THE FACTS ON THE ANIMAL USE OF ANTIBIOTICS IN AGRICULTURE

Prepared by Keep Antibiotics Working
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This fact sheet was prepared in response to some common misconceptions swirling around the animal antibiotic debate.

FACT: ANTIBIOTIC USE IN ANIMALS HAS SERIOUS ADVERSE EFFECTS ON HUMAN HEALTH.

Independent reviews by public health experts have consistently found that antibiotic use in livestock and poultry facilitates the development of disease-causing bacteria (pathogens) that are drug-resistant, and therefore harder and more expensive to treat.

- In 2009, the World Health Organization Advisory Group on Integrated Surveillance of Antimicrobial Resistance found that "[a] large number of studies have shown that the use of antimicrobial agents in food animals favours antimicrobial resistance among non-typhoid *Salmonella* and *Campylobacter*; later, these can transmit to and cause infections in people. This can then result in failure of antimicrobial treatment in people with resistant infections. Recent studies also suggest that people taking antimicrobials for other diseases are at increased risk of acquiring new infections due to antimicrobial resistant bacteria such as *Salmonella*. The main route of transmission between food animals and people is via contaminated food products."[1]
- In 2007, the USDA issued a fact sheet explaining the link between antimicrobial drug use in animals and methicillin-resistant *Staphylococcus aureus* (MRSA) infections in humans.[2]
- In 2003, the National Academies of Sciences found that the "use of antimicrobials in food animals leads to antibiotic resistance, which can then be transmitted to humans through the food supply," and recommended that "[s]ubstantial efforts must be made to decrease inappropriate overuse of antimicrobials in animals and agriculture as well."[3]
- In 2003, a joint expert review panel of the U.N. Food and Agriculture Organization, World Health Organization and the World Animal Health Organization examining agricultural use of antibiotics concluded that "there is clear evidence of adverse human health consequences due to resistant organisms resulting from non-human usage of antimicrobials. These consequences include infections that would not have otherwise occurred, increased frequency of treatment failures (in some cases

death), and increased severity of infections, as documented for instance by fluoroquinolone-resistant human *Salmonella* infections."[4]

- In 2002, the *Clinical Infectious Diseases* journal 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."[5]
- In 2001, the *New England Journal of Medicine* published a special editorial whose title sums it up well: "Antimicrobial Use in Animal Feed —Time to Stop."[6]

For comprehensive references on the science connecting antibiotic use in agriculture and human health, see the Keep Antibiotics Working website: http://keepantibioticsworking.org/new/indepth_keyevid.cfm.

In addition, assessments of the risks from using particular drugs in food animals, carried out by the FDA and by independent researchers, have documented human health risks. On the basis of one such assessment, **t**he FDA withdrew its approval for use of the fluoroquinolone antibiotic, Baytril, in poultry. That use was connected to an increase in resistant *Campylobacter* infections in humans.[7] The FDA began but never completed an assessment of the risks of using the antibiotic, virginiamycin, in animal feed, but made the preliminary determination that between two and 391 people would be adversely affected each year.[8] This "adverse effect" would impact as many as one in every 50 of the more than 16,000 patients treated annually with the related human drug, Synercid. Independent risk assessors also found a credible threat to human health from the use of virginiamycin.[9]

FACT: <u>BOTH INDUSTRY AND NON-PROFITS AGREE THAT HUGE QUANTITIES OF ANTIBIOTICS ARE USED IN FOOD ANIMAL PRODUCTION</u>.

It is not now possible to know the exact amount of antibiotics used in animal agriculture because the government does not systematically collect these data. However, both the veterinary pharmaceutical industry and a non-profit science organization have produced estimates of antimicrobial use in food animal production in the United States on the order of 20 to 30 million pounds per year. The Animal Health Institute (AHI), a trade organization for the veterinary pharmaceutical industry, reported in 2006 that its members sold 26.4 million pounds of antibiotics for animals[10] – a figure which fails to include the additional antibiotics sold by makers of generic animal drugs. In 2001, the Union of Concerned Scientists (UCS) estimated that a slightly lower amount, 24.6 million pounds, of antimicrobials were used for non-therapeutic purposes in swine, cattle, and poultry.[11] By contrast, AHI in 2001 reported that only seven million pounds of antibiotics were used in human medicine.[12] UCS acknowledges that its number is an estimate and has repeatedly called for legislation and regulatory action by the FDA to collect data on livestock and poultry use of antibiotics.

FACT: <u>FOODBORNE PATHOGENS ON FARM AND IN FOOD IN THE UNITED STATES ARE INCREASINGLY RESISTANT TO ANTIBIOTICS</u>.

