

## Wellhead Protection Issues Related to Feedlot Operations

The purpose of this document is to communicate Minnesota Department of Health (MDH) concerns about the placement and operation of feedlots in or near wellhead protection areas. Wellhead protection areas are distributed statewide and exist as a means of protecting groundwater supplies used for drinking water. As a result, this document focuses on issues pertaining to feedlot placement and operation that have the potential to affect drinking water supplies. In addition, the MDH has authority to enforce drinking water standards established at the federal level for nitrogen and pathogenic contaminants. Therefore, concern about these two types of contaminants is central to the issues raised in this document.

Much attention has been given recently to any number of emerging contaminants (e.g., hormones, antibiotics, pesticide degradates) that have been found in surface and groundwater. However, because little is definitively known about the health effects of these compounds, they will not be a focus of this document. Research results may allow MDH staff to address these compounds in the future.

For the purposes of this document, feedlot operations include: permanent and temporary feeding stations, animal confinement areas, manure storage areas, wastewater lagoons, manure spreading areas, and site restoration. Placing feedlot operations in geologically sensitive settings may affect drinking water quality and public health. An area is geologically sensitive when layers of fine-grained material, such as clay or shale, are not of sufficient thickness to prevent the vertical movement of waterborne contaminants from reaching groundwater resources over a time period of weeks to less than a decade. In addition, runoff from feedlot operations is of concern because it has the potential to not only affect surface water quality but, in some settings, to recharge shallow groundwater systems in geologically sensitive portions of wellhead protection areas.

Mismanagement of manure, liquid waste, and storm water from feedlot operations may contaminate groundwater that is used for a drinking water supply. Such contamination may require that an alternate drinking water source be used or that treatment equipment be installed. However, treating contaminated drinking water is usually expensive and is not a good public health policy because treatment equipment may fail and expose users to acute contaminant levels. Furthermore, ineffective feedlot management practices that lead to contamination of water supply wells may result in expensive legal and remediation costs to the owners of the properties that contributed the contaminants.

The following feedlot issues are of particular concern for drinking water in geologically sensitive portions of a wellhead protection area:

- **Pathogen movement into drinking water sources.** Some pathogens can remain viable in groundwater for as long as one year. Potential pathogen sources, such as feedlots, that are located within a one-year time of travel capture area have the potential to contaminate a drinking water supply well.

## WELLHEAD PROTECTION ISSUES RELATED TO FEEDLOT OPERATIONS

- **Excessive nutrient loading may contaminate drinking water supplies.** Nutrients, especially nitrate-nitrogen, dissolve readily in both ground- and surface water. Nitrogen management is important in reducing the risk associated with the loss of nitrate-nitrogen to the water. Mismanagement could result in exceeding the federal drinking water standard of 10.0 ppm nitrate-nitrogen in water, causing a health concern.
- **Contaminated runoff from feedlot operations.** Contaminated runoff in a geologically sensitive area may recharge an aquifer that supplies drinking water. A feedlot operation must address the risk that snow-melt or storm-water runoff present to geologically sensitive portions of wellhead protection areas
- **Timing and incorporation of manure applications.** Manure application on frozen ground, or without incorporation into the soil, before spring runoff or storms may result in surface water runoff. The contaminated runoff may recharge a geologically sensitive aquifer used as a source of drinking water for a public water supply well.
- **Direct access to water bodies by livestock.** Surface water used for livestock watering in geologically sensitive areas may contaminate the surface water, which can then impact groundwater supplies which may be a source of public drinking water.
- **Spills or accidental release of manure or wastewater.** Accidental spills or release of liquid manure or wastewater may cause groundwater contamination in geologically sensitive parts of a wellhead protection area.
- **Improperly sealed wells located at feedlot operations or in manure application areas.** Improperly sealed wells can serve as conduits for contaminated surface water or near-surface groundwater to enter an aquifer used by a public drinking water supplier.
- **Abandoned or inactive feedlots may leach contaminants into groundwater.** A feedlot may leach contaminants, particularly nitrate-nitrogen, into groundwater for years if the site is not reclaimed to address this excess nitrogen source.
- **Livestock morbidity.** Proper disposal of animal remains is important to protect water quality, especially in geologically sensitive wellhead protection areas.

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