

## Description

Land application of manure to cropland is an important component to the long-term sustainability of animal agriculture. Manure application returns nutrients and organic matter to the soil, keeping it healthy and productive. Unfortunately, manure application to cropland does present some environmental risk. Over application of manure can lead to nitrate leaching into groundwater, phosphorus runoff into surface water, and a variety of other pollution problems. Proper manure application requires knowledge of the nutrient content of manure, the nutrient requirements for the crops, the availability of the manure nutrients, the physical limitations of the application equipment, and some understanding of the critical environmental hazards associated with manure application.

Along with water quality problems are nuisance odor concerns. Odor from manure is, in general, offensive to most people. One of the key factors in odor control is the surface area of the emitting source. The larger the surface area, the more odors are emitted. As such, manure applied on the surface of cropland presents one of the most significant sources of odor for any livestock or poultry operation. Applying manure at low rates to avoid over applying nutrients may in fact exacerbate odor problems since the manure must be spread on larger land areas.

Odor may last for a few hours to as much as two weeks, depending on weather conditions and the manure source. Applying manure beneath the soil surface (injected) or covering it immediately after spreading (incorporation) eliminates most of the odor because the odorous gases must then travel up through a soil layer before being emitted into the atmosphere. The soil layer acts as both a trap for odorous gases and an aerobic treatment system, changing odorous gases into less odorous gases through microbial processes. Manure injection or incorporation also reduces manure nitrogen losses to the atmosphere by reducing ammonia volatilization. Field research suggests that odor and ammonia emission reductions of 90% are attainable using shallow or deep injector manure systems versus surface application (Phillips et al. 1988).

The land application of manure from livestock and poultry facilities is the most frequent source of odor complaints from the public... .

...odor and ammonia emission reductions of 90% are attainable using shallow or deep [injection]... .