**Antibiotic resistance: Should I be concerned? Whenever antibiotics are needed and used, whether for livestock or humans, they need to be administered judiciously with great responsibility**.

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Many people are concerned about antibiotic resistance. What is antibiotic resistance? Antibiotic resistance occurs when an antibiotic loses its ability to effectively control or kill certain bacterial growth. Why is this concerning? The bacteria become “resistant” to an antibiotic and will multiply. The next time illness occurs (in human or animal); it may take a different antibiotic or a stronger dose of an antibiotic to control the bacterial infection.

Whenever antibiotics are needed and used, whether for livestock or humans, they need to be administered judiciously with great responsibility. In many cases, when an animal becomes ill enough to need an antibiotic, it is a matter of life and death for that animal. If the animal does not receive the antibiotic it will suffer and may die. So it is the responsibility of the livestock producer to ensure an animal receives a quick diagnosis and the proper treatment.

South Dakota State University Extension put together a nice antibiotic fact sheet (<http://www.sdstate.edu/vs/extension/beef-procedures-antibiotics.cfm>). Antibiotics are given to people and animals to treat or prevent illnesses caused by bacteria. Antibiotics are given to livestock to relieve the pain and/or distress from the illness, to make them feel better, and recover. Just like with people, antibiotics have no effect on diseases caused by viruses or parasites. Antibiotics can be administered several ways, including an injection under the skin, via a pill (bolus), or mixed in the feed or water. When an animal is very sick an inject able antibiotic is the quickest route to get the animal on the road to recovery. It should also be mentioned that if animals are sick, they don’t feel like eating or drinking, so mixing an antibiotic into the feed or water is not always effective. All livestock antibiotics approved by the FDA (Food and Drug Administration) since 1988 require a prescription from a veterinarian who has developed a relationship with the livestock producer and can help determine the best options for disease prevention and treatment.

A common myth is that antibiotics are mixed into ALL livestock rations. That is untrue. There are certain times in an animal’s life when things are more stressful, and antibiotics in the feed can make good sense. For example, if animals are co-mingled at a young age they are more likely to transmit bacteria back and forth (just like kids at daycare or in a school classroom). It is hard on their bodies, and being sick can take a toll on their health and make recovery harder. Also, weaning is a stressful time on animals. High levels of stress often result in a weakened and susceptible immune system which increases the probability of bacterial infections. Weather conditions may also take a toll on livestock. Extreme fluctuations in temperature and the inability to get dry or warm can result in illness or pneumonia. Finally, as an animal approaches its final weight, antibiotics may be fed to help prevent liver abscesses, which may be caused from a high ration of grain in the diet.

The use of antibiotics in feed or water is at the discretion of the livestock producers, their veterinarians, and nutritionists. Some beef producers do not feed antibiotics during these times of stress, and will just treat animals that may get sick, and some may treat all the animals to keep them all healthy. Also, animals that are fed for a niche market (i.e. organic, naturally raised, or no antibiotics used systems) will not have received an antibiotic (in these programs if they receive an antibiotic, then they are completely removed from the program). Geographically, there are some locations in the U.S. (Midwest – Iowa and Eastern Nebraska, South Texas, and Desert Southwest – Arizona and California) that feed fewer antibiotics in the feed because of a diet higher in roughages and fewer fluctuations in weather. There is no right or wrong method; each beef producer weighs the advantages and disadvantages of the cost (antibiotics are expensive to manufacture and purchase), labor, time, efficiency, withdrawal period, and animal’s health to make a decision that is best. Animals from some backgrounds can handle stress better than others and may never get sick, while others may get sick multiple times.

A withdrawal date or time is the amount of time that must pass after an animal has received an antibiotic to the time when that animal or the products it produces can be consumed. This is measured in days, and is taken very seriously by persons involved in food production. A withdrawal date or time will vary depending on the medication; these dates are set by the FDA. The livestock industry has programs in place by species (beef, swine, sheep, dairy, etc.) for livestock producers designed to enhance and reinforce proper animal care practices, recordkeeping, and the responsible and judicious use of antibiotics.

**When would antibiotics be included in the feed?**

Liver abscesses can be associated with grain intake and consumption. These high energy diets require intense feeding management and can be associated with acidosis. A liver abscess can be caused when cattle have an episode of acidosis. Acidosis is the most common nutritional disorder in the feedlot and can occur when cattle are fed a high amount of grain in a short time, or when cattle overeat (regardless of the feedstuff). This results in the production of more lactic acid than can be buffered by the rumen and water from the circulatory system is drawn into the rumen, resulting in a change in pH. Dr. Dee Griffin, DVM, says there are many reasons cattle overeat, but one of the more common reasons is a decrease in barometric pressure. Cattle can sense a storm coming and will eat more than usual. If that diet is high in energy (i.e. grain) it may result in an acidosis event. Dr. Griffin says that when the pH in the rumen falls below five, certain bacteria can cross the rumen into the liver resulting in a liver abscess. To help control the abscesses, an antibiotic called Tylan can be fed to cattle in their feed. Dr. Griffin and feedlot nutritionists estimate that at least 75% of cattle in feedlots are fed Tylan. Tylan helps reduce liver abscesses by 40-70%. As mentioned above, this is an individual beef producer’s decision.

