Antibiotic Resistance and Residues: Know the Difference

As a pork producer, you likely are aware of the new antibiotic regulations from the U.S. Food and Drug Administration (FDA) that will take effect Jan. 1, 2017. However, what’s likely less clear is the discussion about antibiotic resistance, which is at the center of most conversations about this important topic.

Definitions Provide Context

“Antibiotic residue” and “antibiotic resistance” are often confused, according to Dr. Jennifer Koeman, director of producer and public health for the Pork Checkoff. However, she says the two are not interchangeable, and it’s important to understand the difference.

“Producers are very aware of antibiotic residues and understand what they are,” Koeman said. “This was a driving force behind the original Pork Quality Assurance® Plus (PQA Plus®) program nearly 30 years ago. It’s only when the discussion turns to antibiotic resistance that many people, including many consumers, can get quite confused.”

• **Antibiotic resistance** occurs when bacteria develop the capacity to inactivate or exclude antibiotics, or develop a mechanism to block the inhibitory or killing effects of antibiotics. The bacteria survive, continue to multiply and spread, causing more harm.

• **Antibiotic residue** refers to molecules that remain in meat from animals that have been treated with antibiotics. During the drug approval process, the FDA establishes tolerance levels or maximum residue limits (MRLs) in edible tissues to ensure consumer safety. A **violative residue** occurs when a food animal is marketed with drug residues exceeding the designated MRL, which is illegal. USDA’s Food Safety Inspection Service tests for violative drug residues at harvest to ensure that meat is safe to enter the food supply.

According to pork safety expert Steve Larsen, who serves as assistant vice president of the Pork Checkoff’s science and technology department, the U.S. pork industry has an extremely low incidence of violative residues in market hogs. However, sows and lightweight roaster pigs can sometimes present residue challenges because they fall outside of the typical marketing cycle and may have different treatment requirements than market hogs.

“These pigs require careful planning and extra veterinary guidance to ensure that all withdrawal times are followed to avoid potential violative residues,” Larsen said.

Antibiotic resistance is another story. “It’s multifaceted, is not easy to understand, and solutions are complex,” said Lonnie King, DVM, dean of The Ohio State University College of Veterinary Medicine. The former director of the Center for the Evaluation of Antibiotic Resistance Trends and Evaluation.

“It’s no surprise that antibiotic resistance has increased, but it is surprising how fast it’s increasing. It is a national and global crisis, and it’s the most significant health problem that humans face.”

– Lonnie King, DVM, dean of The Ohio State University College of Veterinary Medicine

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There are many bacteria. Some are drug resistant.

Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection. The resistant ones are unaffected.

The drug-resistant bacteria are now allowed to grow and take over.

Some bacteria transfer their drug-resistance to other bacteria, causing more problems.

Based on information from the CDC.

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Antibiotic resistance is a completely different topic from residues and certainly is more complex, Koeman said. Animal health and public health experts agree that antibiotic resistance has occurred for millennia, independent of human involvement and modern-day antibiotics. “However, antibiotic use, whether in human health, animal health or agriculture, can apply selection pressures for antibiotic-resistant bacteria to develop,” Koeman said. “Antibiotic-resistant bacteria may not respond to treatment in humans or animals if and when they cause illness.”

Koeman added, “That’s why responsible antibiotic use involves everyone, from doctors to veterinarians to food producers to consumers in general. People need to maintain their health, follow doctors’ prescriptions and practice food-safety practices when handling and preparing all types of food.”

Many Paths to Success

Of course, antibiotics are just one tool in a producer’s animal health plan, which includes proper nutrition, clean water, air ventilation, temperature management, animal housing maintenance, animal care and even genetics, Koeman said. Vaccinations are key, used at the right time, on the right organisms, as well as heightened biosecurity measures to minimize the pathogens that animals encounter.

The PQA Plus program outlines steps for responsible antibiotic use, which can help minimize the potential risk of resistance developing within a herd. Here are points to consider:
Understand Withdrawal Times and MRLs

Honoring withdrawal times and meeting maximum residue levels (MRLs) is critical to maintaining trust and keeping pork sales moving in both domestic and international markets, according to Steve Larsen, assistant vice president of science and technology for the Pork Checkoff. The United States is now the world’s largest pork exporter, with 20.2 percent of 2015’s production shipped to other countries. The long-term goal is to expand sales further.

