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**DAIRY WATER CYCLE AND SOURCES OF NITROGEN IN DAIRIES**

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**ABSTRACT:** Dairy Water Cycle and Sources of Nitrogen in Dairies Jay Lazarus, Glorieta Geoscience, Inc. PO Box 5727 Santa Fe, NM 87502 Dairies in New Mexico use water for cow drinking, cow cooling, milk cooling, milking parlor clean-up and irrigation. The dairy water cycle starts with ground water used for cow drinking water and milking parlor clean-up from onsite wells. Water is pumped from wells for cooling milk and recycled for milking parlor clean-up. The milking parlor clean-up produces a liquid manure or greenwater in the milking parlors that flows to storage lagoons. Greenwater is recycled for crop irrigation and blended with irrigation water. Dairies divert groundwater using permitted, declared or vested water rights. The primary source of dairy irrigation water is groundwater although some dairies in the Rio Grande Valley use surface water for irrigation. Identification of all sources of nitrogen on dairies is required for compliance with a dairy's State of New Mexico groundwater discharge permit. Dairies that reuse greenwater for irrigation are required to balance the amount of nitrogen land-applied to crops with the nitrogen uptake of the crops. Nitrogen sources at dairies include nitrogen in groundwater used for cow drinking and cooling water, irrigation water, ammonia-nitrogen in cow urine, manure solids, dairy greenwater and chemical fertilizers. Applying excess nitrogen to land application fields from greenwater, manure solids and/or chemical fertilizers provides a source of nitrogen that can leach and has leached downward below the root zone and vadose zone into groundwater. Many dairies were designed and constructed with unlined greenwater and storm water runoff lagoons. The constant head in greenwater lagoons provided a pressure head that resulted in nitrate and or TKN being detected in monitoring wells located downgradient from these unlined lagoons. Most dairies now use center pivot irrigation systems that reduce pressure head on the fields, some dairies use flood irrigation which is more labor-intensive to manage and the flood irrigation creates a head for downward leaching of nitrogen compounds into the aquifer. Lining greenwater and storm water lagoons and using best management practices for irrigation reduce the potential for nitrogen contributions to the aquifer.

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