Fact Sheet #10

Reducing the Risk of Groundwater Contamination by

Improving Milking Center Wastewater Treatment

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Wastewater from the dairy milking center, including wastes from the milking parlor and washpens, (urine, manure, feed solids, hoof dirt), and the milkhouse, (bulk tank rinse water, and detergent used in cleaning), can be a threat to both ground and surface water.

In New Mexico, delivery of milking center wastewater to a manure storage, handling, and processing facility is a commonly used and accepted practice. Wastewater is stored in lined lagoons until conditions are suitable for land application, or until the liquid evaporates. These waste handling systems generally include a lagoon with a liner (synthetic, bentonite, or concrete), and may include a solids separator to extend lagoon life. Discharge options for milking center wastewater include aerial application and slow surface irrigation. The effluent is usually applied to a cropping system consisting of both cool and warm season grasses, (i.e. bermuda and rye), to maximize nitrogen uptake. It is essential that producers match fertilizer loads with the amount of nutrients these cropping systems can use.

Ground and surface water is least likely to be contaminated if appropriate wastewater management procedures are followed or when wastewater and manure solids are disposed of in an approved location **off the farm site**. However, proper offsite disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others.

1. Total evaporation lagoons

The semi-arid climate in New Mexico allows dairy producers to dispose of wastewater by total evaporation from shallow lagoons. Evaporation of wastewater ensures that nitrates and other pollutants are not leached down into groundwater. These lagoons must be lined and impervious to meet New Mexico Water Quality Control Commission regulations.

> Periodic pumping of the lagoon allows for solids removal and inspection of the lagoon liner. Wastewater and the remaining solids from this action can be applied to cropland (see "Discharge Methods" below).

The minimum legal separation distance from a lagoon to a private drinking water well is 100 feet (200 feet for public wells). However, a distance of 300 feet is recommended to further reduce the risk to your drinking water.

2. Treatment before discharge

Treating wastewater to remove some solids before discharge can extend the life of a disposal system. Some systems may include a solids separator that will reduce total solids reaching the lagoon, thus extending lagoon liner life and clean-out intervals. Additional pretreatment usually consists of a slab separator that holds the wastewater long enough for heavier particles to settle out.

For glossary, see Worksheet #10.

3. Discharge methods

Application of wastewater to cropland, at low application rates, poses the least danger to groundwater and surface water. The soil can assimilate the dispersed wastes and crops can use the nutrients, thus preventing them from entering groundwater or surface water. To maximize the efficiency of this system, harvest the crop or other vegetation.

> Forage harvested from wastewater irrigated fields is an excellent livestock feed. Regardless of what the vegetation will be used for, it should be removed from the field. Routine harvesting of the infiltration area will keep vegetation from decomposing and releasing nutrients that could seep down to the groundwater, and the regrowth will use additional nitrogen.

Any discharge methods that involve application of wastewater, or solid wastes, to the soil surface should be tied to a soil fertility analysis and a plan for utilization of the nutrients by crops. These applied nutrients should be credited in the fertilizer program.

New Mexico regulations limit the amount of nitrogen that may be applied to crops in the treated wastewater. The maximum allowed is 200 pounds of nitrogen per acre per year, OR the amount which the crop will take up plus 25%, whichever is greater. Forage crops grown year round and harvested regularly may take up more than 200 pounds per acre.

Applying milking center wastes to fields at rates that do not exceed crop needs for nitrogen is least risky for groundwater contamination from effluent or solid manure. Phosphorus can accumulate to levels that will harm crops, but in New Mexico's typically phosphorus-deficient soils this is usually not a problem.

In New Mexico, discharge systems fall into two categories, aerial (sprinkler) application and slow surface irrigation. Other discharge systems, such as below-ground absorption or rapid surface infiltration are not used in New Mexico.

> Administering wastewater intermittently may require that the retention tank and disposal area be large enough to handle several days production of milking center wastes. Alternating between two infiltration areas is another way to allow an area to dry out.

Do not saturate soils that can allow rapid percolation to groundwater or runoff to surface water.

Dairy wastewater can be applied to croplands and pastures with portable sprinkler irrigation equipment (moveable pipe, traveling impulse sprinkler, sideroll, etc.). Pipes and sprinklers can be permanently installed, but may make harvest difficult.

Aerial Application

As with evaporation lagoons, volatilization of nitrogen is one of the benefits of this practice. The amount of nitrogen lost to the atmosphere will depend upon the type of sprinkler system used and climatic conditions during application (temperature, wind velocity, relative humidity).

More frequent, light aerial applications can increase nitrogen volatilization. With light applications, the soil will not become saturated to any significant depth. This practice will allow the nitrogen contained in the wastewater to stay near the surface, thus exposing it to the atmosphere for increased denitrification and limiting soil saturation to reduce leaching potential.

Slow surface irrigation

Wastewater for irrigation can be delivered through ditches or pipes to gently sloped or level fields planted in permanent or seasonal crops. Organic compounds and bacteria can decompose or be filtered out as wastes flow over the sloped, vegetated soil surface and percolate through the soil. This system works best on well-drained loamy soils with at least 4 feet to bedrock or groundwater. The area should be designed to minimize runoff during heavy rain.

Properly operated, a slow irrigation system poses a moderate risk of groundwater contamination by nitrate and other soluble compounds. There is a low risk of contamination by organic matter, pathogenic (disease-causing) microorganisms, phosphorus and detergents.

Rapid infiltration disposal

This practice poses a high risk of groundwater contamination by nitrates, phosphorus, ammonia and other soluble compounds, such as detergents. When infiltration is rapid, as in sandy soils, microorganisms and organic compounds can not be adequately filtered or decomposed by soil bacteria before the wastewater reaches groundwater. These systems are prone to discharge problems that make them a poor management practice and possibly illegal in New Mexico.

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