



*2009 CSREES National Water Conference; St. Louis, MO*

**Relationship of tillage and dairy manure application to shallow ground water nitrate**

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Abstract:

A study was initiated in 2004 to evaluate the relationship between dairy manure application and shallow ground water nitrate concentrations. Specific data collected were; manure and fertilizer nitrogen application, crop nitrogen uptake, and nitrate concentrations in soil and shallow groundwater. In the spring of 2004 an 8.9 hectare grass field was tilled and replanted to grass for silage production. Six shallow monitoring wells were placed at ~ depths of 3.6 to 4 meters. Groundwater samples were collected monthly during the fall and winter and every six weeks during the spring and summer. Groundwater samples included pH, conductivity, dissolved oxygen, ammonia-N, nitrate+nitrite-N, total N, dissolved organic carbon, chloride, total dissolved solids, and total phosphorus. Soil nitrate, moisture, and temperature samples were collected weekly from August to November and monthly during the rest of the year. Crop nitrogen samples were collected ~ five times per year, each time the grass crop was harvested. Grass samples were analyzed for dry matter, crude protein, and nitrate. The quantity and quality of manure was estimated at each application. Manure samples were analyzed for ammonia-N and total N. Irrigation water was sampled and analyzed for ammonia-N, nitrate+nitrite-N, and total N (ammonia and total N were only done in 2007 and 2008). Data indicated an initial increase in soil nitrate and shallow ground water nitrate associated with soil tillage. The 1-ft soil nitrate concentrations ranged from ~ 5 to 60 ppm annually. Grass nitrogen yields ranged from ~ 159 to 209 kg per acre per growing season. Shallow ground water nitrate increased in the first 5 months (Feb 05) to ~ 30 mg/liter and decreased steadily to less than 10 mg/liter beginning in March 07. Taking into account the soil organic nitrogen contribution when determining manure application affects nitrate concentrations in shallow groundwater.

Impact Statement:

Results of this study suggest that complete soil tillage likely plays a major role in elevation of soil and shallow ground water nirates the the 24 months following tillage and reseeding of grass fields.

Category: Agricultural BMPs

Type of Presentation: Oral Presentation