Policies of the U.S. Food and Drug Administration (FDA) appear to be contributing to the development of a public health crisis. FDA approval of a growth hormone (rBGH) for use in cows, and approval of the Flavr Savr genetically-engineered tomato, both may increase the number of antibiotic-resistant disease organisms.

Germs resistant to antibiotics are one of the medical community's worst nightmares. Diseases that we routinely cure with antibiotics --such as typhoid fever, cholera, meningitis, pneumonia, gonorrhea, syphilis, and tuberculosis --are now appearing in forms that resist antibiotics. As the trend continues, we slip backward toward conditions that existed prior to 1928 when Arthur Fleming discovered penicillin, the first antibiotic. Prior to 1928, infectious diseases killed Americans by the tens of thousands each year. A simple wound or surgical incision could lead to fatal blood poisoning; a child's ear infection could turn into lethal meningitis; common pneumonia often ended in death. For 50 years the world has enjoyed a reprieve from these brutal conditions, all because of 100-or-so antibiotics.

According to agricultural experts, the use of synthetic growth hormone (rBGH) in milk cows, to boost milk production, increases the incidence of mastitis, an infection of the udder, which can contribute pus to milk.[1] Pus in milk can reduce, or destroy, the commercial value of the milk, so farmers fight mastitis by treating their cows with antibiotics.

The widespread use of antibiotics in livestock is ALREADY causing human disease germs, like salmonella, to develop resistance to antibiotics. The chain, rBGH--> mastitis--> antibiotics, simply promises to make an already-serious problem worse.

Consider the return of tuberculosis. A writer in SCIENCE said in 1992, "After a century of decline in the United States, tuberculosis is increasing, and strains resistant to multiple antibiotics have emerged.... The steadily declining incidence of TB in the United States since 1882 has been reversed since 1985, with 26,283 cases reported in 1991. To the trend of increasing incidence one must add the ominous emergence of drug-resistant strains that threaten our capability of controlling the disease. One-third of all cases tested in a New York City survey in 1991 were resistant to one or more drugs."[2]

TB was the leading cause of death in the United States until the 1950s when improved sanitation and antibiotics brought it under control. TB spreads when TB victims cough, sneeze or even sing and others nearby breathe their germs. Today, antibiotics are our only reliable control for TB. The progressive loss of antibiotics as a weapon against TB has health officials shaking their heads in dismay.

The New York TIMES last month reported an epidemic of TB at middle-class La Quinta High School in Westminster, California, 25 miles southeast of downtown Los Angeles.[3] Twenty-three percent of the 1270 students at La Quinta tested positive for TB in 1993 and the number has risen since then. Twelve students are being treated for active cases of multiple-drug-resistant TB (MDRTB) and 70 other students known to have been exposed to MDRTB are being monitored by x-ray examination of their lungs, the TIMES said.

Tuberculosis is not the only serious human disease becoming resistant to antibiotics. Others are pneumonia; streptococcus infections (such as "strep throat," impetigo, scarlet fever, and rheumatic fever[4]); staphylococcus infections ("staph infections"--serious blood infections common in hospitals); shigella; salmonella; cholera; dysentery and others.[5] According to the federal Centers for Disease Control (CDC), in 1992, 13,300 hospital patients died of bacterial infections that resisted the antibiotics that doctors used against them.[6]

Earlier this year, at the annual meeting of the American Association for the Advancement of Science, microbiologist Alexander Tomasz of Rockefeller University warned that antibiotic-resistant germs represent "nothing short of a medical disaster."[7]

Drug resistance occurs when a colony of bacteria is dosed with an antibiotic. Most of the bacteria die, but a few hardy ones survive because, by chance, they harbor genes that make them immune to the drug. These hardly creatures thrive and proliferate, passing their resistant genes to their progeny. (One bacteria can give rise to 16,777,220 offspring in 24 hours.)

Furthermore, mutant bacteria can share their resistant genes with unrelated bacteria. When two bacteria touch each other (say, in the mud of a barnyard, in a hospital bed sheet, or in a human stomach), they can exchange a loop of DNA called a plasmid --thus transferring resistance from one organism to another. Even a relatively benign bacteria, such as E. COLI, common in the human gut, can develop antibiotic resistance and then pass that resistance, via plasmid transfer, or by other means, to bacteria that cause a fatal disease such as cholera or typhoid fever.[8]

Experts agree there are two causes of antibiotic resistance among bacteria: overuse of antibiotics in humans and in farm animals.

