Dairy Environmental Systems Program

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ANTIBIOTIC RESISTANCE AND DAIRY PRODUCTION
- FACT SHEET* -

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Antibiotics are chemicals that result in *bacterial cell death or inhibition of bacterial growth.* Antibiotics are produced *naturally* by bacteria and fungi, and are manufactured by pharmaceutical companies for their use as treatments for infectious bacterial diseases in humans, animals, and plants[1]. Antibiotics do not include disinfectants, antiseptics or ionophores, and are not effective for the treatment of fungal, viral or parasitic infections. The United States Food and Drug Administration (FDA) considers "the continued availability of effective antimicrobial drugs [to be] critically important for combating infectious disease in both humans and animals"[2].

Antibiotic use in dairy cattle

Based on a 2007 study representing 79.5% of US dairy operations and 82.5% of US dairy cows; antibiotics were used therapeutically by ~85% of US dairy operations to treat cow mastitis and by over 50% to treat respiratory, reproductive and lameness issues. More than 60% of dairies used antibiotics to treat respiratory problems in weaned calves and heifers, and to treat respiratory problems and diarrhea in unweaned calves[3]. To prevent disease and promote healthy growth, 90.1% of US dairy operations practiced dry cow therapy, 18.2% fed antibiotics in heifer rations, and 57.5% fed medicated milk replacer to unweaned calves.

How are antibiotic residuals kept out of the Nation's food supply?

Federal law requires that all veterinary antibiotics are approved for use by the FDA, that antibiotic treatments are administered according to the drug label, that milk and meat from treated animals are withheld from the food supply for a period of time listed on the drug labels that ensures drug residues are no longer present, and that antibiotics used in feed for animal health purposes are administered with veterinarian oversight. Testing and inspection of milk and meat products ensure these rules are followed.

Antibiotic residual testing of Milk

The Pasteurized Milk Ordinance (PMO) does not allow milk residues to enter the food supply. Rigorous protocols require milk haulers to sample milk at every farm before loading their truck and the testing of each truck load before it is unloaded at a milk processing plant. Truck loads that test negative for antibiotics are allowed to be unloaded into the milk processing plant. Truck loads that test positive for antibiotics are discarded, and the individual farm samples are tested to identify the farm out of compliance. The farm identified must then pay for the entire load of discarded milk and can face regulatory action[4]. Only 0.01% of truck loads (429 of 3.15 million) tested positive in 2014, and no retail samples tested positive[5].

Antibiotic residual testing of meat products

The United States Department of Agriculture (USDA) Food Safety Inspection Services (FSIS) administers the interagency United States National Residue Program (US NRP) that examines meat, poultry, and egg products for chemical contaminants including veterinary drugs. The US NRP carries out annual scheduled sampling of tissue from healthy-appearing food animals and inspector generated sampling of suspect food animals and carcasses. All animals and carcasses that test positive are withheld from the food system and destroyed. In 2014, approximately 2.8 million dairy cows were slaughtered for beef[6], and only 629 samples (0.02%) were in violation[7].

*This document was prepared for the use of the general public.
It is intended to provide a brief list of facts about antibiotic resistance as it relates to dairy production.

Antibiotic Resistance (AR) is a naturally occurring process where previously susceptible bacteria develop the ability to resist the effects of an antibiotic. *AR is not gained by the host (cow or human) but by the bacteria.* It is widely believed that the extensive use of both human and veterinary antibiotics has increased the prevalence of antibiotic resistant bacteria[1, 8, 9].

Risk of antibiotic resistance

Overuse and misuse of antibiotics by humans and animals, and environmental releases of antibiotics, antibiotic resistant bacteria and their associated AR genes from domestic, hospital and industrial wastewater treatment facility effluents and from certain agricultural practices can increase the prevalence of AR by selecting for antibiotic resistant bacteria[8]. Higher incidence of AR can increase the cost and difficulty of effectively treating and preventing bacterial infections in humans, animals and plants.

Is antibiotic usage by dairy operations a main cause of antibiotic resistance?

While there is evidence that antibiotic use in food-producing animals may lead to AR in animal and human pathogens[10] and elevated levels of AR can be associated with dairies[11] there is no evidence suggesting dairy is a main or sole cause of AR as many domestic, hospital, industrial and agricultural sources are recognized[8]. According to the review by Stephen Oliver et al., though the use of antibiotics in adult dairy cows may contribute to the development of AR, "there are no studies that show that use of antimicrobials to treat mastitis in dairy cows has resulted in the emergence and establishment of dominant antimicrobial resistant clonal types in both human and dairy cattle populations"[12].

Control of antibiotic resistance

As part of the national effort to control AR, the National Antimicrobial Resistance Monitoring System (NARMS) has been analyzing human, animal and food samples for antimicrobial resistance since 1996. They report both increases and decreases in resistance to antibiotics depending on the drug and pathogen. Sampling of cecal (beginning of the large intestine) contents for individual livestock groups started in 2013, so dairy specific trends are not yet available[13].

What is being done to reduce the impact of veterinary antibiotic use on antibiotic resistance?

Prompted by the National Action Plan for Combating Antibiotic-Resistant Bacteria[14], the U.S. Food and Drug Administration has been refining its regulation of antibiotic usage in livestock animals to promote more judicious usage and to better protect animal and human health. Specifically, the Administration's aim is to "phase out the use of medically important antimicrobials in food animals for production purposes (e.g., to enhance growth or improve feed efficiency), and to bring the therapeutic uses of such drugs (to treat, control, or prevent specific diseases) under the oversight of licensed veterinarians"[15]. Additionally, improvements in animal husbandry, farm hygiene and strong working relationships with farm veterinarians are helping to promote animal health, improve treatment protocols, and optimize antibiotic usage [8].

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