Winter Manure Applications: Sound Practice or Risky Business?

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Some Facts about Wisconsin Manure Application*

- 2/3 of Wisconsin Farms have adequate cropland for manure applications
- Many farms use less than half of available acres for manure application
- 10-25% of manure applications occur in winter
- 75-95% of winter applications are outside the “SWQMA”

* From “On-Farmers Ground” Project (54 farms typical of Wisconsin Dairy Industry)
Some Facts about Winter Runoff

- On average, 1/3 of runoff occurs as snowmelt
- Winter runoff is characteristically low in sediment
- Nutrients are primarily in dissolved forms
- Little or no infiltration occurs
- Winter manure applications are on public “radar screen”
A half-million gallons of liquid manure washed off a farm and two streams into Lake Mendota in February, the Wisconsin Department of Natural Resources said Wednesday.

The manure, which contained bacteria that can cause serious illness in humans, contaminated the water in the West Branch of the Sugar River. An estimated six miles of the stream was affected by liquid manure from fields off Wisconsin 78 and Blue Valley Road in the town of Horeb.

More than 100 brown trout of all sizes and ages were recovered 50 miles from the area, natural resources officials said. However, more are expected to be recovered, said DNR spokesman Jeff Kinnard.

A similar event occurred in Lafayette and Iowa counties in 2004, and the area was ranked as one of the most polluted in the state.

Manure can be a natural fertilizer, Kinnard said, but it must be applied under the right conditions, especially when it is likely to stay on the soil when rain or runoff is highest.

Unfortunately, winter manure run-off can also cause serious problems for farmers.

We can see the results of this same run-off on the water in the Trempealeau River, said Patricia Reichling, when contacted on Friday. "It was very unfortunate."

Farming lobbies have argued that most farmers are very careful when spreading manure on the land.
Manure-Related Fishkills, Well Contaminations and Runoff Events

March 1, 2004 - June 1, 2005
Distribution of 52 runoff events

Number of Reported Manure Runoff Events Per Month (July 1, 2004 to June 30, 2005)

- July: 2
- Aug: 0
- Sept: 0
- Oct: 4
- Nov: 4
- Dec: 0
- Jan: 2
- Feb: 12
- Mar: 20
- Apr: 5
- May: 3
- June: 0

Data compiled by Wisconsin DNR, 2005
Causes of Manure Runoff Events

- Storage Overtopping: 10%
- Equipment Failure: 8%
- Feedlot Runoff: 4%
- Mismanagement: 4%
- Land Spreading: 74%

WIDNR, 2005
Soil Conditions During Landspreading

- Saturated: 2%
- Rain: 6%
- Normal: 2%
- Unspecified: 6%
- Frozen or Snow-Covered: 84%
Liquid vs. Solid Application Resulting in Manure Runoff

Unspecified
- 15%
Solid
- 25%
Liquid
- 60%

WIDNR, 2005
Impacts of Manure Runoff Events

- Well contamination: 20%
- Runoff (discharge prevented): 20%
- Fishkill: 17%
- Discharge to waterbody*: 43%

* Some events had multiple impacts
Acute losses

- Runoff that occurs soon after a surface manure or fertilizer application
- In data compiled from UW, Discovery Farms, and Pioneer Farm, acute P losses ranged from 0.5 to 3.4 lb/acre.
- Of eight events considered acute, seven were winter snowmelt events.
- Winter manure applications pose a threat for acute (single-event) runoff losses
Summary of Winter Manure – Related Research*

- Nutrients lost from runoff following winter applications are usually greater than from manure spread in other seasons.
- Risk of manure runoff appears similar, whether manure is spread on frozen bare ground or snow-covered ground.
- Spreading manure onto a cover crop does not necessarily reduce the risk of runoff.

*Fleming and Fraser (2000), Impacts of Winter Spreading of Manure on Water Quality – Literature Review, University of Guelph.
Direct Effects of Manure on Snowmelt

- Research indicates solid manure applications can retard snowmelt under specific circumstances
  - Can act as an insulator
- Liquid manure applications generally increase rate of snowmelt
- Effects observed in the field can be variable
- Timing of application is critical
**Watershed 2 – East aspect, 18 acres**

**Watershed 3 – East aspect, 14 acres**
Timing and Manure Application Effect on Runoff Losses (2 yr average)

- **FI** = fall injected
- **EW** = early winter
- **LW** = late winter
- **SB** = spring broadcast

http://www.extension.iastate.edu/Pages/communications/EPC/F99/winter.html
Comparing Winter Runoff at Pioneer Farm

Solid manure applied winter 2002-2003

Solid manure applied winter 2004-2005

Pioneer Farm Runoff Monitoring

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Manure spill settlement likely in Kewaunee County

Associated Press
September 23, 2005

A Kewaunee County dairy farm reached a proposed settlement in state and federal lawsuits over the spread of liquid manure that a rural Luxemburg family says polluted their well and sickened them.

The settlement, which still needs court approval, would require Glen Stahl to make environmental improvements at his farm and pay a fine to the state. Stahl’s insurance company would pay the Treml family $80,000.

According to the federal lawsuit, Stahl runs a 900-cow farm near the Tremls and spreads liquid manure on an 80-acre field across the road from the Tremls.

Members of the Treml family, including three young children, became sick last year from exposure to contaminated drinking water caused by the manure pollution, the lawsuit claimed. The family had water trucked to their home for a time because of the problem.
2003 Winter Runoff - 3 events

Winter Manure applied
2004-2005 Winter Runoff – Pioneer Farm

- Only solid manure applied to Watershed #2 in late January-Early February.
- Site malfunction caused incomplete sampling of 1st snowmelt event following manure application.
- Data and photo observations indicate runoff occurred more rapidly in Watershed #2 compared to Watershed #3.
Winter Runoff from Sites 2 and 3  
2 events, February 2005
Why don’t we know more about watershed-scale snowmelt runoff?

- Watershed – scale monitoring of snowmelt runoff is laborious and time-consuming
- Rainfall-runoff monitoring equipment is often unsuitable
Planned 2005-2006 Manure Applications

- Dairy Slurry @ 22,000 gal/acre fall-injected
- Fall-incorporated solid manure
- Winter Surface applied solid and liquid manure

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Winter Manure and the 590

“When frozen and snow-covered ground prevent effective application and the nutrient application is allowed...”

- Do not apply within the SWQMA (within 300’ of streams, within 1000’ of lakes and ponds)
- Do not exceed P removal of following season's crop
Winter Manure and NR 243

- No liquid manure applications on frozen or snow-covered ground
- Solid manure spreading prohibited in February and March unless incorporated
- CAFOs are required to have 6 months of manure storage
Points to remember

- Commercial fertilizer applicators don’t apply in winter
- Following a NMP or CNMP does not relieve liability
- “Weather” is the single greatest factor affecting losses
- Winter manure management is a type of risk management