Humans: Because patients have come to expect antibiotics from their doctor, doctors now prescribe antibiotics for many ailments that antibiotics cannot cure --such as viral infections like the common cold. The result of such misuse is the development of antibiotic-resistant germs. The World Health Organization (WHO) calls it "a situation which is fast becoming a global public health problem."[9]

Even when an antibiotic is prescribed properly, if the patient stops taking it (because he or she feels better after 2 or 3 days), this causes growth of drug-resistant bacteria. People who save up antibiotics to self-medicate themselves later, and people who take portions of other peoples' prescription antibiotics, worsen the problem of resistance.

Farm animals: Someone discovered in the 1950s that feeding low levels of antibiotics to livestock will increase weight-gain. Even today no one understands how this works, but for 40 years farmers--urged on by drug and chemical companies--have fed antibiotics to healthy animals to speed growth. An estimated 15 million pounds, about half of all antibiotics, are fed to farm animals.

Ironically, the FDA (U.S. Food and Drug Administration) recognized the public health implications of this problem 17 years ago, in 1977, and published a FEDERAL REGISTER notice announcing its intention to curb the routine feeding of antibiotics to livestock. Drug and livestock corporations responded by bringing intense pressure on Congress, which promptly ordered FDA to back off. Everyone agreed that using antibiotics in livestock (cows, sheep, pigs and chickens) was creating disease organisms resistant to antibiotics. But corporate lobbyists argued then that no one knew for sure that such organisms could infect humans. Since that time, definitive evidence has come to light,[10] but FDA still has not acted.

Today there is no doubt that routinely dosing farm animals with antibiotics is creating a serious public health problem for humans. Some responsible officials are already calling it a public health emergency.[5] Eleven years ago, in 1983, 300 scientists petitioned the FDA to control the use of antibiotics on the farm.[11] But the FDA remains paralyzed and antibiotics remain freely available without prescription.

In July of this year, we walked into Bowen's Farm Supply in Annapolis, Md., and purchased, off the shelf, a 100-milliliter bottle of penicillin-G for $9.29. We also bought 6.4 ounces of the Aureomycin brand of tetracycline for $3.49. Penicillin and tetracycline are potent antibiotics. Also available was tetracycline selling under the trade name Terramycin. The Terramycin package
insert said, "Terramycin used right after birth gives them the protection they need... Starts them off faster to more profitable gains." The insert urged routine treatment of cattle and calves, pigs and hogs, sheep, mink, poultry and bees with tetracycline to prevent disease.

FDA's failure to control antibiotic abuse is symptomatic of the agency's weakness in controlling the behavior of powerful corporations. In justifying its decision to approve bovine growth hormone (rBGH) in milk cows, FDA simply did not discuss the problem of mastitis leading to increased antibiotic use which promises to make a big public health problem bigger.\[12\]

Likewise, in its decision this year to allow Calgene's Flavr Savr genetically-engineered tomato onto the market, FDA did not answer all the critics of the Flavr Savr. The Flavr Savr tomato contains a gene that is resistant to the antibiotic kanamycin. Some geneticists warned that the resistant gene can be transferred to other bacteria in people's stomachs and intestines, creating new antibiotic-resistant germs with potentially serious public health consequences.\[13\] FDA remained silent and gave Calgene what it wanted.

Available evidence forces the conclusion that antibiotic-resistant disease organisms are already threatening public health in important ways, world-wide. What prevents decisive action by responsible authorities is the unrestrained political influence of certain corporations. It seems clear that, until we learn to control the behavior of such corporations, this public health problem will grow steadily toward crisis proportions.

--Peter Montague


\[7\] Sharon Begley, "The End of Antibiotics?" NEWSWEEK Vol. 123 (March 7, 1994), pg. 63. See also, John Travis, "Reviving the Antibiotic Miracle?" SCIENCE Vol. 264 (April 15, 1994), 360-362.