

by

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Introduction

The Department of Environmental Regulation is responsible for the protection, conservation and restoration of the air, water and natural resources of the state. To fulfill its duty to protect surface and ground waters, the Department develops and enforces rules to prevent pollutant discharges into waters of the state that would violate established water quality standards. This paper discusses existing rules and policies for regulation of dairies and ongoing studies that may result in additional regulation of dairies.

Department rules that apply to dairies and other feedlot operations are designed to protect both surface and ground waters. Outside the Lake Okeechobee drainage basin, dairies are generally exempt from obtaining an industrial wastewater permit if they do not discharge wastewater or contaminated stormwater runoff from their property and they do not represent a potential threat to ground water. All dairies in the Lake Okeechobee drainage basin are required to have permits and implement waste management practices specified by the rule that applies to these dairies.

Protection of Surface Waters
(Statewide)

Applicable Rules:

17-660.400(1)(e)8, Florida Administrative Code
17-670.200 through 17-670.400, Florida Administrative Code

To protect surface waters, both state and federal regulations require dairies with more than 700 mature cows (milked and dry) to be designed, constructed and operated to retain on their property all wastewater generated by their operation and contaminated stormwater runoff from the 25-year, 24-hour storm. Wastewater includes water from flushing and washing of barns, milking parlors and other paved areas. The 25-year, 24-hour storm is a storm that produces the amount of rainfall in 24 hours that is likely to be exceeded once in 25 years. Depending on the area of the state, this storm would be approximately 7.5 to 11 inches of rain in 24 hours. The requirement to retain runoff from this and all lesser storms applies to the dairy feedlot, which is defined as the area where cows are confined and fed or maintained and that does not support crops or other vegetation. Any dairy that has more than 700 cows and does not comply with this "no discharge"

requirement must obtain an industrial wastewater permit to construct a waste management system to eliminate the discharge. Once the necessary system has been constructed and its effectiveness demonstrated, no further permit may be required. However, if a potential for pollution still exists at a dairy that complies with the "no discharge" requirement, an industrial wastewater operation permit may be required. An operation permit is renewable every five years.

Dairies with 700 or fewer cows are required to obtain an industrial wastewater permit only if they discharge to surface waters of the state through a manmade device, such as a pipe or ditch, or if cows in the feedlot area come in direct contact with surface waters of the state. Under the permit, construction would be required to stop the direct discharge of pollutants and exclude cows from waters of the state. Waters of the state do not include surface waters on the dairy property that have no connection to waters off the site.

The "no discharge" requirement for dairies is normally achieved by routing wastewater and stormwater runoff to a waste lagoon or other storage structure and then using this water to irrigate forage crops. Although the "no discharge" rule does not specifically require measures to prevent runoff of pollutants from fields irrigated with wastewater, water quality standards in surface waters could be violated if applied wastes are transported in runoff to surface waters. To prevent runoff during wastewater application, lagoon capacity should be adequate for storage of wastewater and stormwater runoff during periods when soil is saturated from rainfall. To minimize the nutrient load carried in stormwater runoff from fields, it is critical that the nutrient (nitrogen and phosphorus) content of applied liquid and solid wastes does not exceed the nutrient requirements of the crops to which the wastes are applied. The timing of waste application is also important because nutrients applied when crops are not actively growing are more likely to be transported in stormwater runoff. When a dairy applies for an industrial wastewater permit, it must provide design calculations to address these issues.

Protection Of Surface Waters
(Lake Okeechobee Drainage Basin)

Applicable Rules:

17-670.500 through 17-670.540, Florida Administrative Code

Dairies in the Lake Okeechobee Drainage Basin are regulated by rules that apply only in that area of the state. These rules are designed to protect Lake Okeechobee, which has water quality problems caused by excessive nutrients.

All dairies in the Basin are required to have permits and implement specific best management practices (BMPs) to control phosphorus runoff. The BMPs are incorporated into a comprehensive conservation plan for the dairy, prepared by either the Soil Conservation Service or a private engineer. The required BMPs are as follows:

1. fence cattle away from waterways;
2. collect, treat and reuse barn wastes; and,
3. collect, treat and reuse runoff from "high intensity areas."

Reuse of barn wastes and runoff is accomplished through their application to fields of forage crops or grasses. This allows the nutrients in the wastes to be assimilated by the crops and then fed to the cows. This recycling of nutrients on the dairy lessens nutrient losses to surface waters and reduces the amount of commercial fertilizer necessary for growing feed.

Protection of Ground Water
(Statewide)

Applicable Rule:

17-28.700(4)(c), Florida Administrative Code

Even if a dairy's waste management practices are adequate to protect surface waters, it may be required to obtain an industrial wastewater permit to ensure ground water quality is protected. From the standpoint of ground water quality protection, a dairy is not required to obtain a permit unless it threatens to violate ground water quality standards beyond a "zone of discharge." The "zone of discharge" is an area in the ground water within which water quality standards are not enforced. At a dairy that does not have a permit, the zone of discharge extends a distance of 100 feet from a pollution source, such as a field or waste lagoon, or to the dairy's property boundary, whichever is less. If there is a potential for a violation of a ground water quality standard beyond the zone of discharge, a permit may be required. Under such a permit, a dairy must implement a ground water monitoring plan, which includes the installation and periodic sampling of monitoring wells, to ensure ground water quality standards are not violated beyond the zone of discharge.

