



Why Livestock Producers Should Care about Antibiotic Resistance

Antibiotics are critical tools for treatment and control of diseases in livestock. Antibiotic resistance threatens the use of antibiotics in livestock for two important reasons. If resistance develops, the antibiotic may not be effective in treating the disease. Increased antibiotic resistance could lead to policies limiting access to antibiotics for use in livestock.

Q: What is antibiotic resistance?

Infectious bacteria that used to be susceptible to antibiotic therapy but are now no longer killed or inhibited by a particular antibiotic are considered to have acquired “resistance” to that antibiotic. Many bacteria are present in the gut. Antibiotics kill bacteria that are causing an illness but negatively affect good bacteria that protect the body from infection. Antibiotic-resistant bacteria are not affected but grow and multiply because they no longer have to compete with as many good bacteria. To complicate matters, bacteria can transfer antibiotic-resistance traits to other bacteria.

Q: Is antibiotic resistance in livestock really an issue for human health?

Although the major contributor to antibiotic resistance in humans is antibiotic use in human medicine, many studies agree that antibiotic use in animals has added to the resistance problem, particularly when considering enteric (gut) bacteria. More than 15 classes of antibiotics have been developed to kill bacteria in humans or livestock. Over time, all have become associated with resistance. Antibiotic use in livestock leads to an increased prevalence of antibiotic-resistant bacteria. Much of the resistance is to antibiotics that are not important for human use; however, some resistance has developed to antibiotics important in human medicine.

Q: How are people exposed to antibiotic-resistant bacteria from livestock?

- Consumption of meat products that have been contaminated with antibiotic-resistant bacteria that were not properly handled or cooked;
- When fertilizer or water containing animal feces harboring antibiotic-resistant bacteria is used on food crops later consumed by people; and
- Failure to follow good hygiene/sanitation practices when working with livestock.

Q: Which bacteria in livestock pose the greatest risk for humans?

Campylobacter can cause mild diarrhea in young animals when present in the small intestine. *Campylobacter* has developed resistance to several antibiotics including ciprofloxacin, which is an important broad-spectrum antibiotic for humans. The use of ciprofloxacin is banned in livestock.

Salmonella enterica may be present as one of many strains. Most strains have low pathogenicity, but some strains affect livestock with occasional diarrhea, septicemia, and death. Antimicrobial resistance in *salmonella* is monitored intensively because of potential transmission between animals and people.

Enterococcus spp. are commensal bacteria found in human intestines as well as in livestock. In humans, these infections pose a minor risk to healthy individuals but may cause life-threatening infections in individuals with compromised immune systems. Vancomycin is typically used to treat these infections, although some strains express vancomycin-resistant genes.

Staphylococcus aureus is a Gram-positive bacterium typically associated with skin infections. When resistant to methicillin (MRSA) or vancomycin (VRSA), this organism can pose a serious risk to human health.

Escherichia coli is a predominant isolate in feces and can cause diarrhea in young pigs. The direct risk of infection due to *E. coli* resistance is hard to quantify, but the organism can readily transfer resistance genes to other bacteria.

Q: What can livestock producers do?

The following steps are recommended for the prevention of antibiotic resistance:

1. Use good management and hygiene practices to reduce the need for antibiotic use including preventing disease introductions to the herd and reducing stress that allows expression of the disease.
2. Use antibiotics judiciously and involve a veterinarian in all animal health decisions.
3. Follow treatment protocols to prevent under- or overuse of antibiotics. Always follow and use antibiotics according to their label or veterinarian recommendations.
4. Replace antibiotics with alternatives whenever possible.
5. Continue your education. Learn about new methods for improving management and alternatives to antibiotics.

Mike Tokach, Swine nutritionist

Jose Soto, Graduate research assistant

Bob Goodband, Swine nutritionist

A.J. Tarpoff, Veterinarian

Morgan Scott, Veterinary epidemiologist

www.KSUantibiotics.org

This work is/was supported by the USDA National Institute of Food and Agriculture, AFRI Food Safety Challenge Grant project 2013-68003-21257. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA or NIFA.

Publications from Kansas State University are available at www.ksre.ksu.edu

Publications are reviewed or revised annually by appropriate faculty to reflect current research and practice. Date shown is that of publication or last revision. Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Mike Tokach et al., *Why Livestock Producers Should Care about Antibiotic Resistance*, Kansas State University, October 2016.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, John D. Floros, Director.

MF3315 October 2016