffective drug can give an infection a chance to progress to a more serious illness. For cases where none of the available antibiotics work, resistance becomes a matter of life and death. In addition to rendering drugs ineffective, resistant strains are often more virulent than their susceptible counterparts.

Antibiotic resistance is of particular concern in terms of food safety. The CDC has found that half of all human *Campylobacter* infections[2] are drug resistant as are one in five *Salmonella* infections.[3] Nearly 100,000 of the *Salmonella* infections would resist treatment with at least five antibiotics. *Salmonella* and *Campylobacter*, the most common sources of food borne illnesses in the United States, account for well over a million resistant infections in this country each year.[4]

Longer hospital stays to treat food borne illnesses and other diseases dramatically increase the nation's health costs—by one estimate adding over $4 billion per year to the health care tab in the United States.[5] And, of course, more time away from work is a drag on our economy.

Antibiotic resistance is not a problem only for humans. The bottom line of antibiotic resistance—harder to treat diseases and higher medical costs—is also true for veterinary medicine.

Unfortunately, the resistance crisis will not be alleviated by the arrival of new drugs. The discovery of new classes of antibiotics, once almost a predictable occurrence, has become frustratingly difficult in recent decades. The unhappy truth is that there are virtually no new classes of antibiotic drugs in the pipeline.[6] Unless we act to preserve the antibiotics we have, the age of the miracle antibiotics may be coming to an end.

Antibiotic resistance results from antibiotic use

Exposure to antibiotics selects for those bacteria that can withstand the drug. Resistant organisms are encouraged in settings where antibiotics are heavily used—primarily human medicine, veterinary medicine, and food animal production. Microorganisms

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[2] Centers for Disease Control (CDC). 2005. National Antimicrobial Resistance Monitoring System (NARMS) for Enteric Bacteria: Human Isolates. Final Report. Atlanta, GA: U.S. Department of Health and Human Services, CDC.

[3] CDC. 2005. NARMS.

[4] Total number of illnesses from USDA (www.ers.usda.gov/Data/FoodBorneIllness) is multiplied by data from footnote 3 to obtain totals for resistant illness.

[5] National Academy of Sciences Institute of Medicine. 1998. *Antimicrobial Resistance: Issues and Options.* Washington, DC: National Academies Press, p. 1.

[6] Infectious Diseases Society of America. 2003. Bad bugs, no drugs: Defining the antimicrobial availability problem. Backgrounder. Online at www.idsociety.org/badbugsnodrugs.

exist in an interconnected ecosystem and travel back and forth among humans, animals, and other elements in the environment. Thus, antibiotic-resistant microorganisms generated in the guts of pigs in the Iowa countryside don't stay on the farm. They can be transmitted to humans in at least three ways: carried on meat or poultry; colonizing farm workers who transmit them into the community; or moving through water and soil, which can lead to the contamination of fresh produce. Recently, lettuce, tomatoes, and spinach have all been found to be sources of food borne illness.

When the antibiotics used in raising food animals such as pigs are the same (or more precisely, in the same classes) as those used in doctors' offices, bacteria from the pigs will be impervious to therapies based on the drugs.[7]

The fundamental approach to prolonging the effectiveness of drugs is to curb unnecessary uses—whether in human medicine, veterinary medicine, or food animal production. Every sector needs to accept responsibility and curb its own unnecessary antibiotic use.

The medical profession has stepped up to the plate and identified and attempted to address the issue by establishing guidelines against unnecessary uses, like treatment of viral diseases, and aggressively seeking to reduce prescriptions for those uses. Periodically, it evaluates the effectiveness of its initiatives.

To date, the veterinary and industrial agriculture communities lag far behind the human medical community in taking similar steps to reduce unnecessary use. Instead it has spent its energies in minimizing or denying the problem.

Production agriculture's contribution to the problem

As it turns out, food animal production uses the lion's share of the antibiotics in the United States—some 13 million pounds of antibiotics every year, about 70 percent of the total. The estimates include drugs used in only three livestock sectors—poultry, swine, and beef cattle—and only for purposes other than treating sick animals—non-therapeutic purposes like growth promotion and routine disease prevention.[8] All of these antibiotics, among them penicillins, tetracyclines, and erythromycin—are in classes of drugs used in human medicine.[9] Most of these drugs are delivered to animals mixed in their feed.

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[7] McEwen S, and Fedorka-Cray P. 2002. Antimicrobial use and resistance in animals. *Clinical Infectious Diseases* 34:S93-106.

