

Rachel's Environment & Health News

#690 - Hidden Costs of Animal Factories

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As the U.S. discards its family farms and in their place erects factory farms, we might consider the costs. Here we will consider only one cost: the harm to human health from increased use of antibiotics in confined livestock operations, sometimes known as animal factories.

As most people know, modern animal factories in the U.S. now raise tens of thousands of chickens, cattle and pigs in the smallest possible space. The animals are physically close to each other -- jammed together might be a better description -- so an outbreak of disease can pass readily from animal to animal. To prevent this from happening -- and to promote rapid growth -- the animals are regularly treated with antibiotics.

The Institute of Medicine, a division of the National Academy of Sciences, began to question this practice in 1989.[1] The Institute identified a hazard to human health: the creation of antibiotic-resistant bacteria which can cause serious human diseases.

Resistance is a well-understood phenomenon. Not all bacteria are affected equally by antibiotics -- some bacteria are genetically able to resist the killing effects of an antibiotic. As a result, when a group of bacteria is dosed with an antibiotic, some hardy bacteria survive. These resistant bacteria reproduce and the next time they are dosed with the same antibiotic, a hardy few survive again. Eventually, the only surviving bacteria are immune to that particular antibiotic. They have developed "resistance," and that antibiotic has lost its effectiveness against those bacteria. As time passes, some bacteria can develop resistance to multiple antibiotics and these are referred to as "multi-drug-resistant strains." Such multi-drug-resistant bacteria are a serious medical concern because they may cause diseases that are difficult or impossible to cure, the Institute of Medicine said in 1992.[2,pg.92]

Some of the costs of antibiotic-resistant bacteria were summarized by the Institute of Medicine:

"An increasingly important contributor to the emergence of microbial threats to health is drug [antibiotic] resistance. Microbes that once were easily controlled by antimicrobial drugs are, more and more often, causing infections that no longer respond to treatment with these drugs." [2,pg.92]

The Institute went on to outline the human costs of antibiotic-resistant germs: "Treating resistant infections requires the use of more expensive or more toxic alternative drugs and longer hospital stays; in addition, it frequently means a higher risk of death for the patient harboring a resistant pathogen. Estimates of the cost of antibiotic resistance in the United States annually range as high as \$30 billion. Even with the continuing development of new drugs, resistance to antibiotics is an increasingly important problem with certain bacterial pathogens." [2,pg.93]

The Institute laid the problem squarely on the doorstep of animal factories: "New agricultural procedures can also have unanticipated microbiological effects. For example, the introduction of feedlots and large-scale poultry rearing and processing facilities has been implicated in the increasing incidence of human pathogens, such as SALMONELLA, in domestic animals over the past 30 years. The use of antibiotics to enhance the growth of and prevent illness in domestic animals has been questioned because of its potential role in the development and dissemination of antibiotic resistance. Approximately half the tonnage of antibiotics produced in the U.S. is used in the raising of animals for human consumption. Thus, concerns about the selection of antibiotic-resistant strains of bacteria and their passage into the human population as a result of this excessive use of antibiotics are realistic." [2,pg.64]

Throughout the 1990s, awareness of this problem has been growing.

In May 1998, the federal Centers for Disease Control and Prevention reported in the NEW ENGLAND JOURNAL OF MEDICINE that a strain of salmonella bacteria had emerged in the U.S. in the last 5

years which is resistant to 5 different antibiotics.[3] Called typhimurium DT 104, this rapidly-emerging bacterium is responsible for an estimated 68,000 to 340,000 illnesses each year in the U.S. The proportion of salmonella infections caused by typhimurium DT 104 increased 30-fold in the U.S. between 1980 and 1996.

The Centers for Disease Control blamed the rapid emergence of this infectious agent on the use of antibiotics in livestock, summarizing its recommendations this way: "More prudent use of antimicrobial agents [antibiotics] in farm animals and more effective disease prevention on farms are necessary to reduce the dissemination of multi-drug-resistant typhimurium DT 104 and to slow the emergence of resistance to additional agents in this and other strains of salmonella." [3]

In March of 1999 the FDA began a multi-year process to regulate the use of antibiotics in farm animals. Here is how the NEW YORK TIMES reported the FDA's action in a front-page story March 8:

"Faced with mounting evidence that the routine use of antibiotics in livestock may diminish the drugs' power to cure infections in people, the Food and Drug Administration has begun a major revision of its guidelines for approving new antibiotics for animals and for monitoring the effects of old ones.

"The goal of the revision is to minimize the emergence of bacterial strains that are resistant to antibiotics, which makes them difficult or even impossible to kill. Drug-resistant infections, some fatal, have been increasing in people in the United States, and many scientists attribute the problem to the misuse of antibiotics in both humans and animals.

"Of particular concern to scientists are recent studies showing bacteria in chickens that are resistant to fluoroquinolones, the most recently approved class of antibiotics and one that scientists had been hoping would remain effective for a long time." [4]

The NEW YORK TIMES then described [4] the May, 1998, study by the federal Centers for Disease Control, [3] adding new information from an interview with Dr. Fred Angulo, one of the authors of the study:

"Last May, a team from the centers reported in the New England Journal of Medicine that the prevalence of a salmonella strain resistant to five different antibiotics increased from 0.6 percent of all specimens from around the country tested by the centers in 1980 to 34 percent in 1996.

"Similarly, drug resistance in campylobacter bacteria rose from zero in 1991 to 13 percent in 1997 and 14 percent in 1998, said Dr. Fred Angulo, an epidemiologist in the food-borne and diarrheal disease branch at the centers. He said epidemiologists had been alarmed by the campylobacter figures, because the resistance was to fluoroquinolones, the very drugs the F.D.A. was trying hardest to preserve.

