Important Human Medicines
Used on Industrial Animal Farms

Industrial animal farms commonly administer low doses of antibiotics and other antimicrobials (drugs that fight microorganisms like bacteria and viruses) to pigs, cows, chickens, sheep, and other food animal species for the purpose of growth promotion or weight gain. Typically, these sub-therapeutic doses, which are generally not high enough to fight active diseases or infections, are given directly to animals in their feed or water. In fact, it is common for feed to be pre-mixed with antimicrobial ingredients before it is purchased by livestock growers. The animals can receive additional, higher doses of these and other drugs again in their feed, water, or by injection for disease prevention and treatment.

The Food and Drug Administration (FDA) has the authority to collect information on drugs marketed to livestock producers, but the data collected from drug manufacturers has not been standardized and to date has been inadequate for effective monitoring and research purposes. Data have been provided on the anniversary of the drug approval date rather than a universal date each year for all drugs. There has been no standard for reporting the quantity sold (e.g., active ingredient vs. pill vs. bottle), or information on use by geography, species, or purpose (i.e., growth promotion, disease treatment, prevention due to exposure to sick animals). For these reasons, it is not known exactly how many antimicrobials are used on industrial animal farms for growth promotion. But, some estimate that perhaps as much as 70% of all antibiotics sold in the U.S. is given to cattle, swine, and poultry for purposes other than treating disease.[1] Recently passed legislation will improve reporting from drug manufacturers, but there is still no requirement for industrial animal farms to report on actual drug use.

Animal feed. (Source: USDA)

In spite of these limitations, the U.S. Department of Agriculture (USDA) has some sense of the way in which these antimicrobials are used on farms raising food animals. The USDA's Animal and Plant Health Inspection Service has conducted large-scale voluntary surveys of livestock health management practices, and has gathered and reported data on the use of antimicrobials in swine, beef cattle, and sheep.[2] A similar survey of poultry producers did not contain such information.[3] The survey of swine operations in seventeen states representing 94% of the industry revealed that 84% of swine farms gave antimicrobials to grower-finisher (i.e., weaned pre-slaughter) pigs in their feed for a variety of reasons; 55% did so for growth promotion alone. Similarly, 83% of cattle feedlots and 84% of sheep farms were found to administer antimicrobials in their feed or water for health or production reasons. These survey data were used to compile the chart below.

Many of these feed or water additives are identical or closely related to antibiotic drugs used in human medicine to cure serious diseases. Penicillins, tetracyclines, macrolides, sulfonamides, and other antibiotic classes commonly fed to chickens, cows, pigs, sheep, turkeys, and other animals are used in people to treat pneumonia, scarlet fever, rheumatic fever, venereal disease, and infections of the lung, skin, eye, intestine, and more. In fact, the drug class used most commonly in animal feed – tetracyclines – is an important treatment or preventive for human pandemics like malaria and plague, as well as potential bioterrorism agents like smallpox and anthrax.

TOP HUMAN ANTIBIOTICS USED ON INDUSTRIAL ANIMAL FARMS

Rank	Antibiotic	Livestock Given Antibiotic in Feed or Water for Growth Promotion[4]	Use in Humans
1	Chlortetracycline (In tetracycline antibiotic class; related to doxycycline.)	Chicken (broilers), turkey, swine, sheep, beef cattle	Drug class used to treat pneumonia and other infections of the respiratory tract, urinary tract, intestines, and skin; and also gonorrhea, Chlamydia, syphilis, typhus and Rocky Mountain Spotted Fever, Lyme Disease, smallpox, anthrax, plague (preventive), and malaria.[5]
2	Tylosin (In macrolide antibiotic class; related to erythromycin, azithromycin.)	Chicken (broilers and layers), turkey, swine, beef cattle	Drug class used to treat pneumonia, bronchitis, and other lung infections; diphtheria; Legionnaires' disease; whooping cough; rheumatic fever; venereal disease; ulcers; and ear, intestine, lung, urinary tract, and skin infections.[6]
3	Bacitracin	Chicken (broilers and egg layers), turkey, swine (grower-finishers), beef cattle, quail, pheasant	Used topically to prevent skin, eye, and wound infections.[7]
4	Oxytetracycline (In tetracycline antibiotic class; related to doxycycline.)	Chicken (broilers), turkey, swine, sheep, beef cattle	(See chlortetracycline, above.)

Note: According to the USDA reports, many animal farms also use combination antibiotics in feed or water, such as chlortetracycline/sulfamethazine/penicillin, or chlortetracycline/sulfathiazole/penicillin.