[8] Mellon M, Benbrook C, and Benbrook K. 2001. *Hogging it!: Estimates of Antimicrobial Abuse in Livestock*. Cambridge, MA: Union of Concerned Scientists, p. 60. Online at www.ucsusa.org/food_and_agriculture/science_and_impacts/impacts_industrial_agriculture/hogging-it-estimates-of.html.

[9] Mellon M, Benbrook C, and Benbrook K. 2001. *Hogging It!*, pp. 51-53.

Why do animal producers use such huge quantities of valuable drugs when most of the antibiotics are not used to treat disease? In part, because growth promotion and feed efficiency uses are thought to improve the bottom line even in healthy animals. But also because drugs are needed to compensate for crowded, stressful, and unhygienic conditions characteristic of many animal production operations.

The link between animal production and reduced efficacy of human drugs

In light of the enormous use in production agriculture of *exactly the same drugs used in human medicine*, it is difficult to imagine a credible scenario under which resistant bacteria generated in the billions of animals we grow for food would not find their way to human populations and erode the effectiveness of our antibiotic arsenal. And indeed a mountain of scientific studies now demonstrates that that is the case.

The list of antibiotic-resistant pathogens originating in animals is long. It includes the food borne illnesses mentioned above caused by *Campylobacter* and *Salmonella.* Contaminated retail meat used to be the primary source of such infections. But increasingly, produce like peppers and spinach is causing illness, likely the result of contamination by animal waste during the production and processing of crops.

Microorganisms originating in animals are also often associated with bloodstream infections that affect hospitalized patients. Resistance in *Campylobacter* and *Salmonella* is associated with increased bloodstream infections, increased hospitalization, and increased death.[10] Resistant urinary tract infections, which can be caused by a number of different animal-associated bacteria, including *E. coli*, have also been linked to animal sources.[11]

And the list continues to grow. Just last year, we learned that livestock can be an important source of life-threatening methicillin-resistant *Staphylococcus aureus* (MRSA). In Europe, a strain of MRSA responsible for 20 percent of human MRSA infections in the Netherlands[12] has been shown to be transmitted from pigs to farmers and their families, veterinarians, and hospital staff.[13] The pig- associated strain of MRSA has now been

[10] Helms M, et al. 2005. Adverse health events associated with antimicrobial drug resistance in Campylobacter species: a registry-based cohort study. *Journal of Infectious Diseases* 191:1050-5; Varma JK, et al. 2005. Antimicrobial-resistant nontyphoidal Salmonella is associated with excess bloodstream infections and hospitalizations. *Journal of Infectious Diseases* 192:554-61.
[11] Hooton T, and Samadpour M. 2004. Is acute uncomplicated urinary tract infection a foodborne illness, and are animals the source? *Clinical and Infectious Diseases* 40:258-9.
[12] van Loo I, et al. 2007. Emergence of methicillin-resistant *Staphylococcus aureus* of animal origin in humans. *Emerging Infectious Diseases* [serial on the Internet] December. Online at www.cdc.gov/EID/content/13/12/1834.htm.
[13] Huijsdens X, et al. 2006. Community-acquired MRSA and pig farming. *Annals of Clinical Microbiology and Antimicrobials* 5:26. Online at www.ann-clinmicrob.com/content/5/1/26.; Voss A, et al. 2005. Methicillin-resistant *Staphylococcus aureus* in pig farming. *Emerging Infectious Diseases* 11:1965–6.

found in Canada[14] and in the United States.[15] Small studies to determine whether the pig-associated strain will be found in hospitals and doctors' clinics in the United States are underway, but larger more comprehensive studies are needed.

Importantly, the list of resistant bacteria themselves traceable to animals does not convey the full scope of the problem. Bacteria are promiscuous. They can acquire bits of DNA, including resistance traits, from unrelated bacteria. This means that the traits that originate in animal guts might move through the microbial ecosystem to confer resistance on bacteria not of animal origin. In addition, bacteria are known to harbor large circles of DNA that carry ten or more resistance traits.[16] In these circumstances, the use of one antibiotic, say penicillin, can simultaneously drive up the levels of resistance to other antibiotics, like tetracycline, cephalosporins, and fluoroquinolones.