The improper handling, storage, and disposal of manure and wastewater can result in ground water contamination by a variety of pollutants, especially nitrate. An unlined waste lagoon may leak considerable amounts of pollutants into the ground water, especially if it is constructed in permeable soil. Contaminated stormwater runoff and seepage from a manure pile may also seep into ground water. If wastewater or manure is applied to crops in amounts that provide more nitrogen than the plants can use, the excess nitrogen can leach into the ground water as nitrate. This can also happen where cows gather in such numbers that the manure they deposit exceeds the nitrogen requirements of the cover crop. Herd densities greater than two or three cows per acre can deposit more nitrogen than pasture grasses can use. Trampled, bare dirt areas that develop around barns, milking parlors and feeding stations are a particular problem because large amounts of manure are deposited in these areas and there are no plants to take up the nitrogen before it leaches into the ground water. The maximum allowable concentration of nitrate nitrogen in ground water beyond a zone of discharge is 10 milligrams per liter (mg/l). This standard was established because consumption of drinking water with

greater than 10 mg/l nitrate nitrogen is potentially fatal to children younger than one year old.

The potential for ground water contamination at a dairy is influenced by the hydrogeology of the site. Ground water is most vulnerable to contamination in areas where the soil is highly permeable and ground water is close to the surface. The presence of sinkholes at a dairy greatly increases the possibility of ground water contamination because sinkholes provide direct connections to the ground water.

To determine the potential for ground water contamination at dairies, the Department has been conducting a study in the Suwannee River Basin, an area of the state with highly vulnerable ground water. As part of this study, 34 shallow monitoring wells were installed at nine dairies. The monitoring wells were primarily located near the most likely sources of ground water contamination: unlined waste lagoons, a manure storage pile, fields irrigated with wastewater, intensive pastures, and bare dirt "high intensity areas" where cows gather at high densities. Ground water samples collected from these monitoring wells over a period of a year have displayed elevated levels of several pollutants, particularly nitrate. Nitrate nitrogen concentrations as high as 150 mg/l have been recorded. The highest average nitrate nitrogen concentrations were found in wells next to lagoons (approximately 35 mg/l average) and "high intensity areas" (approximately 30 mg/l average). Average concentrations in wells next to intensive pastures and fields irrigated with wastewater were approximately 15 mg/l, but these levels may have been at least partially caused by application of commercial fertilizer. These values are in marked contrast to the natural concentration of nitrate nitrogen in ground water (2 mg/l or less). Additionally, testing of existing drinking water wells at 76 dairies in the Suwannee River Basin has found wells with greater than 10 mg/l nitrate nitrogen at thirteen of the dairies.

Although nitrate nitrogen concentrations greater than the 10 mg/l ground water standard were found in many of monitoring wells, these are not violations because they occurred within the allowable zone of discharge at each dairy. However, the data indicate there is a potential for ground water quality violations beyond the zone of discharge. Over the next year, the ground water monitoring at four of the nine previously monitored dairies will be expanded to determine the vertical and lateral extent of ground water contamination.

Current Policy and Future Regulation

The Department's recent experience indicates some dairies are not being operated to comply with applicable rules. The original design of some dairies was inadequate to protect surface and ground water quality, while others have waste management systems that may have been adequate originally but have not been properly operated or maintained or have exceeded their design capacities because of increased herd sizes. This situation may have resulted because dairy operators are not aware of applicable rules. Dairies and other feedlot operations

are now coming under closer scrutiny, and an effort is being made to educate dairy operators on what is necessary to protect the water resources of the state.

The Department's current policy for existing dairies requires permits for dairies with documented violations of surface or ground water quality standards, dairies with more than 700 cows that do not comply with the "no discharge" requirement, and dairies that discharge to sinkholes or otherwise represent a threat to ground water. New dairies must provide assurances they will comply with applicable rules. A waste management system designed and constructed to Soil Conservation Service criteria is generally considered adequate for this purpose. All new dairies in the Suwannee River Basin are required to obtain permits because of the demonstrated potential for ground water contamination from dairies in that area of the state. Any dairy in the state may apply for a permit if it so desires.

Existing dairies are encouraged to implement the following management practices to prevent pollution of surface and ground waters:

1. line waste lagoons and other impoundments if needed to prevent leakage;
2. irrigate wastewater and apply manure solids at rates that do not exceed crop nutrient requirements;
3. minimize or eliminate runoff and seepage from "high intensity areas;"
4. locate waste disposal areas (lagoons, spray irrigation fields, manure storage and disposal areas) away from surface waters sinkholes, drinking water wells and property boundaries; and,
5. install and sample monitoring wells, and have existing production and drinking water wells tested for nitrate.

The Department is currently evaluating the need for additional regulation of dairies throughout the state. When this process is complete, new rules may be developed and all dairies may be required to obtain industrial wastewater permits.