Many people point the finger of antibiotic resistance blame at the agricultural industry, but there are many other factors that should be considered. First, the overuse and abuse of antibiotics by humans should be discussed. Antibiotics can be obtained over the internet and in some countries without a prescription, leaving people to self-dose and self-medicate. Additionally, persons may take antibiotics for viral infections, like the common cold, when they are not effective. People may also contribute to this problem by not completing a course of antibiotics. They may stop when they feel better or save part of the dosage to decrease expenses associated with a doctor visit and prescription. By not completing a prescribed dose of antibiotics, you are not effectively killing the bacteria that are causing the infection; the bacteria that were not killed have become stronger and in turn resistant to that antibiotic at that level and duration of dosage. Finally, we live in an antibacterial society. How many people have antibacterial hand sanitizer, antibacterial soaps and lotions, antibacterial wipes, etc. at home/work? Each time these are used they may kill some bacteria, but the bacteria that are not killed become stronger and more resistant. So take a moment to ponder how you may be contributing to antibiotic resistance on a personal level.

**Who monitors antibiotic and drug use in livestock?**

All antibiotics used to treat animals have been approved by the U.S. Food and Drug Administration (FDA). The FDA is responsible for protecting public health by assuring the safety, efficacy and security of human and veterinary drugs, biological products, medical devices, our nation’s food supply, cosmetics, and products that emit radiation. FDA is also responsible for advancing the public health by helping to speed innovations that make medicines more effective, safer, and more affordable and by helping the public get the accurate, science-based information they need to use medicines and foods to maintain and improve their health.

Did you know that the Food Safety and Inspection Service National Residue Program (FSIS NRP) (yes, there is an entire division dedicated to monitoring drug resistance!!) tests all domestic and international meat, milk, and egg products for antibiotic residue? The U.S. government says that NO (meaning zero tolerance) beef (as well as other species including pork, poultry, etc.) with antibiotic residues exceeding the FDA standards will be allowed in the food supply!

Dr. Dee Griffin, DVM, says that in addition to these samples, a USDA veterinarian will take samples of “suspicious” animals at the packing plant. “Suspicious” animals may include animals with a disease lesion, or animals that look like they have been treated for illness recently. If the tissue from these animals tests positive for drug residue the carcass will be condemned and NOT allowed in the food supply. In 2012 approximately 200,000 tissue samples were taken from beef alone and less than 1,000 tested positive for a residue. That is one half of one percent testing positive for a residue from the animals the government inspectors targeted as having a high risk of having a violative residue. While we hope to get that number to zero someday, is it important that testing is occurring, and those that do test positive are being condemned and not allowed into the food chain.

The Center for Veterinary Medicine (CVM) regulates the manufacture and distribution of food additives and drugs that will be given to animals. These include animals from which human foods are derived, as well as food additives and drugs for pet (or companion) animals. The CVM is also responsible for regulating drugs, devices, and food additives given to, or used on, over one hundred million companion animals, plus millions of poultry, cattle, swine, and minor animal species.

Have you ever heard of the Generic Animal Drug and Patent Restoration Act? This Act requires that each sponsor of an approved animal drug must submit to the FDA certain information regarding patents held for the animal drug or its method of use. The Act also requires that this information, as well as a list of all animal drug products approved for safety and effectiveness, be made available to the public. This list must be updated monthly under the provisions of the Act. The list, known as the “Green Book,” was first published in January 1989. Updates have been added monthly since then. Each January, the list is published in its entirety.

Did you know that Veterinarians have to take an oath? According to the American Veterinary Medical Association (AVMA) the oath states:

“Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health and welfare, the prevention and relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge. I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics. I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.”

It should not be a secret that some livestock are administered antibiotics. Just like us, animals sometimes get sick and need antibiotics to get better.

This article has provided an overview of why cattle are fed antibiotics and the responsible use of antibiotics by beef producers. Beef producers do not want a resistance problem anymore than you or me, so they are doing all they can do to ensure that doesn’t happen. Next time you hear about antibiotic residue in meat, I hope you will remember that livestock farmers follow antibiotic withdrawal dates very seriously and that there are several government agencies tasked with guaranteeing a safe food supply.

A longer and more in-depth discussion on antibiotic resistance can be found at [http://agriculturalwithdrlindsay.com](http://agriculturalwithdrlindsay.com/).

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