KEEP ANTIBIOTICS WORKING

The Campaign to End Antibiotic Overuse

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# Myths and Realities

**Myth:** Antibiotics are used in animal agriculture only when animals are sick.

**Reality:** Like people, animals occasionally get sick and animals with bacterial infections are often treated with antibiotics. But among U.S. livestock, it's actually healthy animals - not sick ones - that receive the lion's share of the drugs. The Union of Concerned Scientists estimates that 70% of antibiotics in the U.S. are fed to healthy pigs, cows, and chickens to promote growth and prevent disease (the term "antibiotic" is used here in the general sense, to include antibiotics and functionally similar compounds).

**Myth:** Use of large quantities of antibiotics is essential to modern agriculture.

**Reality:** The kind of industrialized animal agriculture which predominates in the U.S. typically relies on crowded, unsanitary, and stressful growing conditions conducive to the emergence of disease. Much disease could be avoided through better animal husbandry, including better animal housing and more attention to animal hygiene. Although effective antibiotics must continue to be available for sick animals, the design of animal production systems for avoiding disease represents an important strategy for reducing antibiotic use.

**Myth:** Antibiotic use in agriculture has little connection to infections that are resistant to antibiotics in people.

**Reality:** While agricultural use of antibiotics may not be the greatest contributor to antibiotic resistant infections in people, it is significant. The American Medical Association has adopted a formal resolution opposing the nontherapeutic use of antibiotics (i.e., their use in healthy animals). Other expert groups, including the American Public Health Association, the Council of State and Territorial Epidemiologists, and the American College of Preventive Medicine, have taken similar stances. The Centers for Disease Control (CDC) considers animal use of antibiotics, for example, to be the major cause of foodborne illnesses that resist treatment with antibiotics. The World Health Organization has called for an end to the growth promoting uses of animal antibiotics important to human medicine.

The scientific data underlying these recommendations, although difficult to obtain, has been accumulating for more than twenty years and is becoming increasingly robust. For example, the connection between the rise in Campylobacter resistant to a class of antibiotics called fluoroquinolones and use of these drugs in poultry is so compelling that the U.S. Food and Drug Administration has taken the unprecedented action of proposing to withdraw them from the market. Likewise in Europe, the scientific link between resistance to antibiotics in the Enterococci bacteria and use of the antibiotic avoparcin in agriculture justified an immediate withdrawal of avoparcin. The emergence of Salmonella DT104 - a strain of Salmonella resistant to multiple antibiotics, and an important cause of food-borne illness - has also been firmly linked to antibiotic use in agriculture. Salmonella causes illnesses that are particularly serious in children, the elderly, and those with impaired immune systems.

**Myth:** We should defer action to reduce antibiotic overuse until we have more studies linking agricultural use of antibiotics to problems in human medicine.

**Reality:** There is overwhelming evidence that drug resistance is developing in bacteria as a result of use of antibiotics in animal systems. Further studies will only continue to confirm the link between antibiotic use in agriculture and the emergence of resistant bacteria and difficult-to-treat disease. Waiting for studies or better monitoring should not become an excuse for inaction. Resistance is worsening in the interim. The responsible course is to act now.

**Myth:** According to a survey of doctors, agricultural use of antibiotics does not contribute significantly to antibiotic resistance.

**Reality:** The agricultural industry often quotes a survey sponsored by Pfizer (a major pharmaceutical company) to suggest that agriculture's contribution to antibiotic resistance is minimal. The "survey" in question was sent to 26 medical clinicians, of whom just 16 responded. None of the 16 physicians had known expertise in the area of antibiotic use in animals.

This tiny "survey" is inadequate for estimating how particular uses of antibiotics contribute to the overall problem of resistant disease. The physicians' opinions also do not appear to take into account the indirect effects that antibiotic use has on human diseases as well as the direct effects on food-borne and gut bacteria. The use of enormous quantities of agricultural antibiotics generates a pool of resistance genes in animal wastes spread throughout the environment - in surface water, in groundwater, and in soils. These genes can transfer from the bacteria in which they originally exist (which may be harmless) to unrelated bacteria - including types that cause human disease. This environmental dimension of antibiotic use in agriculture is also significant.