Bacteria isolated from animals at slaughter, and collected by the USDA itself, shows the percentage of *Salmonella* bacteria resistant to drugs is going up in cattle, swine, and turkeys.[13] By contrast, the percentage of chickens carrying *Salmonella* resistant to any of the drugs of concern is trending downward, which is likely the result of chicken producers taking steps to reduce their antibiotic use in chicken since 1995.[14] Even for chickens, resistance to specific drugs such as amoxicillin, ceftiofur, and tetracycline has risen drastically since the USDA started collecting data. Similarly, the percentage of

resistant *Salmonella* isolated from retail meat increased from 35% in 2002 to 55% in 2007, according to the FDA.[15]

FACT: <u>THE STRAIN OF MRSA THAT COMES FROM LIVESTOCK DOES CAUSE SERIOUS ILLNESS IN HUMANS</u>.

The livestock-associated strain of MRSA ST398 recently found on swine in Iowa and Illinois has caused outbreaks in hospitals[16] and serious human skin, wound, lung, and heart infections,[17] including a case of a dairy worker with necrotizing fasciitis – also known as flesh-eating disease.[18] This strain now accounts for one in five MRSA infections in the Netherlands.[19]

FACT: <u>REDUCTIONS IN ANTIBIOTIC USE DO NOT LEAD TO INCREASED FOODBORNE ILLNESS</u>.

A growth promoter ban implemented throughout Europe in January 2006[20] was followed in 2006 and in subsequent years by sustained *decreases* in foodborne illness in Europe.[21,22] After Denmark eliminated growth promoters in 1998, there was no impact on the amount of foodborne pathogens in livestock or meat.[23] In the United States, there were significant reductions in types of foodborne illness normally acquired from eating chicken[24] between 1995 and 2000, the same period that saw significant reductions in antibiotic use in the poultry industry.[25]

FACT: <u>REDUCING ANTIBIOTIC USE IN MOST LIVESTOCK SPECIES AND IN MOST STAGES OF PRODUCTION HAS NO EFFECT WHATSOEVER ON ANIMAL HEALTH AND PRODUCTIVITY</u>.

In U.S. finishing pigs, nontherapeutic antibiotics have been consistently found to provide either no benefits[26] or benefits so small as to not be large enough to "offset the additional expenses" of the antibiotics themselves.[27] For U.S. poultry as well, the benefits of nontherapeutic antibiotics have been shown to be very limited and less than the cost of the drugs.[28] In Denmark, the only significant impact of the growth promoter ban on animals was a short-term impact in weaning-age pigs.[29] Specifically, while there was some reduction in weaner productivity and a small increase in weaner mortality associated with the ban, these effects lasted only one year. Weaner mortality went up before and after the ban but then dropped. Weaner productivity is currently higher and mortality lower than before the growth promoter ban took effect.[30] Danish pork production has increased by 40 percent since the ban.

FACT: <u>ANY CONSUMER PRICE INCREASE THAT MIGHT OCCUR FROM RESTRICTING ANTIBIOTIC USE WOULD BE INSIGNIFICANT COMPARED TO THE MEDICAL COSTS FROM UNCHECKED ANTIBIOTIC RESISTANCE</u>.

Increases in medical costs and human suffering from resistant infections dwarf any benefits to society from lower food costs associated with nontherapeutic antibiotic use**.** Currently the annual societal cost of resistance in U.S. hospital patients is over $20 billion and possibly as high as $38 billion.[31] These costs result from increased severity of illness, longer duration of hospital stays, and increased mortality. In contrast, several recent studies looking at U.S. data have found the net benefit to pig producers for their use of nontherapeutic antibiotics in animal feed to be between $0.25 and $0.36 per pig,[32] an amount too small to have a noticeable impact on consumer prices.

FACT: LARGE U.S. SWINE FARMS USE MORE ANTIBIOTICS[33] AND "ARE CONSIDERABLY MORE LIKELY" TO FEED NONTHERAPEUTIC ANTIBIOTICS, ACCORDING TO USDA SURVEYS.[34]

Because of this, restrictions on antibiotics in the United States are likely to have the greatest impacts on large producers, not small producers, and therefore are unlikely to contribute to consolidation and loss of small family farms.

WHAT PAMTA WILL AND WILL NOT DO

The Preservation of Antibiotics for Medical Treatment Act (PAMTA, S. 619/H.R. 1549) requires the FDA to review drugs currently on the market to ensure that they meet the current safety standards for antibiotic resistance if drug manufacturers wish to continue marketing them for nontherapeutic use (e.g., to promote growth or to keep animals from getting sick in overcrowded, unsanitary conditions). In essence, PAMTA means that manufacturers must prove the safety of their existing drugs with regard to antibiotic resistance just as they would for any new antibiotics they plan to bring to the market.

