

Winter Manure Application *Nitrogen Usage*

Objective: Evaluate the utilization of nitrogen in native pasture when dairy slurry was applied during winter months.

Methods: Plots were assigned in duplicate to one of three treatments. The 1x treatment was the typical application rate for the dairy operation.

Manure was applied in winter (January) and in spring after the first cutting of grass (May/June).

Soil and/or grass clippings were taken once every 4 weeks.

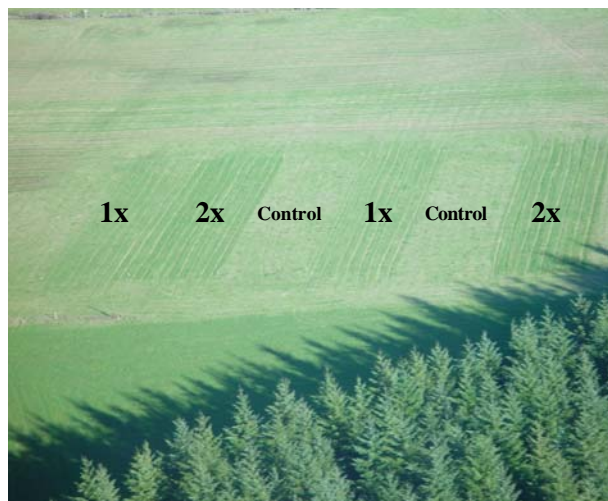


Figure 1. Aerial view of the plots.

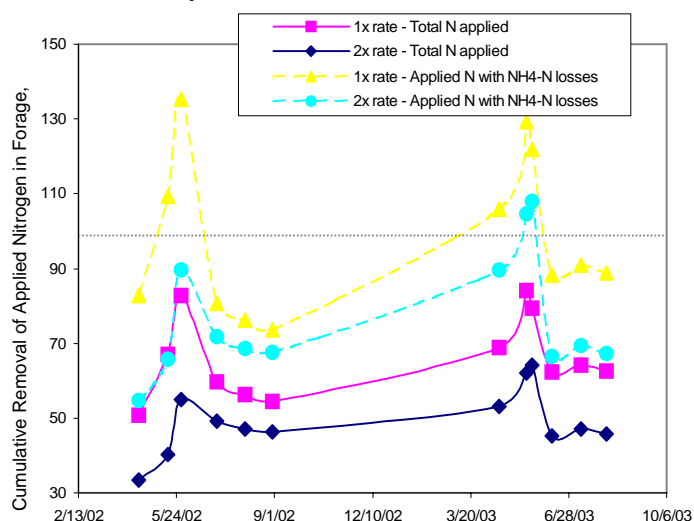


Figure 2. Forage removal of N as a percentage of N applied to plots.

Results

Grass Yields

- Dry matter yields were greatest for the 2x treatments and 1x plots had greater yields than control plots.
- Forage crude protein concentrations were greater for plots receiving more manure.
- Nitrogen removal from forage was the greatest for the 2x plots.

Soil Nitrogen

- Soil $\text{NO}_3\text{-N}$ concentrations (1-ft depth) for the 1x and 2x treatments were not different from the control.
- Soil $\text{NH}_4\text{-N}$ concentrations (1-ft depth) were not different between treatments.
- The 2-ft soil samples taken in spring did not show any differences in $\text{NO}_3\text{-N}$ or $\text{NH}_4\text{-N}$ between plots.

Winter Manure Application *Transport of Fecal Bacteria to Surface Water*

Objective: Evaluate the risk of fecal coliform and *Escherichia coli* transport to surface water after winter manure application.

Methods: Dairy slurry was applied to native pasture in December and in January.

Fecal coliform and *E. coli* levels were monitored in soils and in water samples taken from the grassed waterway that drained the property during winter months.

December and January applications of dairy slurry were applied at rates of 0.16 or 0.18 acre-in. The December application area was 4 to 5 times greater and the January application area was 2 to 3 times greater than the normal application area used on the dairy operation.



Figure 1. Slurry application.



Figure 2. Water sampling.