Even if agricultural uses were not the greatest contributor to antibiotic-resistant human disease, agricultural use is still important - particularly when there are alternatives, and especially when the populations most at risks are children, the elderly and the immune-compromised.

**Myth:** The use of antibiotic drugs in animals is fundamental to animal health and well-being.

**Reality:** Increasingly in the U.S., food animals are raised in crowded, unsanitary and stressful conditions on industrial farms. These conditions encourage disease. Reforming these agricultural practices to protect animal welfare would reduce the need for antibiotics in the first place. That is a far more effective approach to ensuring animal well being than continuing the use of large quantities of drugs. In addition, Scandinavian producers are thriving while raising healthy food animals without antibiotics.

**Myth:** It just isn't possible to produce the huge amount of meat necessary in this country without using antibiotics.

**Reality:** Animal production levels have not been affected in European countries that have banned the use of antibiotics in healthy animals. And, many European farming operations are large-scale, just as they are in the U.S. Broiler production has more than doubled in Sweden since the ban was first put into place. Also, a growing number of U.S. companies are successfully producing meat products without the routine use of antibiotics.

**Myth:** Antibiotic use in Scandinavia increased after the ban on antibiotic growth promoters went into effect there.

**Reality:** The opposite is true. Total antibiotic use in Sweden after the 1986 ban on antibiotic growth promoters actually decreased by 75% compared to pre-ban levels: 41,259 kg in 1980 to 18,237 kg in 1999. Some increases in therapeutic use were observed immediately after the ban, but even that use is decreasing. Denmark banned most growth promoters in 1998. Total antibiotic use in Denmark (including therapeutic and growth promoters) decreased from 106,594 kg in 1998 to 74,183 kg in 1999.

**Myth:** Producing meat without antibiotics is too costly and will bankrupt farmers and hurt poor people.

**Reality:** A report done by the National Academy of Sciences found that a U.S. ban on the use of non-therapeutic antibiotics would probably have little impact on the profits of farmers who employ good management practices. The Academy study estimated that the ban would increase food costs for the average person about $4.85 to $9.72 per year (a few cents a day). In Sweden and Denmark, which have already banned antibiotics used as growth promoters, farmers and the meat industry are thriving and increases in retail meat prices have been negligible.

The Academy study did not offset the estimated increase in food prices by the decreases in health costs expected as a result of avoiding antibiotic resistant disease, and the savings from preserving the effectiveness of older (and often less costly) antibiotics. In 1995, a federal agency estimated that the additional health-care costs from antibiotic resistance to just a single drug exceeded $1.3 billion annually; the current total cost from resistance to the full range of antibiotics is undoubtedly several-fold higher. Moreover, while the costs of the price of meat are spread equally through all who purchase it, the cost of the misuse of antibiotics is higher for children, the elderly, and people with weakened immune systems, because they become sick more often than others do.

**Myth:** The biggest problem with antibiotics in food is that drug residues may contaminate meat.

**Reality:** Residues of antibiotic drugs in food are a potential problem for two distinct reasons: first, because the residues can cause allergic or toxic reactions and second, because they may contribute to the development of resistant organisms inside the human gut. The government has addressed drug residue issues with laws that require drug withdrawal periods before animals go to slaughter, and by setting maximum allowable levels for residues. Although monitoring programs are limited in scope, most of the samples that are tested do not exceed the existing residue limits (there are occasional exceptions).

Even if residue standards were never exceeded, however, agricultural use of antibiotics would still be a concern. Resistant bacteria arise on the farm when antibiotics are fed to animals in food and water. The bacteria, which usually reside within the guts of the pigs, chickens, or beef, may contaminate meat during slaughter and processing, be released into the environment, or be transmitted by workers.

Unlike drug residues, the generation of antibiotic-resistant bacteria in animal agriculture is receiving relatively little attention from the government. (That's why Keep Antibiotics Working was founded.)

**Myth:** Antibiotic resistance doesn't decrease after stopping antibiotic use.

**Reality:** Antibiotic resistance doesn't always decrease after stopping antibiotic use, but often it does. The rate of erythromycin-resistant Group A Streptococcus (the bacteria that cause sore throats in children and can lead to Rheumatic Fever if untreated) dropped in Finland after a campaign to reduce erythromycin use for those infections. In Denmark, the incidence of vancomycin-resistant Enterococcus decreased after it was made illegal to feed avoparcin (an antibiotic related to vancomycin) to food animals. Another recent Danish study demonstrated that ending the feeding of antibiotics to healthy farm animals dramatically reduces the levels of resistant bacteria present in those animals.

