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The Journey of Antibiotics from Farm to Fork

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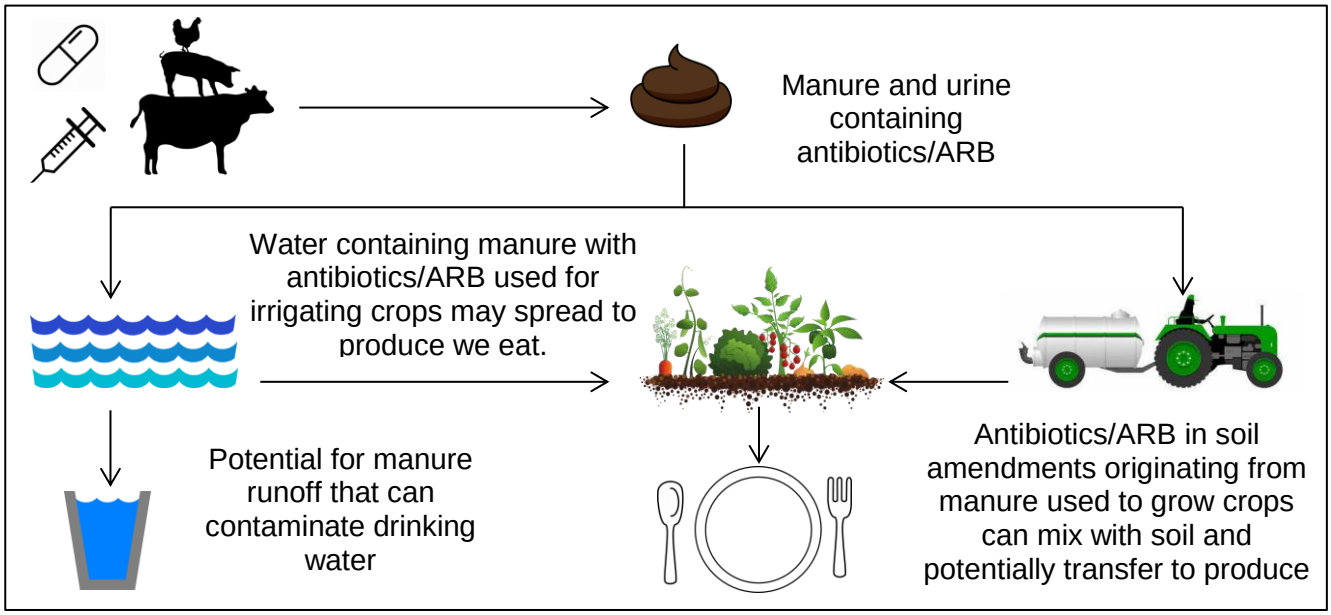
Antimicrobial resistance (AMR) is a complex issue in our world, especially when it comes to food. Have you ever wondered how antibiotics given to food animals might affect what we eat? Antibiotics and antibiotic resistant bacteria (ARB) have the potential to make their way into food products. So, what exactly happens to antibiotics after they are given to an animal? This guide is meant to show the potential pathways of antibiotics and ARB from the farm to your fork as well as the barriers in place to help stop these pathways.

Antibiotics are commonly given to food animals that are ill or are at risk of becoming ill. Antibiotics are indispensible tools on a farm because they enhance animal welfare and provide economic advantages. Nearly all of the antibiotics administered to livestock will end up in their urine and manure. Without effective sanitation and protective barriers, manure and urine containing antibiotics/ARB can contaminate drinking water as well as soil and water used to grow produce. Since manure-based amendments, like compost, are typically used to fertilize crops, manure-derived antibiotics/ARB have the potential to spread to the soil and crops.

Antibiotics and antibiotic resistance bacteria (ARB)- *What's the difference?*

Antibiotic- the actual drug given to the animal or human, such as penicillin or erythromycin, to kill infection-causing bacteria.

Antibiotic Resistance Bacteria ARB- the bacteria that survive in the presence of antibacterial drugs. ARB may include normal flora (i.e., harmless bacteria and pathogens (i.e., infectious bacteria).



What's Being Done to Prevent the Journey from Farm to Fork

Antibiotics themselves will generally diminish in concentration along each step from farm to fork. ARBs, on the other hand, are living organisms and may die off or grow to higher concentrations depending on whether the environment is suitable. Currently, antibiotics are monitored to make sure there is little to no residual in our milk and meat products. Veterinarians and producers have access to databases such as the Food Animal Residue Avoidance Databank (FARAD), which gives detailed information regarding withdrawal times for numerous drugs.

Unlike antibiotics, there are no specific guidelines for monitoring ARBs. However, there are barriers in place to prevent the spread of harmful bacteria (pathogens), such as the Food Safety Modernization Act (FSMA), which may help limit the spread of antibiotic resistance. FSMA contains specific information regarding techniques aimed at killing or reducing the number of pathogens in food. Some examples of these techniques include heat treatments, high pressure processing (HPP), irradiation, refrigeration, and freezing. The U.S. Environmental Protection Agency (EPA) likewise has strict regulations regarding manure runoff into water supply sources as well as soil amendments originating from manure. The National Pollutant Discharge Elimination System (NPDES) permit in particular is required for livestock and poultry production, which helps prevent pathogen contamination of drinking water and crops.

While there are not yet guidelines for ARBs, these barriers already in place likely reduce the amount of ARB in or on our food. Researchers at Virginia Tech are conducting experiments to identify which of these practices are most effective for limiting the potential for ARBs to be transmitted from farm to fork.

References

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