

Winter Manure Application

Based on potential nutrient losses and water quality degradation, winter manure application is not recommended. However, if you do need to make winter manure applications because of limited storage or an early fall freeze, there are several things to consider to minimize nutrient losses and water quality degradation.

The usual recommendations for winter manure applications include: applying to level ground; applying where soil erosion is controlled; and applying where run-off control practices exist. The Iowa Administrative Code recommends limiting manure application on frozen or snow covered ground to those areas with slopes of 4 percent or less or where adequate soil erosion control practices exist.

Research

Based on research from around the Midwest, manure application timing and weather conditions following application also have a major influence on potential nutrient losses. A literature review by Fleming and Frazier, *Impacts of Winter Spreading of Manure on Water Quality*, looked at 11 research reports and found quite variable losses of nutrients from winter time spreading of



manure. Most of the variability was dependent on how soon and how much runoff occurred after manure application. If the first rainfall or snow melt was small and soaked into the soil, nutrient losses were minimal. However, if the first snowmelt or precipitation event produces significant runoff, nutrient losses and surface water pollution can be substantial. In general, the more time that elapses between manure application and runoff, the less the risk of environmental degradation (this is true anytime, not just in the winter).

Research at Iowa State University showed that the risk of manure losses with

surface runoff can be reduced significantly by adjusting the timing of the manure application.

A study by Jeff Lorimor in 1994 and 1995 compared four different manure application timings: 1) fall broadcast manure, 2) manure applied early in the winter on frozen ground, 3) manure applied late in the winter on top of the snow, and 4) spring broadcast manure.



The study showed that the greatest risk of surface runoff losses occurred when manure was applied on top of snow late in the winter. Nearly all of the losses in the 2 years occurred during one snowmelt and runoff event in February of 1994 just a few days after the late winter manure application and prior to the spring application. Losses were higher from standing corn stubble than from soybean stubble (Table 1). At first this may

Contributors

- Natural Resource Conservation Service
- Agribusiness Assoc. of Iowa
- Iowa Farm Bureau Federation
- Iowa Poultry Association
- Iowa Turkey Federation
- Iowa Pork Industry Center
- Iowa Beef Center
- Iowa Pork Producers Assoc.
- Iowa Department of Natural Resources
- Iowa Cattlemen's Assoc.
- Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship
- Iowa State Dairy Association
- Iowa Commercial Nutrient Applicators Assoc.
- Coalition to Support Iowa's Farmers
- Iowa Corn Growers Assoc.
- Iowa Soybean Association
- Iowa State University, University Extension
- Iowa State University, College of Agriculture

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seem backwards from what one would expect with the cornstalk residue providing better soil erosion control. However, the corn stubble held deeper snow cover than the soybean stubble, so there was more water runoff from the snow melt that occurred from the corn stubble ground.

Table 1. Nitrogen lost in surface runoff from corn and soybean stubble plots. Summary of 2-year averages in pounds per acre and percentage of the amount applied.

	Fall		Early winter		Late winter		Spring	
	lb/acre	%	lb/acre	%	lb/acre	%	lb/acre	%
Corn stubble	11.8	12.4	17.1	8.2	41.0	22.1	3.9	1.2
Soybean stubble	1.4	1.5	2.8	1.4	19.2	10.3	2.2	0.6

Best Management Practices

Anytime manure is applied on frozen ground there is an increased risk of environmental degradation. If manure application must take place in the winter time, the following are some guidelines to minimize runoff and subsequent loss of nutrients.

- o Apply manure to level ground.
- o If applying on manure on a terraced field or sloping field, avoid application to areas that drain to tile intakes that directly discharge to surface or ground water.
- o Do not apply manure in grassed waterways.
- o Apply the manure early in the winter prior to significant snowfall.
- o Stay away from tile intakes, creeks, streams and other surface water. (Iowa law prohibits manure application within 200 feet of surface water or within 800 feet of a high quality water resource unless the manure is incorporated on the same day or an area of permanent vegetation cover exists for 50 feet surrounding the water resource.) See DNR 113 for additional information.

- o Do not apply manure on top of deeper snow cover, especially later in the winter.
- o Applying manure on soybean stubble where less snow is captured is preferable to applying to standing cornstalks.
- o If applying manure in late winter, wait until the snow has melted before applying manure.
- o During any application season, watch the forecast for predicted rainfall, snow or warming conditions that could cause snow melt or runoff.

When winter manure applications are not avoidable, please take weather conditions, soil conditions and application timing into consideration.

Resources

Flemming, P. and H. Fraser. 2000. *Impacts of Winter Spreading of Manure on Water Quality* - Literature Review. Ridgetown College. University of Guelph, Ridgetown, Ontario, Canada. The report is available on the web at: http://www.ridgetownc.on.ca/research/documents/fleming_manure.pdf.

Lorimor, J. 1995. Fate of Nutrients from Liquid Swine Manure Land-Applied in the Winter. Ph.D. dissertation. Iowa State University, Ames, IA.

DNR 113 Separation Distances for Land Application of Manure from Open Feedlots & Confinement Feeding Operation, including SAFOs. <http://www.iowadnr.com/afo/files/sepdstb4.pdf>



Written by: Greg Brenneman, ISU Extension Field Specialist- Ag Engineering

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