Food Animal Production and Antibiotic Resistance

The Link

The Challenge

Since the first use of penicillin, antibiotics have transformed human medicine in the United States and around the world.[1] These life-saving medicines cure bacterial infections that threaten human health—from pneumonia to strep to staph infections. Now, however, the overuse and misuse of antibiotics have precipitated an emerging health crisis—bacteria are more quickly adapting to and resisting common antibiotics, posing a serious challenge to human health.

Without effective antibiotics, modern medical treatments such as operations and transplants will become riskier or impossible.[2] According to the Interagency Task Force on Antimicrobial Resistance, co-chaired by the Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA) and the National Institutes of Health, antibiotic-resistant bacteria could make previously treatable diseases like pneumonia, tuberculosis and meningitis again untreatable.[3]

Antibiotic resistance complicates medical treatment, and frequently results in longer, more serious illness, even death in some instances. Children, the elderly and the chronically ill are particularly vulnerable to antibiotic-resistant infections.[4] Finally, longer, more severe illnesses associated with antibiotic resistance raise the cost of health care. For example, in 1998, the Institute of Medicine estimated that antibiotic resistance generated at least $4 billion to $5 billion per year in extra costs to the U.S. health care system.[5] More recently, researchers with the Alliance for the Prudent Use of Antibiotics and Cook County Hospital in Chicago estimated that this number has grown to $16.6 billion to $26 billion per year.[6] For all these reasons, the CDC has declared that antibiotic resistance is among its top concerns.[7]

The Link to Food Animal Production

The overuse and misuse of antibiotics occurs in many ways, including inappropriate use by patients. Antibiotics also are overused and misused in food animal production. In fact, up to 70 percent of all antibiotics sold in the U.S. are given to healthy food animals.[8]

In the U.S., entire herds or flocks of food animals are often administered antibiotics in their feed or water to promote growth and weight gain—a practice that has been identified as a contributor to antibiotic resistance.[9] Antibiotics also are given to compensate for overcrowded and unsanitary conditions commonly found in food animal production facilities.

Because there are few regulations requiring drug manufacturers or food animal producers to report the quantity of antibiotics used in food animal production, the scale of antibiotic use is not precisely known. The best estimates suggest that more than 25 million pounds of antibiotics are used in food animal production every year, which is more than two-thirds of all antibiotics sold annually.[10] This practice makes the U.S. one of the biggest users of antibiotics in food animal production in the world.[11]

A Threat to Human Health

Many of the antibiotics used in food animal production, including penicillins, tetracyclines, macrolides, sulfonamides and other antibiotic classes, are identical to, or in the same family as, drugs used in human medicine to cure serious diseases. According to the CDC, these similarities mean that bacteria resistant to antibiotics in animals also will be resistant to antibiotics used in humans.[12] Moreover, when a bacterium develops resistance, it can be transferred by various means—through contaminated meat, through produce fertilized by contaminated manure,[13] via contact with farm/food workers who handle contaminated animals/meat[14] or by contact with soil, air or water that has been polluted by animal waste.[15]

Many of the antibiotics used in food animal production are identical to, or in the same family as, drugs used in human medicine to cure serious diseases. According to the CDC, these similarities mean that bacteria resistant to antibiotics in animals also will be resistant to antibiotics used in humans.

According to the CDC, there are 76 million cases of food-borne illness every year in the U.S., causing 5,000 deaths and 325,000 hospitalizations.[16] Food-borne illnesses such as those caused by *Salmonella, E. coli* and *Campylobacter* are increasingly becoming resistant to antibiotics.

In July 2010 the FDA, U.S. Department of Agriculture and the CDC testified before Congress that there was a definitive link between the routine, non-therapeutic uses of antibiotics in food animal production and the crisis of antibiotic resistance in humans.[17] Moreover, the American Medical Association, the American Academy of Pediatrics and other leading medical groups have independently concluded that the increase of antibiotic-resistant bacteria is a looming challenge to human health. These organizations also support ending the routine use of antibiotics in food animal production in order to preserve the effectiveness of these drugs for future generations.

The Solution

Working together, citizens and government, industry and public interest organizations have the tools to stop the overuse and misuse of antibiotics:

- Individuals can practice safe and effective use of antibiotics by only taking the drugs when and as prescribed by a doctor.
- The food animal industry can adopt cost-effective alternative hygienic strategies for preventing illness in animals and discontinue use of antibiotics in feed for growth promotion.[18]

Source: USDA

The Preservation of Antibiotics for Medical Treatment Act would withdraw the routine, non-therapeutic use of seven classes of antibiotics vitally important to human health from food animal production unless animals or herds are sick with diagnosed. Federal legislation such as this and/or regulation is needed in order to preserve the effectiveness of these life-saving drugs and to protect human health.

Our Campaign

The Pew Campaign on Human Health and Industrial Farming promotes prudent, cost-effective strategies for curtailing the use of antibiotics in food animal production. We work with public health leaders, veterinarians, agricultural interests, academics and citizens' groups who share our objective of preserving the integrity of antibiotics as a means of protecting human and animal health.

