

THE MANAGER

ENVIRONMENTAL HOT TOPICS

By Karl Czymmek & Harold van Es

There are manure spreading practices you can use to apply manure in winter, where allowed, and limit the risk of runoff

Winter spreading, a manure management option

This past spring was challenging for any farmer trying to plant crops. It was all the more difficult for those who also needed to spread manure before they could put a seed in the ground.

For a number of reasons, many manure storages on Northeast and Midwest dairies were fuller than normal coming into a wet spring. High snowfall rates and an exceptionally wet spring not only made winter and early spring manure applications difficult, but they added significant water to uncovered storage structures. Then there are those dairies legally prohibited from winter application or that reduced normal winter applications to protect the environment.

For dairies where manure storage capacity was inadequate this year, a few extra days of manure application during the winter months could have

prevented overtopped manure storage, costly field compaction or both. Where could we find extra days to land apply manure while also managing to reduce the risk of losses to the environment?

Careful frost injection/incorporation or surface application on heavy crop residue during winter may be one answer. A caveat: Manure, particularly liquid manure, is prone to runoff anytime that rainfall or runoff occurs shortly after surface application. This is true regardless of whether soil is frozen or thawed, covered or bare, conventional tilled or no-tilled, north or south, winter or summer.

Let's look at some concepts that can help make manure applications less prone to movement from the field.

1. All other things being equal, mixing manure with soil through incorporation or placing it below the soil surface reduces losses during runoff events.

2. Cover crops, crop residue from corn grain or hay stubble can provide surface area for manure to stick to and slow water runoff.

3. Losses can be reduced by providing as much time as possible for manure to interact with soil and crop residue before rainfall or runoff occurs. Manure reacts something like oatmeal: Leave oatmeal residue on a bowl all day, and it will dry out and be effectively glued to the surface.



Careful frost injection/incorporation or surface application of manure on heavy crop residue during winter may be an answer to avoiding overtopped manure storages in wet years and to meeting the challenges of coordinating crop work and manure spreading in the spring. *Photo by Eleanor Jacobs.*

FYI

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■ For more information about frost injection/incorporation on a dairy farm, see http://css.cals.cornell.edu/cals/css/extension/cropping-up-archive/wcu_vol11no2_2001a3manureinjection.pdf

Whether surface applied, injected or incorporated, the longer manure has to interact with the surrounding environment, the more stable it becomes and the less likely some of it will move off-site.



Practices that work

There are two winter application practices that, where legal and when carefully implemented, should reduce major runoff risk.

The right conditions for these practices generally develop on short notice; to take full advantage, equipment and crews must be ready to go at the drop of a hat.

The practices are:

1. Frost injection/incorporation.
2. Surface application on hay or other significant crop residue.

The conditions for both practices occur when unfrozen soil with no or little snow cover goes into a freezing cycle with very cold night temperatures and daytime temperatures at or below the freezing point. The developing 1- to 3-inch frost layer draws moisture from the soil below, making it safe to inject or apply while supporting heavy equipment, especially tankers laden with manure.

Exercise caution when surface applying manure to crop residue in the winter without incorporation or injection. Since weather is often unsettled during late winter into early spring, manure application is more likely to be followed by runoff conditions. Early to mid-winter tends to be a time of lower risk. However, application on hay stubble provides better runoff protection than corn silage stubble, and heavy crop residue is always safer in this regard.

Check local laws to make sure these practices are legal in your state. Also, as states review the NRCS 590 nutrient management standard, producers and environmental planners may want to provide input about allowing these practices. For example, frost injection is not “spreading on frozen, snow covered or saturated soil.”

To keep this issue in perspective, it’s important to understand that nutrient – and soil – losses occur anytime there is runoff from any field, regardless of manure being applied or not. We’re talking about managing losses, not eliminating them. ■

Frost injection how-to

Frost injection or incorporation takes advantage of certain winter conditions that dry out the soil and provide excellent support of heavy equipment traffic. Above freezing temperatures and bare soil followed by freezing night-time temperatures create a shallow 1- to 3-inch layer of frost at the soil surface. When that happens, conditions are perfect for frost injection or incorporation of manure.

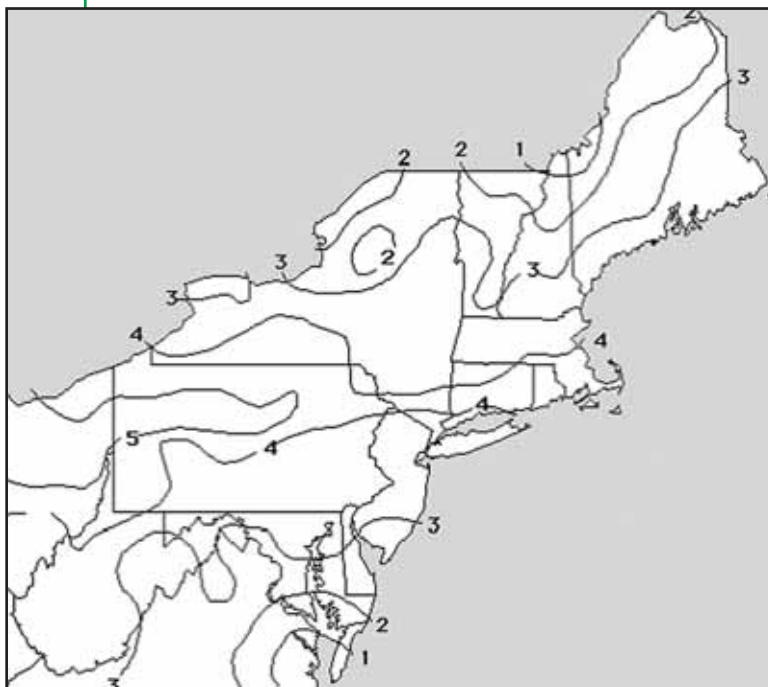
What are the advantages?

- Manure can be placed below the soil surface, protecting it from runoff.
- Heavy equipment won’t easily compact soils.
- Dairies have extra application days.
- Below surface placement limits ammonia volatilization losses.
- Cold soil helps to stabilize the ammonium-nitrogen such that in northern areas much of it is expected to be plant available when the corn crop is ready to use it.

The map shows the predicted average number of days available for frost injection or incorporation in the Northeast. Field observation suggests that many areas experience one to two additional days over those shown. Portions of the upper Midwest are expected to have similar conditions, though a map isn’t currently available.

Frost injection or incorporation requires approximately 20% more power than placement into non-frozen ground. It can also increase equipment breakdowns as field conditions may vary, such as thicker frost in some locations.

Before you begin, test field conditions to ensure injectors can penetrate the soil. To determine if the soil beneath the frost layer is in appropriate condition for tillage, do the “ball test.” Make a ball of soil and press with thumb. If it crumbles readily, soil is suitable to till. – *By Karl Czymbek and Harold van Es*



Predicted average number of days for frost injection/incorporation in the Northeast