Virtually none of the antibiotics used for nontherapeutic purposes in animals have been reviewed by the FDA to make sure they are safe with respect to antibiotic resistance. The animal uses of antibiotics that raise such public health concerns today are uses approved decades ago, long before the FDA began to routinely assess the safety of new drugs with respect to antimicrobial resistance. FDA has begun several reviews of drugs already on the market but so far none have been completed. At this time none of these drugs currently used in animal feed have been shown to meet current safety standards. Two of the drugs (penicillins and tetracyclines) were reviewed in the 1970s and failed to meet standards in place at the time.

PAMTA would allow farmers to continue using all antimicrobials for therapy, as well as for non-routine use in feed to prevent or control disease, and even for routine preventive use that meets FDA's standards for safety. PAMTA does not pertain to antibiotics used for disease prevention when there are symptoms of illness in a flock or herd. It only affects the "routine" or "blanket use" of antibiotics in the absence of clinical signs. The legislation also allows manufacturers of drugs used routinely to submit data to the FDA showing this use is safe. Because most feed antibiotics are approved for both growth promotion and disease prevention often at identical doses, addressing the use of growth promoters alone will likely have limited impact on public health.

PAMTA is consistent with risk assessment and uses the same safety standard that FDA applies to all livestock drugs. PAMTA requires drug manufacturers to provide data showing that their products meet current safety standards or they will be taken off the market. This means that manufacturers must provide scientifically sound risk assessments to the FDA just as they would for a new drug. The standard in PAMTA – "reasonable certainty of no harm" – is the same standard used by FDA for all veterinary drug applications.

[1] WHO. 2009. Report of the 1st Meeting of the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance. Copenhagen 15-19 June, 2009. http://apps.who.int/medicinedocs/en/m/abstract/Js16735e.

[2] USDA APHIS. 2007. Methicillin-Resistant *Staphylococcus Aureus*: A Growing Concern for Animal and Human Health. www.aphis.usda.gov/animal_health/emergingissues/downloads/mrsa_122007.pdf.

[3] NAS. 2003. Microbial Threats to Health: Emergence, Detection, and Response. http://books.nap.edu/catalog.php?record_id=10636.

[4] WHO. 2003. Joint FAO/OIE/WHO Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance: Scientific Assessment. Geneva, December 1 – 5, 2003. www.who.int/foodsafety/micro/meetings/nov2003/en.

[5] Barza. 2002. The need to improve antimicrobial use in agriculture: ecological and human health consequences. Clin. Infect. Dis. 34(suppl):S73–144. www.journals.uchicago.edu/CID/journal/contents/v34nS3.html.

[6] Gorbach. 2001. Antimicrobial use in animal feed—time to stop. N. Engl. J. Med. 345:1202-1203. http://aem.asm.org/cgi/ijlink?linkType=FULL&journalCode=nejm&resid=345/16/1202.

[7] FDA. 2005. Enrofloxacin for Poultry: Opportunity for Hearing. www.regulations.gov/search/Regs/home.html#docketDetail?R=FDA-2000-N-0109.

[8] FDA.2004. Draft Virginiamycin Risk Assessment. www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm048417.htm.

[9] Smith. 2003. Assessing risks for a pre-emergent pathogen: virginiamycin use and the emergence of streptogramin resistance in *Enterococcus faecium*. Lancet Infect. Dis. 3(4):241-9.

[10] AHI. 2007. Trends in Sales of Lifesaving Animal Medicines Continue. http://ahi.timberlakepublishing.com/files/Media%20Center/Antibiotic%20use%202006.pdf

[11] UCS. 2001. Hogging It. www.ucsusa.org/assets/documents/food_and_agriculture/hog_front.pdf.

[12] AHI. 2001. Practical considerations in the collection and interpretation of data on animal use of antibiotics, a U.S. perspective. Presentation and abstract. WHO Consultation on the Monitoring of Antimicrobial Usage in Food Animals for the Protection of Human Health. Oslo, Norway, 10-13 Sept. 2001.

[13] USDA. Resistance patterns of *Salmonella* from chickens and turkeys, by year, 1997-2006. www.ars.usda.gov/sp2UserFiles/Place/66120508/NARMS/narms_2006/14%20Salm.pdf.

[14] Chapman. 2002. Use of antibiotics and roxarsone in broiler chickens in the USA: Analysis for the years 1995 to 2000. Poultry Science 81:356–364.