In other situations, bacteria continue to be resistant to certain antibiotics even after those antibiotics are not used anymore. We can't predict which reduction of use will restore the efficacy of drugs and which will not. That is why it is important to limit unnecessary uses of antibiotics, thereby slowing the development of antibiotic-resistant bacteria in the first place.

**Myth:** We need antibiotics in agriculture to fight against foot-and-mouth and "mad cow" diseases.

**Reality:** Antibiotics - which are effective against bacteria and other microorganisms - are not used to treat either foot-and-mouth or "mad cow" disease. Foot-and-mouth disease is caused by a virus, a class of organisms against which antibiotics are ineffective. "Mad cow" [Bovine Spongiform Encephalopathy (BSE)], a poorly understood disease, is thought to be caused by "prions" - a type of protein, transmitted by feeding meat and bone meal from BSE-afflicted animals. BSE is not caused by microorganisms and is not treated with antibiotics.

**Myth:** Antibiotic-resistance problems from using antibiotics in animal agriculture could be solved by irradiating all meat and poultry products.

**Reality:** Irradiation of meat (itself a controversial technology) could reduce the number of live, resistant bacteria ingested by consumers. But even if irradiation could eliminate all bacteria on meat prior to human consumption, it would do nothing to reduce environmental contamination by resistant bacteria and antibiotics in animal waste, or exposures of farmers and workers at industrial-scale animal production operations.

Resistant bacteria are found not only on raw meat but also in manure (nearly two trillion pounds of which is generated in the U.S. annually). Up to 75% of the antibiotics fed to farm animals may pass through the animal, undigested, into the waste. The waste from swine, for example, is typically stored in open-air lagoons (often unlined) and, later, spread on cropland. Waste or runoff may contaminate crops, ground water, surface water and/or drinking water - all of which can result in human exposure.

In addition, workers in animal factories are routinely exposed to antibiotics and to antibiotic resistant bacteria and can acquire antibiotic-resistance bacteria themselves. Such workers are at higher risk of contracting antibiotic-resistant illnesses and may spread illness to members of their family and community.

**Myth:** We need antibiotics in agriculture to reduce animal waste.

**Reality:** Some in the pharmaceutical and agricultural industries claim that if antibiotics are reduced in animal agriculture, the amount of feed needed for animals to reach market weight will increase and as a result so will the manure output from food animal production. This perspective ignores the fact that the problem with livestock manure is not the total amount of manure produced but its concentration and handling. Manure itself is a valuable resource as fertilizer. Only when it is restricted to relatively small areas does manure become a waste problem and potential environmental contaminant.

The huge amount of manure coming from industrial animal factories has become an enormous environmental issue. Resistant bacteria, seeping from the manure lagoons into underlying groundwater supplies and running off into surface water, are potentially placing drinking water at risk. But the solutions to the manure problem are dispersal of animal production facilities and better treatment methods-not continued dependence on antibiotics.

**Myth:** A Danish study showed that organic chickens raised without antibiotics were more likely to carry bacteria that make people sick than chickens raised in more conventional ways using antibiotics.

**Reality:** In Denmark, neither organic nor conventionally raised poultry ever receive routine (nontherapeutic) antibiotics - so whatever the source of the disparity, it has nothing to do with banning use of nontherapeutic antibiotics. Moreover, retail meats in Denmark have significantly lower levels of Salmonella and Campylobacter than those in the U.S. (Salmonella: 4% on Danish meat, 20% on U.S. meat; Campylobacter: 40% on Danish meat, 80% on U.S. meat). Additionally, a study presented at the 2002 International Conference in Emerging Infectious Disease showed that levels of Salmonella in chickens and swine decreased after the discontinuation of the nontherapeutic use of antibiotics in Denmark. A recent New England Journal of Medicine study of U.S. retail poultry meat found 80% of Salmonella resistant to one antibiotic and greater than 50% resistant to three or more antibiotics.

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