The literature in this arena is voluminous and the conclusion is clear: antibiotic overuse in agriculture—just as in human medicine—is undercutting the efficacy of important human therapies and generating more virulent pathogens

Several major studies and reports make the point:

- In 2002, *Clinical Infectious Diseases* published a special supplement on the "Need to Improve Antimicrobial Use in Agriculture" that concluded the *"[u]se of antimicrobials in food animals contributes to the growing problem of antimicrobial resistance in animal and human infections."*

- In 2003, the World Health Organization concluded, *"There is clear evidence of the human health consequences [from agricultural use of antibiotics, including] infections that would not have otherwise occurred, increased frequency of treatment failures (in some cases death) and increased severity of infections."*

- In 2003, the National Academy of Sciences' Institute of Medicine came to the same conclusion, stating*, "Clearly, a decrease in antimicrobial use in human medicine*

[14] Khanna T, et al. 2008. Methicillin resistant *Staphylococcus aureus* colonization in pigs and pig farmers. *Veterinary Microbiolgy* 128:298–303.
[15] Smith T, et al. 2008. Paper presented at the International Conference on Emerging Infectious Diseases, Centers for Disease Control and Prevention, Council of State and Territorial Epidemiologists, Atlanta, GA, March, and personal communication.
[16] Partridge SR, et al. 2009. Gene cassettes and cassette arrays in mobile resistance integrons. *Federation of European Microbiological Societies (FEMS) Microbiological Reviews* 33:757-84; Akwar HT, et al. 2008. Associations of antimicrobial uses with antimicrobial resistance of fecal *Escherichia coli* from pigs on 47 farrow-to-finish farms in Ontario and British Columbia. *Canadian Journal of Veterinary Research* 72:202-10; Gillings M, et al. 2008. The evolution of class 1 integrons and the rise of antibiotic resistance. *Journal of Bacteriology* 190:5095-100.

alone will have little effect on the current situation. Substantial efforts must be made to decrease inappropriate overuse in animals and agriculture as well."

- In 2001, the prestigious *New England Journal of Medicine* published a special editorial whose title sums it up well—*"Antimicrobial Use in Animal Feed—Time to Stop."*

The solution is reducing antibiotic use

As long as the massive use of antibiotics continues, animals, particularly animal guts, will remain a fountain of resistant pathogens, dangerous to both animals and humans. The straightforward solution to the problem is to reduce the use of antibiotics in animal production and thereby diminish the pool of resistant organisms and traits.

Fortunately, the largest amounts of antibiotics in food animal production are used for growth promotion, feed efficiency, and routine disease control, uses that can be eliminated without damage to animal health or unacceptable increases in animal production costs or consumer meat prices.

As documented in the literature, these uses can be reduced or eliminated with modern management practices. The viability of such practices has been demonstrated in the industrial and alternative agricultural operations. On the industrial side, Tyson, Inc., a major poultry grower and retailer, was able to develop systems for all of its retail chicken that used no antibiotics at all. On the niche side, cattle grown out-of-doors and fed primarily grass rarely need antibiotics at all. Many American producers, like Laura's Lean Beef, Niman Ranch, and Coleman Natural, are thriving in the market place selling beef and pork produced without antibiotics.

A recent report from the USDA Economic Research Service looking at changes in U.S. agriculture supported the notion that antibiotic use in agriculture could be reduced without significant costs to producers.[17] The USDA confirmed that large farms are more likely than small farms to use antibiotics in feed but noted that the benefits of this use is limited to certain stages of production, particularly pig nurseries. For other stages of production like finisher pigs, there were few benefits. The USDA also found that practices such as increased sanitation and vaccination could be substituted for antibiotics.

Data from Europe also support the feasibility of reducing antibiotic use even in intensely industrial poultry and swine systems. In 1999, Denmark, the world's leading pork exporter, ended all use of antimicrobial growth promoters. A World Health Organization (WHO) analysis of the Danish experience has shown that ban has had little or no impact

[17] USDA Economic Research Service. 2009. *The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks.* Online at www.ers.usda.gov/Publications/EIB43/EIB43e.pdf.

on agricultural productivity and animal welfare.[18] The comprehensive analysis, published in 2003, showed that there were no appreciable impacts from the antibiotic ban in broiler chickens or older, so-called "finisher," pigs. In young nursery pigs, also called "weaners", there was a modest increase in the number of pigs requiring antibiotics for the treatment of diarrhea, but the increase was completely offset by the overall decrease in antibiotic use. According to the WHO report, the overall drop in antibiotic use was 54 percent. In the years following the ban, the Danish pig herd continued to grow and the production losses associated with the ban in weaner pigs have been overcome.

Policy recommendation

Because as mentioned above, reduction in uses can often be accomplished by better management, production agriculture represents a golden opportunity to reduce the pressure driving up resistance traits in the microbial ecosystem.

