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Reducing Antibiotic Use in Animal Production Systems

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ANTIMICROBIAL DRUGS are commonly used for animals raised in food production for treatment, control, and prevention of disease as well as growth promotion or increased feed efficiency in many production systems. A recent report from the USDA Economic Research Service (Sneeringer et al. 2015) indicates that the share of hogs, broilers, and beef cattle that have been raised without the use of antibiotics has increased, although a significant share of animals do receive antibiotics for growth promotion or disease prevention (e.g., 59 percent of finishing hogs in 2009 and 52 percent of broilers in 2011). Furthermore, many producers reported that they did not know about their use of antibiotics, particularly those producing under contract (based on data from the USDA Agricultural Resource Management Survey, Sneeringer et al. 2015). The advantages of using antimicrobials in production include prevention of mortality and morbidity especially for young animals (e.g., weaning pigs), reduced input costs (improved feed efficiency), and reduced variation in growth and final product. However, concerns have been raised that the extent of antibiotic use in animal production has the potential to promote the development of antibiotic-resistant pathogens that can affect human health through exposure in food and the environment and limit the important and critical benefits of drugs used to treat and protect human health. Consumer groups and public health proponents have pushed for the food animal production industry to restrict antimicrobial use.

US Policies and Practices
In 2013, the Food and Drug Administration (FDA) issued guidance on the appropriate use of “medically important” antibiotics in food animal production. Guidance #213 includes requests to remove use for growth promotion through re-labeling products to remove feed efficiency and growth promotion use claims; limit application of dosing to specific duration and level for an identified disease and targeted animal industry; avoid administering doses to entire flock or herd; and clarify the use of drugs for disease prevention. FDA also proposed a rule to require the use of veterinary feed directives that increase veterinary oversight for the use of antibiotics deemed medically important for human health. USDA was directed to “advance development and use of antibiotic stewardship practices that assure judicious use of antibiotics in agriculture.” Alternative strategies to preventing and controlling disease include vaccination, improved animal housing and management systems, and adjustments in feeding systems. However, changing practices and decisions made at the production level is challenging, and current data systems do not effectively monitor usage and applications.

Concurrent with changes in use of antibiotics, efforts are underway to improve the reporting on antimicrobials sold or distributed for use in food-producing animals. At the same time, the food industry and meat companies have responded to consumer demand to limit antimicrobial use by adopting new requirements on production practices and use of antibiotics by suppliers of their animal and meat products. For example, Perdue Farms has stopped almost all antibiotic use in raising chicken, Tyson is offering a brand of chicken raised without antibiotics, retail grocers and food service companies like Chick-fil-A, Chipotle, and Subway have made statements to indicate restriction on products (poultry) produced with antibiotics, and other stores like Wal-
Mart are offering beef, pork, and chicken raised without antibiotics as a specialty product. In response, producers and animal practitioners have expressed concerns that restricting use in the treatment of disease risks harm to animal welfare. The policy for animals in the United States is still evolving and differs from policy enacted in the European Union where there is less use of voluntary efforts, and greater use of restriction on producer and veterinary practice. Many of the differences between the United States and European Union stem from differences in the data systems used to track drugs used in veterinary practice.

The Danish Experience

Denmark was one of the earliest countries to adopt more restrictive policies on the use of antibiotics and, as a major producer of pork in the world market, can offer lessons on the practice and effectiveness of policies and restrictions on their antimicrobials in animal production. Denmark prohibited the use of antimicrobials for growth promotion in 1998 and restricted use in all production phases in 2000. Hayes and Jensen (2003) conducted one of the early studies to assess implications of such restrictions on the US swine industry. Based on parameters from the Danish experience, they applied biological and economic modeling to the US production systems and concluded that the ban at the weaning stage was the most difficult—minimizing the effects of reducing usage requires changes in management and production practices and coordination between producer and veterinary services, especially for young pigs.

In Denmark, further reductions in antimicrobial use have resulted from tighter controls on veterinary practices, monitoring veterinary prescriptions, the use of a “yellow card” system to flag producers and operations with high use (implemented in 2010), and limiting the ability of veterinarians to profit from sales. Denmark maintains an extensive antimicrobial monitoring and research program with collaborating offices in veterinary, food, and health institutes and agencies and an integrated data reporting system through veterinary practices, private laboratories, processing plants, and health services and hospitals. Antimicrobial use in animal production is monitored by specific drug, quantity, veterinarian, specie, animal age group, and farm identification. However, close examination of the current Danish system shows that challenges in on-farm and veterinary practices to increasingly tighter controls remain (Jensen and Hayes 2014). Most recently, Denmark implemented additional taxes on veterinary sales including a differentiated tax on antibiotics (highest on the most critically important antibiotics) and removed the existing tax on vaccines, which may reduce the need for antibiotics. Despite the overall decrease in consumption of antimicrobial agents in Denmark, the overall effectiveness of reduced animal use in mitigating development of antimicrobial resistance is mixed.

Implications for the United States

Although the Danish context is significantly different than that in the United States, the Danish experience offers insight into the implications from a shift in US policy and food industry practice to implement more restrictions on antibiotic use in animal production. Experience with the most efficient and best managed production facilities indicates that production systems can operate well without compromising productivity, although with some increase in costs. New research is improving our understanding of the development and persistence of resistance at the farm and in the human population. Understanding the management and production practices in a multi-disciplinary context is necessary to reduce resistance and exposures in the environment and ongoing work and collaborations at Iowa State University are currently addressing these problems.

In addition to farm-level practices, there are adjustments likely to occur throughout the supply chain that will favor producers with the ability to have tighter production controls and meet the requirements of buyers with stricter standards on antimicrobial use. Global trade and production systems pose other challenges. Recent problems of E. coli resistant to cephalosporins in poultry in Denmark were traced to grandparent flocks in Great Britain. If there are cost increases at the production level, consumers are likely to bear some of the cost of adjustment through higher prices. However, based on industry response and observation of the development and persistence of market niches offering products with limited use of antibiotics, consumers do have a choice and some are willing to pay the price. Companies in the food service industry trying to guarantee product sourced with more restrictive practices now need to compete for more limited supply of product raised with limited use of antibiotics. From the public health perspective, there is a critical need to determine if efforts in animal and food sectors will have a positive effect on reducing the overall level of exposure to antimicrobial resistance in human health.

references on page 9