

Introduction of the Issues Related to Antimicrobial Resistance in Beef Production

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In beef feedlot production, antimicrobials are used for therapeutic, prophylactic, and production enhancement purposes. Recently, there has been increasing public concern about the use of antimicrobials in livestock production because this practice may contribute to the emergence of antimicrobial-resistant bacteria that could directly or indirectly cause bacterial resistance in human pathogens. There is limited scientific data to show that the use of antimicrobials in beef feedlot production is responsible for the emergence of resistant bacteria in human populations.

Antimicrobial resistance in human pathogens is a significant problem in human medicine. There is considerable evidence that resistant strains of several common human bacterial pathogens, including *Staphylococcus aureus* and various enterococci, are widespread in human hospitals. In addition, the number of antimicrobials available to treat these “resistant” organisms is limited. Bacterial resistance to vancomycin, a front-line antimicrobial used in human medicine, is reported with increasing frequency. Furthermore, certain organisms, specifically pneumococci, are demonstrating that the amount of antimicrobial necessary to prevent bacterial growth is increasing. Unfortunately, it is speculated that antimicrobial resistance in human pathogens is caused by widespread use of antimicrobials in food animal production. Alternatively, it has been suggested that drug resistance in human pathogens is related to overuse of antimicrobials in prevention and treatment of such human diseases as the common cold, ear infections, and the “flu”.

Public opinion in Europe has prompted legislation that bans certain antimicrobials from animal use. For example, avoparcin and virginiamycin were banned in Denmark in 1996 and 1997, respectively. A report from the 1997 Commission on Antimicrobial Feed Additives (Stockholm, Sweden) stated: “It is the conclusion of this

commission that the benefits of antibacterial feed additives do not outweigh the risks”. At the World Health Organization meeting on the Use of Quinolones in Food Producing Animals and Potential Impact on Human Health (Geneva, Switzerland, 1998), it was stated that “The use of fluoroquinolones in food animals has led to the emergence of fluoroquinolone-resistant *Campylobacter* and emergence of *Salmonella* with reduced susceptibility to fluoroquinolones”. However, the Committee on Drug Use in Food Animals (National Research Council of the National Academy of Sciences, 1999) stated that “A totally risk-free system of food production is an unreasonable and fundamentally unattainable goal. Actual human health risks associated with food-producing animals are most immediately brought into focus in reviewing the number of cases of human illness that occur from food contamination with microorganisms of animal origin. The magnitude of this risk is somewhat difficult to assess. In terms of tracing the origin of an illness directly back to the animal, a complicated intertwining of farm, wholesale-retail, and consumer practices exists that create opportunities for disease to emerge. However, because many aspects of the risk are known and acknowledged, it could be thought of as manageable, because logical courses of action can be applied. The potential risk to human health directly associated with the use of antibiotic drugs in food animal production is a more nebulous issue but still of great concern because of what is not known, what *could* occur, and a general attitude that control and management of the situation need to be improved.”

In summary, it will be difficult for the beef cattle industry to avoid criticism regarding antimicrobial usage. The feedlot sector of the beef industry is particularly vulnerable because feedlots utilize antimicrobials for disease prevention, reduction of liver abscesses, and improving feed efficiency and gain.