ANTIBIOTICS: PENICILLIN AND BEYOND

commercial livestock farming of cattle, pigs, sheep and poultry. 80%-90% of the antibiotics used in the U.S. are used on livestock. Most of the antibiotics used for livestock are not used to treat infections. For reasons that aren't exactly clear, when antibiotics are put in the feed of livestock, it causes them to develop more muscle and milk very quickly. Large commercial farmers save a lot of money using antibiotics because it decreases the time it takes to raise livestock to a size appropriate for slaughter. Antibiotics used for non-medical reasons like this are called subtherapeutic antibiotics, but they are controversial because their widespread use contributes to antibiotic resistance.

(7) Antibiotic resistance occurs when antibiotics kill the weakest bacteria in a population but are unable to kill the strongest. As more antibiotics are used, more antibiotic resistant survivors are left. When these survivors pass on their antibiotic resistance to their offspring, the entire population eventually becomes resistant. There is great concern that an increasing number of bacteria are exhibiting antibiotic resistance and that this the beginnings of a public health crisis for which we are very unprepared. Health organizations blame the misuse and overprescription of antibiotics as well as the heavy use of subtherapeutic antibiotics for causing the troubling rise in antibiotic resistance.

Article Questions

- What is the difference between a bactericidal antibiotic and a bacteriostatic antibiotic? A bactericidal antibiotic kills bacteria while a bacteriostatic antibiotic prevents its growth.(2)
- 2) What is the difference between a narrow spectrum antibiotic and a broad spectrum antibiotic? A narrow spectrum antibiotic kills specific bacteria while a broad spectrum antibiotic kills a wide variety of bacteria.(3)
- How can the use of broad spectrum antibiotics lead to negative health consequences. Describe two of these negative health consequences. Broad spectrum antibiotics can kill beneficial gut bacteria. This can lead to 1) digestive system problems and 2) intestinal infections by *C. difficile* bacteria.(3)
- 4) What was the first antibiotic discovered, when was it discovered and who discovered it? Penicillin was the first antibiotic discovered in 1928 by Alexander Fleming.(4)
- 5) What did Fleming observe that caused him to suspect that the mold was producing a substance that prevented the bacteria from growing?
 He observed that surrounding the mold in the Petri dish was an area that was free from bacterial growth.(4)
- 6) What are subtherapeutic antibiotics and what effect do they have? They are antibiotics not used to treat infection, instead they are put in the feed of livestock to increase the rate of muscle growth and milk production.(6)
- 7) What is antibiotic resistance and how does it develop? Antibiotic resistance occurs when bacteria no longer respond to antibiotics because they have developed a resistance to them. This occurs through repeated exposure to antibiotics that kill the weakest bacteria but leave the strongest alive. Over time, the strongest reproduce and pass on their antibiotic resistance to their offspring.(7)