“The pork export channel begins at the farm, so every U.S. producer plays a role in producing safe, nutritious, high-quality pork for the world’s growing population,” Larsen said. “That means clearly understanding withdrawal times and MRLs required for both U.S. and international markets.”

Countries sometimes set their own MRLs for pork or pork products, which underscores the importance of staying up to date on them, Larsen noted.

“If a violation occurs, it can close markets and negatively impact all producers,” he said. “Understanding MRLs and working closely with your veterinarian helps ensure animal health and well-being, as well as helps ensure that guidelines for the proper use of antibiotics are met.”
Take Steps to Prevent Violative Residues

“Preventing violative drug residues is a basic tenet of responsible animal care and safe food production, said the Pork Checkoff’s Jennifer Koeman. “Build a good relationship with your veterinarian to ensure the judicious use of antibiotics. Also, implement other management and herd health strategies to prevent and control disease.”

The Pork Checkoff’s Pork Quality Assurance® Plus program outlines 10 Good Production Practices, which, together with your veterinarian’s guidance, will help navigate antibiotic use and avoid residue concerns. Here are steps to initiate today:

• Read, understand and follow label directions when giving any medication.
• Identify treated animals. This requires marking or segregating an animal or a group (pens, lots, etc.), as well as tracking them through the production and marketing stages.
• Written records should include identification of the animal(s) treated, treatment date(s), the product used, dosage and who administered it and withdrawal time.
• Animals sometimes lose ear tags, escape pens or accidentally access medicated feeds. Also, treatment records can get lost or destroyed. If there are questions about the residue status of an animal or a group, plan to test live animals before marketing.
• Follow all recommended withdrawal times. This information can be found on the product label, feed tag or package; through your veterinarian; and at pork.org/mrl.
• Verify when the withdrawal time begins, when it’s complete and when it’s safe to market an animal.
• If your veterinarian prescribed antimicrobials in an extra-label manner, discuss your marketing plan for the animal(s) to determine appropriate withdrawal times. Follow the veterinarian’s directions exactly; do not market the animals until the withdrawal time has elapsed.
• When using medicated feed, follow instructions outlined in the veterinary feed directive. Establish a documentation system to ensure that the right feed is delivered to the right pigs. Once treatment is complete, remove all residual feed from bins and feeders.
• Verify that flushing, sequencing and/or physical clean-out occurs at the mill between feed batches to prevent cross-contamination. The same holds true for feed delivery vehicles. PQA Plus outlines additional steps to prevent cross-contamination during feed processing.
• With water medications, follow the prescription, check the medicator’s accuracy and confirm when the treatment period is finished.
• Minimize environmental exposure through proper handling and disposal of all antibiotics, including any outdated or unused products.
• Educate animal caretakers on the processes to prevent marketing adulterated animals or animals with violative residues. Provide clear instructions and follow-up.

For more details, go to pork.org/pqa-plus-certification.
Inside: Antibiotic resistance and residues are not the same thing.

Responding to Change by Leading

New regulations on the use of antibiotics on the farm will require changes that pork producers need to address individually and collectively as an industry, according to Terry O’Neel, National Pork Board treasurer and a pork producer from Friend, Nebraska.

“We are trusted to produce safe food,” O’Neel said. “Today, people are concerned about antibiotic use in livestock production. We must assure our consumers that we use antibiotics properly, not only to treat animals when necessary, but also to maintain a safe food supply.”

He added, “Providing a safe food supply starts with a herd health plan that includes stringent biosecurity and management techniques to reduce pathogen exposure and disease challenges. When an antibiotic is called for, producers need to apply proper withdrawal times and correct dosages, as well to record treatment data to prevent violative residues.”

When it comes to antibiotic resistance, O’Neel said producers need to build a good understanding of what is a very complex issue.

“Antibiotic resistance is a critical issue for our industry and for human medicine,” he said. “That’s why it’s important for producers to do their part by working with the food industry and collaborating with the science and medical fields to help keep antibiotics effective for people and pigs. It’s simply the right thing to do.”

In the long run, O’Neel sees positive outcomes, such as an increased awareness of how and why antibiotics are used on the farm, improved medication record-keeping and potentially a reduced need for antibiotic use.

“I think we’ll see improvements in antibiotic alternatives, and ultimately safer food without sacrificing pig health,” he said.