"Dr. Angulo said that he and his colleagues had attributed much of the increase in fluoroquinolone resistance to the drug agency's approval of the drugs to treat a respiratory infection in chickens in 1995. It was an approval that the disease control centers opposed, because it would lead to tens of thousands of the birds being treated at one time.

"Dr. Angulo said he thought the rising levels of resistance in bacteria taken from sick people had been caused by the heavy use of antibiotics in livestock. 'Public health is united in the conclusion,' he said. 'There is no controversy about where antibiotic resistance in food-borne pathogens comes from.'" [4]

Two months later, in May, 1999, a report by the Minnesota Health Department, published in the NEW ENGLAND JOURNAL OF

MEDICINE, found that infections by antibiotic-resistant bacteria increased nearly 8-fold between 1992 and 1997. Part of the increase was linked to foreign travel, and part of the increase was linked to the use of antibiotics in chickens. Even the increase due to foreign travel may have been caused by the use of antibiotics in chickens in countries such as Mexico where the use of antibiotics in poultry has quadrupled in recent years, the report said.[5] The study's lead author, Dr. Kirk E. Smith, told the Associated Press, "There is definitely a public health problem with using quinolone [antibiotic] in poultry, and we need to take a hard look at that." [6]

In November 1999 a new report appeared in the NEW ENGLAND JOURNAL OF MEDICINE linking an outbreak of fatal salmonella in Denmark to the use of antibiotics in pigs.[7] Here is how the NEW YORK TIMES reported the story:

"An outbreak of severe, drug-resistant salmonella infections in 27 people in Denmark, traced to meat from infected pigs, is being described by American scientists as a warning on what can happen in the United States unless steps are taken to limit the use of antibiotics in farm animals.

"The episode in Denmark, in which 11 people were hospitalized and 2 of them died, is especially worrisome because the bacteria had made them partly resistant to a class of antibiotics called fluoroquinolones that doctors had considered one of their most powerful weapons against severe cases of salmonella and other bacteria that infect the intestinal tract. If those bacteria invade the bloodstream, which occurs in 3 percent to 10 percent of salmonella cases, the illness can be fatal.

"Fluoroquinolones become a drug of last resort for some of these infections," said Dr. Stuart Levy, director of the Center for Adaptation Genetics and Drug Resistance at Tufts University. "If we're beginning to lose these drugs, where do we go from here?"

"Fluoroquinolones are the most recently approved class of antibiotics; nothing comparable is expected to become available for several years," the Times said.[8]

Deaths due to infectious diseases have been increasing in the U.S. in recent years. In the '50s and '60s, public health specialists were predicting that infectious diseases would disappear as a problem. However, this prediction was entirely wrong. According to a 1996 report in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, between 1980 and 1992, the death rate due to infectious diseases as the underlying cause of death increased 58%, from 41 to 65 per 100,000 population in the U.S. (See REHW 528.) Some of this was due to an increase in AIDS during the period. However, AIDS is typically a disease of young people. Among those aged 65 and over, deaths due to infectious diseases increased 25% during the period 1980-1992 (from 271 deaths per 100,000 to 338 deaths per 100,000). Thus there seems to have been a real and substantial increase in deaths due to infectious diseases in the U.S. during the past 20 years.[9]

In sum, serious infectious diseases are enjoying a resurgence in the U.S. Our national policy of replacing family farms with animal factories in the name of "economic efficiency" is one of the key reasons.

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)

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[1] Institute of Medicine, HUMAN HEALTH RISKS FROM THE SUBTHERAPEUTIC USE OF PENICILLIN OR TETRACYCLINES IN ANIMAL FEED (Washington, D.C.: National Academy Press, 1989).

[2] Institute of Medicine, EMERGING INFECTIONS: MICROBIAL THREATS TO HEALTH IN THE UNITED STATES (Washington, D.C.: National Academy Press, 1992). ISBN 0-309-04741-2.

[3] M. Kathleen Glynn and others, "Emergence of Multidrug-resistant SALMONELLA ENTERICA Serotype Typhimurium DT104 Infections in the United States," NEW ENGLAND JOURNAL OF MEDICINE Vol. 338, No. 19 (May 7, 1998), pgs. 1333-1338.

[4] Denise Grady, "A Move to Limit Antibiotic Use in Animal Feed," NEW YORK TIMES March 8, 1999, pg. A1.

[5] Kirk E. Smith and others, "Quinolone-Resistant CAMPYLOBACTER JEJUNI Infections in Minnesota, 1992-1998," NEW ENGLAND JOURNAL OF MEDICINE Vol. 340, No. 20 (May 20, 1999), pgs. 1525-1532.

[6] Associated Press, "U.S. Antibiotics Countered by Foreign Meat, Study Says," NEW YORK TIMES May 20, 1999, pg. A20.

[7] Kare Molbak and others, "An Outbreak of Multidrug-Resistant, Quinolone-Resistant SALMONELLA ENTERICA Serotype Typhimurium DT104," NEW ENGLAND JOURNAL OF MEDICINE Vol. 341, No. 19 (November 4, 1999), pgs. 1420-1425.

[8] Denise Grady, "Bacteria Cases in Denmark Cause Antibiotic Concerns in U.S.," NEW YORK TIMES November 4, 1999, pg. A15.

[9] Robert W. Pinner and others, "Trends in Infectious Diseases Mortality in the United States," JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION Vol. 275, No. 3 (January 17, 1996), pgs. 189-193.

Descriptor terms: farming; animal welfare; animal health; poultry; swine; antibiotics; infectious diseases; resistance; morbidity statistics; mortality statistics; confined livestock operations; animal factories;