[15] FDA. 2009. NARMS Retail Meat Annual Report, 2007. www.fda.gov/downloads/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/NationalAntimicrobialResistanceMonitoringSystem/UCM166132.pdf.

[16] Wulf. 2008. First outbreak of methicillin-resistant *Staphylococcus aureus* ST398 in a Dutch hospital, June 2007. Euro Surveill. 13(9). pii: 8051. www.eurosurveillance.org/ViewArticle.aspx?ArticleId=8051.

[17] Ekkelenkamp. 2006. [Endocarditis due to meticillin-resistant Staphylococcus aureus originating from pigs] Ned. Tijdschr. Geneskd 150, 2442-7; Witte.2007. Methicillin-resistant *Staphylococcus aureus* ST398 in humans and animals, Central Europe. Emerg. Infect. Dis. 13(2):255-8. www.cdc.gov/EID/content/13/2/255.htm.

[18] Soavi. 2010. Methicillin-resistant *Staphylococcus aureus* ST398, Italy [letter]. Emerg. Infect. Dis. 16(2) www.cdc.gov/EID/content/16/2/346.htm.

[19] van Loo. 2007. Emergence of methicillin-resistant *Staphylococcus aureus* of animal origin in humans. Emerg. Infect. Dis. 13:1834-9.

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

[21] EFSA. 2007. The Community summary report on trends and sources of zoonoses, zoonotic agents, antimicrobial resistance and foodborne outbreaks in the European Union in 2006. www.efsa.europa.eu/en/scdocs/scdoc/130r.htm.

[22] EFSA. 2009. The Community Summary Report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in the European Union in 2008. www.efsa.europa.eu/en/scdocs/scdoc/1496.htm.

[23] Evans. 2003. Antimicrobial growth promoters and *Salmonella* spp., *Campylobacter* spp. in poultry and swine, Denmark. Emerg. Inf. Dis. 9(4). www.cdc.gov/Ncidod/EID/vol9no4/02-0325.htm.

[24] CDC. 2002. 2001 Foodnet Annual Report. www.cdc.gov/FoodNet/annual/2001/2001annualreport_pdf.

[25] Chapman. 2002. Use of antibiotics and roxarsone in broiler chickens in the USA: analysis for the years 1995 to 2000. Poultry Science 81(3):356-364. http://ps.fass.org/cgi/reprint/81/3/356.

[26] Dritiz. 2002. Effects of administration of antimicrobials in feed on growth rate and feed efficiency of pigs in multisite production systems. J. Am. Vet. Med. Assoc. 220(11):1690-5.

[27] USDA. 2009. The transformation of U.S. livestock agriculture: scale, efficiency, and risks. Electronic information bulletin no. 43. www.ers.usda.gov/Publications/EIB43.

[28] Graham. 2007. Growth Promoting Antibiotics in Food Animal Production: An Economic Analysis. Public Health Reports 122:79-87. www.jhsph.edu/bin/s/a/antibiotics_poultry07.pdf.

[29] WHO. 2003. Impacts of antimicrobial growth promoter termination in Denmark. 6-9 November 2002. http://whqlibdoc.who.int/hq/2003/WHO_CDS_CPE_ZFK_2003.1.pdf.

[30] Danish Ministry of Food, Agriculture, and Fisheries. 2009. Information note regarding the Danish and EU restrictions of non-therapeutical use of antibiotics for growth promotion. http://tinyurl.com/yacvd4e.

[31] Foster. 2010. Economic Consequences of Antibiotic Resistance. Presentation at NFID 2010 Conference on Antimicrobial Resistance. www.nfid.org/conferences/resistance10.

[32] Hayes. 2002. Estimated around $6.00/head but noted that an actual study by a large producer found a benefit of only $0.25 per head, page 99 in Food Control 13:97-101; Miller. 2003. Nontherapeutics provided a benefit of $376 for a 1020 head barn or only $0.36 per head. http://ideas.repec.org/p/ags/aaea03/21931.html; Kohler. 2008. Antibiotic-free hogs (not just additive free) cost only $0.32 more per head. www.ncsu.edu/project/swine_extension/swine_news/2008/sn_v3106%20%28june%29.htm.

[33] USDA. 2002. Preventive practices in swine: Administration of iron and antibiotics. www.aphis.usda.gov/vs/ceah/ncahs/nahms/swine/swine2000/Swine2000_is_Iron_Antibiotics.pdf.

[34] USDA. 2009. The transformation of U.S. livestock agriculture: scale, efficiency, and risks. Electronic information bulletin no. 43. www.ers.usda.gov/Publications/EIB43.