---

[1] Centers for Disease Control and Prevention, *Antibiotic Resistance Questions and Answers*, www.cdc.gov/getsmart/antibiotic-use/anitbiotic-resistance-faqs.html (accessed July 22, 2010).
[2] European Center for Disease Prevention and Control, *Experts Urge Prudent Antibiotic Use to Combat Resistance* (Stockholm: European Center for Disease Prevention and Control, 2009), www.ecdc.europa.eu/en/press/news/Lists/News/ECDC_DispForm.aspx?List=32e43ee8-e230-4424-a783-85742124029a&ID=325&MasterPage=1 (accessed July 15, 2010).
[3] Centers for Disease Control and Prevention, *Interagency Task Force on Antimicrobial Resistance, A Public Health Action Plan to Combat Antimicrobial Resistance* (Atlanta: Centers for Disease Control and Prevention, 2008), www.cdc.gov/drugresistance/actionplan/ (accessed July 15, 2010).
[4] Katherine Shea, K. Florini, and T. Barlam, "When Wonder Drugs Don't Work: How Antibiotic Resistance Threatens Children, Seniors, and the Medically Vulnerable" (Washington, DC: Environmental Defense Fund, 2001).
[5] Polly Harrison and J. Lederberg, "Antimicrobial Resistance: Issues and Options," Workshop Report, Forum on Emerging Infections, Division of Health and Sciences Policy, Institute of Medicine (Washington, DC: National Academy Press, 1998).
[6] James Gallagher, "Study: Antibiotics Problems Cost U.S. between $17B and $26B a Year." *Triangle Business Journal*, October 19, 2009, http://triangle.bizjournals.com/triangle/stories/2009/10/19/daily4.html (accessed July 15, 2010). Based on: Rebecca R. Roberts et al., "Hospital

and Societal Costs of Antimicrobial-Resistant Infections in a Chicago Teaching Hospital: Implications for Antibiotic Stewardship," *Clinical Infectious Diseases*, 49 (2009): 1175–1184.

[7] Centers for Disease Control and Prevention, *Antibiotic Resistance Questions and Answers.*

[8] Margaret Mellon, C. Benbrook, and K. L. Benbrook, *Hogging It! Estimates of Antimicrobial Abuse in Livestock* (Cambridge, MA: Union of Concerned Scientists, 2001).

[9] Centers for Disease Control and Prevention, National Antimicrobial Resistance Monitoring System, *National Antimicrobial Resistance Monitoring System (NARMS) Frequently Asked Questions—Does the Use of Antibiotics to Promote Growth Pose a Public Health Risk?* (Atlanta: Centers for Disease Control and Prevention, 2005), www.cdc.gov/narms/faq_pages/8.htm (accessed July 15, 2010).

[10] Mellon, Benbrook, and Benbrook, "*Hogging It! Estimates of Antimicrobial Abuse in Livestock.*"

[11] Frank Aarestrup to Nancy Pelosi, letter and presentation to Congressional Delegation, September 2009, www.louise.house.gov/index.php?option=com_content&view=article&id=1314:rep-slaughter-releases-letter-from-denmark-on-non-therapeutic-use –of-antimicrobials-&catid=41:press-releases&letmid=109 (accessed July 15, 2010).

[12] Centers for Disease Control and Prevention, National Antimicrobial Resistance Monitoring System, *National Antimicrobial Resistance Monitoring System (NARMS) Frequently Asked Questions (FAQ) About Antibiotic Resistance—Which Antibiotics Used in Food-producing Animals Are Related to Antibiotics Used in Humans?* (Atlanta: Centers for Disease Control and Prevention, 2005), www.cdc.gov/narms/faq_pages/11.htm (accessed July 15, 2010).

[13] Vesna Furtula et al., "Veterinary Pharmaceuticals and Antibiotic Resistance of *Escherichia coli* Isolates in Poultry Litter from Commercial Farms and Controlled Feeding Trials," *Poultry Science*, no. 89 (2010): 180–188; See also: Holly Dolliver, Kuldip Kumar, and Satish Gupta, "Sulfamethazine Uptake by Plants from a Manure-amended Soil," *Journal of Environmental Quality*, no. 36 (2007): 1224–1230.

[14] Lance B. Price et al., "Elevated Risk of Carrying Gentamicin-Resistant *Escherichia coli* among U.S. Poultry Workers," *Environmental Health Perspectives* 115, no. 12 (2007): 1738–1742; See also: Tara C. Smith et al., "Methicillin-resistant *Staphylococcus aureus* (MRSA) Strain ST398 Is Present in Midwestern U.S. Swine and Swine Workers," *PLoS ONE* 4, no. 1 (2009): 1–6.

[15] Joanne C. Chee-Sanford et al., "Occurrence and Diversity of Tetracycline Resistance Genes in Lagoons and Groundwater Underlying Two Swine Production Facilities, *Applied and Environmental Microbiology* 67, no. 4 (2001): 1494–1502; Amy R. Sapotka et al., "Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation," *Environmental Health Perspectives* 115, no. 7 (2001): 1041–1045; and Shawn G. Gibbs et al., "Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation," *Environmental Health Perspectives* 114, no. 7 (2005): 1032–1037.

[16] Paul S. Mead et al., "Food-related Illness and Death in the United States," *Emerging Infectious Diseases* 5, no. 5 (1999): 607–625.

[17] Hearing: Antibiotic Resistance and the Use of Antibiotics in Animal Agriculture, Subcommittee on Health, Energy and Commerce Committee, US. House of Representatives, July 12, 2010, http://energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=8001 (accessed January 24, 2011).

[18] James M. MacDonald and W.D. McBride, "The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks," *Economic Information Bulletin*, no. 43 (2009). Economic Research Service, U.S. Department of Agriculture.