

Human Health and the Use of Animal Manure in Crop Production

Animal manure (and certain other organic materials) is a good source of essential plant nutrients when properly used. It improves soil fertility and biological and physical properties. However, manure has several disadvantages when compared to commercially produced fertilizers, including low nutrient content and high volume, making it uneconomical to transport far from its production source. Manure continues to release nutrients during periods when crops aren't actively growing to take them up. This can result in unused nutrients being left in the soil, to potentially be washed into surface water through erosion and runoff or leached into groundwater. Careful timing of application and incorporation can offset these concerns. Because nutrient contents of manure vary with animal species and management, it is critical to analyze its nutrient content and factor that into nutrient management planning.

There are other disadvantages to the use of animal manure as well. Its somewhat fixed nutrient ratios have led to widespread concern of excessive buildup of phosphorus (P) in heavily manured soils because crops require much less P than nutrients such as nitrogen (N) and potassium (K). So, when manure is applied to the soil in quantities necessary to meet crop need for N, soil P levels can be built to excessive levels. This leads to potential degradation of water quality. Animal manure may also carry pathogens that can present dangers to human health.

The U.S. Environmental Protection Agency has cited pathogenic bacteria as a leading cause of water quality impairment in streams, rivers, and estuaries. There are more than 150 organisms that can spread infection from animals to humans. Many of those can be found in animal feces and urine. They include bacteria—such as E. coli, Salmonella, and Campylobacter—viruses, and protozoa. The U.S. Centers for Disease Control (CDC) estimates there are more than 70,000 cases of infection in humans each year from E. coli alone. Food-borne illnesses are considered the most serious food safety problem in the U.S. The application of raw manure is one way pathogens are spread in the environment. Manure is not applied directly to crops intended for human consumption. Composting kills many harmful pathogens, reducing the human disease risks. Composting also reduces the volume of manure, making it more practical to transport.

Scientists at Ohio State and North Carolina State universities are involved in a 4-year project, working together to try and prevent dangerous food-borne pathogens in animal manure from spreading to the environment and negatively affecting human health. They are attempting to evaluate every food-borne pathogen in manure to see if there is a risk associated with human health. Their goal is to find the most economical method of handling animal waste which will result in the elimination of food borne pathogens found in manure. **Their success with this project can make the use of a valuable resource safer, thus leading to the production of higher, more efficient crop yields and a healthier population of consumers.** **EB**



While livestock manure can be useful as a nutrient source in agriculture, certain bacteria and other organisms can contaminate water and foods if not carefully managed. Researchers are evaluating various methods of livestock waste handling to assure human health and safety.