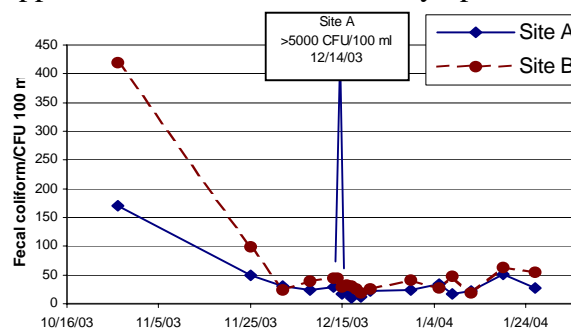


Figure 3. Water fecal coliform levels during the December sampling period.

Results

Water

- Rainfall events of 1.1 inches occurred in the first 48 hours after manure application after both the December and January applications of dairy slurry.
- The large rainfall events led to direct runoff of dairy slurry into the water sampling sites closest to the slurry application areas (sites A and E).
- Concentrations of fecal coliform and *E. coli* were NOT increased at the sampling sites located downstream in the grassed waterway (site B in December and site A in January).

Soil

- Fecal coliform concentrations declined within the first week of application.
- Concentrations of fecal coliform and *E. coli* in the soils returned to background levels in less than 52 days after the slurry applications.

Winter Manure Application *Transport of Nitrogen and Phosphorus to Surface Water*

Objective: Evaluate the risk of nitrogen, phosphorus, and potassium transport to surface water after winter manure application.

Methods: Dairy slurry was applied to native pasture in December and in January.

Concentrations of total N, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, total P, inorganic P, and K were monitored in water samples taken from the grassed waterway that drained the property during winter months.

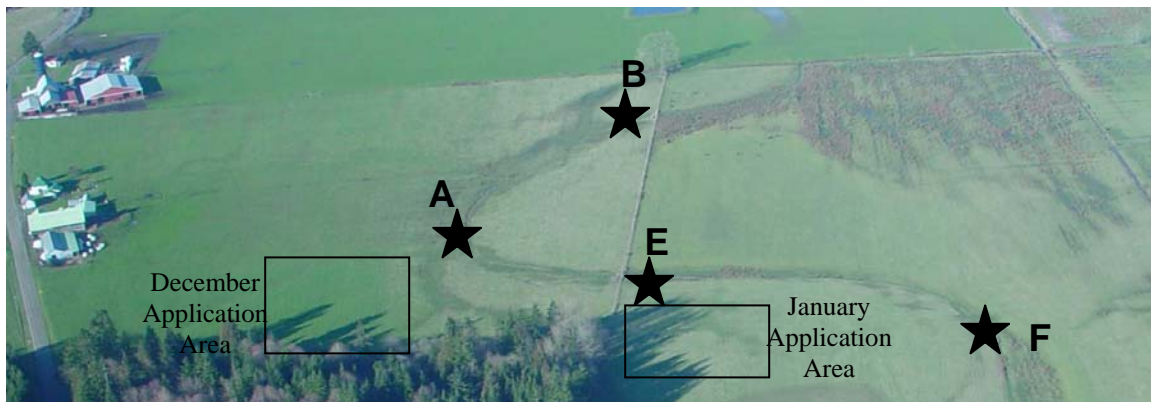


Figure 1. Aerial view of the slurry application areas and the water sampling sites in the grassed waterway. Sites A and B were sampled after the December application and sites F, E, and A were sampled after the January application.

Results

- Direct flow of dairy slurry into the grassed waterway caused an increase in total P levels in the surface water at the sites closest to the slurry application. Total P concentrations were not increased at the downstream sampling sites (site B in December and site A in January).
- Inorganic P concentrations were increased at the sites closest to the slurry application areas (sites A and E) when large rainfall events led to direct runoff of dairy slurry.
- The concentration of $\text{NH}_4\text{-N}$ in the surface water was increased at the sites closest to the slurry application areas (sites A and E) when there was direct flow of dairy slurry into the grassed waterway.
- Nitrate-N concentrations were increased at the upstream site (site F), indicating that the $\text{NO}_3\text{-N}$ concentrations were not directly linked to the slurry application.