The use of human medicines on animal farms is contributing to the increase in antibiotic resistance both on the farm and in people.[8] Antibiotic-resistant bacteria can enter the public sphere in three key ways: when animal waste carrying the bacteria contaminates the environment and drinking water supplies; when farm workers are exposed to the bacteria and pass it on to others; and when consumers purchase and improperly handle or cook meat or eggs containing the bacteria.[9] (See Pew's fact sheet, "Antibiotic Resistant Bacteria in Animals and Unnecessary Human Health Risk.") If human bacterial infection occurs, resistance to one or more antibiotics could as well, reducing the effectiveness of some life-saving drugs.[10]

This conflict between the need to maintain the effectiveness of antibiotics and their use to promote livestock weight gain continues to raise major concerns regarding escalating resistance. In February of 2007, a working group consisting of researchers and veterinarians from the conference on *Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards – Searching for Solutions* considered the state of the science surrounding this important issue. Noting that "the industrialization of livestock production and the widespread use of nontherapeutic antimicrobial growth promotants has intensified the risk for emergence of new, more virulent, or more resistant microorganisms," their recommendations included phasing out the practice of feeding antibiotics to animals as growth enhancers in the U.S.,[11] as is already the case in the European Union, and as called for by the World Health Organization,[12] the Institute of Medicine,[13] and many scientific and public health organizations.[14]

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[1] Union of Concerned Scientists, Hogging It: Estimates of Antimicrobial Abuse in Livestock, January 2001, p. 63, http://www.ucsusa.org/food_and_environment/antibiotics_and_food/hogging-it-estimates-of-antimicrobial-abuse-in-livestock.html.

[2] U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services, National Animal Health Monitoring System, December 2007. *Swine 2006. Part II: Reference of Swine Health and Health Management Practices in the United States, 2006*, pp. 48, 51, 61, 64. Available at: http://nahms.aphis.usda.gov/swine/index.htm#swine2006.
USDA, APHIS, Veterinary Services, December 2000. *Part III: Health Management and Biosecurity in U.S. Feedlots, 1999*, pp. 15-17. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/feedlot/feedlot99/FD99pt3.pdf.
And, USDA APHIS, Veterinary Services, National Animal Health Monitoring System, December 2003. *Sheep 2001. Part IV: Baseline Reference of 2001 Sheep Feedlot Health and Management*. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/sheep/sheep01/sheep01pt4.pdf.

[3] USDA APHIS, Veterinary Services, National Animal Health Monitoring System, April 2006. *Poultry '04. Part III: Reference of Management Practices in Live-Poultry Markets in the United States, 2004*. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/poultry/poultry04/poultry04_part3_report.pdf.

[4] FDA Center for Veterinary Medicine, Database of Approved Animal Drugs, at http://www.accessdata.fda.gov/scripts/AnimalDrugsAtFDA/. Note: Generally, low doses of antimicrobials can be used in feed for an unlimited period of time and until the time of slaughter. Animals can be given higher doses in feed for a limited time for disease prevention and treatment, usually with prescribed withdrawal periods before slaughter.

[5] U.S. National Library of Medicine (NLM) and National Institutes of Health (NIH), MedlinePlus, at http://www.nlm.nih.gov/medlineplus/druginformation.html; Merck & Co., Inc., The Merck Manuals Online Medical Library, at http://www.merck.com/mmhe/sec17/ch192/ch192a.html; and Centers for Disease Control and Prevention (CDC) online fact sheets on Chlamydia, gonorrhea, Rocky Mountain Spotted Fever, typhus, and plague, available at www.cdc.gov.

[6] NLM and NIH, MedlinePlus, *op. cit.*

[7] *Ibid.*

[8] U.S. General Accounting Office (GAO). 2004. Report to Congressional Requesters No. 04-490, "Antibiotic Resistance: Federal Agencies Need to Better Focus Efforts to Address Risk to Humans from Antibiotic Use in Animals." <www.gao.gov/new.items/d04490.pdf>.
[9] *Ibid.*
[10] UN FAO, OIE, and WHO, "Joint FAO/OIE/WHO Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance: Scientific Assessment," Presented in Geneva, Switzerland, Dec. 1-5, 2003. <www.who.int/foodsafety/micro/meetings/nov2003/en/>.
[11] Gilchrist, M J, C Greko, DB Wallinga, GW Beran, DG Riley, and PS Thorne. "The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance." *Environmental Health Perspectives*, Vol. 115, No. 2, February 2007.
[12] World Health Organization. June 5-9, 2000. "WHO Global Principles for the Containment of Antimicrobial Resistance in Animals Intended for Food," Geneva. <http://www.who.int/salmsurv/links/en/GSSGlobalPrinciples2000.pdf>.
[13] Harrison, P. and Lederberg, J. (eds). 1998. "Antimicrobial Resistance: Issues and Options." Workshop Report, Forum on Emerging Infections, Division of Health and Sciences Policy, Institute of Medicine. National Academy Press: Washington, D.C.
[14] See, for example, the American Medical Association at <http://www.keepantibioticsworking.com/library/uploadedfiles/American_Medical_Association_Resolution_508_-_.htm>, American Public Health Association at <http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1361>, and Infectious Diseases Society of America at <http://www.idsociety.org/Content.aspx?id=6234>.