A sensible and protective two-part policy would:

a) reduce antibiotic use wherever possible in animal production by establishing and enforcing clinical practice guidelines in veterinary medicine

b) review, and where supported by the evidence, cancel the use of those antibiotics also used in human medicine (so-called medically important drugs) in animal agriculture for non-therapeutic purposes like growth promotion, feed efficiency, and routine disease prevention. The classes of medically important drugs are penicillins, tetracyclines, sulfonamides, lincosamides, streptogramins, aminoglycosides, and macrolides.

Such a policy would lead to substantial reductions in antibiotic use without depriving producers of antibiotics to treat sick animals. It is important to point out that a number of antibiotic-like drugs are not used in human medicine, and that, under this approach, these drugs would be available to producers for any purpose including feed efficiency or routine disease prevention.

To accomplish public health and food safety goals, the policy needs to be effective across the board. A level playing field will force innovation in the industry and enable producers to resist temptation to fall back on antibiotics to compensate for sloppy management practices.

[18] Wegener H. 2008. Keynote Presentation. ASM Conferences Antimicrobial Resistance in Zoonotic Bacteria and Foodborne Pathogens, Copenhagen, Denmark, June 15-16.

Reduce use through PAMTA

The FDA has the authority to cancel antibiotics that are no longer safe from a resistance point of view, but so far has used it only in the case of fluoroquinolones in poultry.

The failure of the FDA to move gave impetus to the Preservation of Antibiotics for Medical Treatment Act (PAMTA). This legislation would require the FDA to review antibiotics used in animal agriculture to determine whether they put public health at risk by leading to increased resistance and to withdraw from the market in a timely manner those drugs that cannot be shown to be safe.

This legislation has been endorsed by over 350 organizations, including the American Medical Association, American Academy of Pediatrics, American Nurses Association, American Public Health Association, and Infectious Diseases Society of America.

Delay on antibiotics: a disadvantage in the marketplace

The European Union (EU) now has an EU-wide ban on non-therapeutic uses of antibiotics.[19] New Zealand,[20] Thailand,[21] and Korea[22] also have either enacted or will soon enact bans on certain non-therapeutic antibiotic use.

As warned in a Government Accountability Office (GAO) report from 2004,[23] these countries also represent potential challenges to U.S. products in the global marketplace. Under the trade rules, countries can restrict imports that do not conform to certain rules, provided they adhere to those rules themselves. For example, Korea could potentially restrict imports that relied on medicated feed not allowed in Korea. The greater the number of export partners that adopt such bans, the more vulnerable our meat exports in the global marketplace. As further noted in the GAO report,[24] if a major importer were to restrict trade from the United States because of the use of non-therapeutic antibiotics, that action would override any economic benefits of this practice.

The U.S. animal agriculture industry is at risk of following the example of the U.S. auto industry and failing to see where the market is going. Increasingly, consumers are

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[19] European Commission. 2005. Ban on antibiotics as growth promoters in animal feed enters into effect, IP/05/1687. Online at http://europa.eu/rapid/pressReleasesAction.do?reference=IP/05/1687&format=HTML&aged=0&language=EN&guiLanguage=en.

[20] Government Accountability Office (GAO). 2004. *Antibiotic Resistance: Federal Agencies Need to Better Focus Efforts to Address Risk to Humans from Antibiotic Use in Animals*, GAO-04-490, April 22.

[21] Brooks E. 2008. Reconciling scarcity and demand through innovation. *Food Business Asia*, Issue 21, July/August. Online at www.efeedlink.com/ShowDetail/03c885e3-7852-439a-9ef0-a8a0b66a749c.html.

[22] GAO. 2004. Antibiotic Resistance.

[23] GAO. 2004. Antibiotic Resistance.

[24] GAO. 2004. Antibiotic Resistance.

seeking meat from animals raised without these antibiotics. International competitors are beginning to meet this demand. In addition to protecting public health, minimizing antibiotics use in livestock can help U.S. producers add consumer value to their products, and position themselves advantageously in the global marketplace. American producers should be supported in reducing their antibiotics use.

Conclusion

We have waited far too long for action to reduce the unnecessary uses of antibiotics in food animal production. While we have dithered, new resistant diseases have emerged, old diseases have gotten worse, and people have died.

There is simply no reason to continue the profligate use of valuable antibiotics for economic purposes or to compensate for the stressful, crowded animal production facilities. The improved management practices necessary to reduce, if not avoid, antibiotic use are available and feasible. Yet, production agriculture has been unwilling to acknowledge, much less act on, this problem. We cannot tolerate this situation any longer. To protect our food supply and the public health, we must pass PAMTA.