

# MEASURE AND MANAGE

## FAQ this Spring on Nitrogen

By Dale Cowan  
[dcowan@agtest.com](mailto:dcowan@agtest.com)  
Agri-Food Laboratories CCA. On

---

**Question:** How has the wet fall of 2006 affected soil nitrogen and mineralization of nitrogen?

*Answer:* The wet fall may have caused nitrate N to move a little lower in the soil profile or under heavy clay and prolonged saturated conditions caused denitrification. The wet fall has no bearing on spring mineralization because that depends on soil temperature and mineralizable nitrogen pool, under cool or frozen conditions the rate is very, very low.

**Question:** How much nitrate nitrogen is lost?

*Answer:* No one knows, it depends on what was there to start with and in what form; organic, ammonium or nitrate, weather events and duration of those events

**Question:** How much manure nitrogen has been lost from fall applications?

*Answer:* Define fall application early September? Late November? Manure has 2 main forms of Nitrogen. Organic and ammonia (inorganic). Neither one of these is easily lost if manure is incorporated under cold conditions. If not incorporated then a portion of the ammonia can volatilize into the air and be lost. The organic form undergoes mineralization and breakdown into ammonia then nitrate N. The amount of N released depends on the length of exposure to warm soil conditions.

**Question:** How do I determine the amount of N available from fall applied manure accurately?

*Answer:* You will never do it accurately but rather arrive at a credit by having a manure test, calibrated and confirmed application rate, and an appreciation for weather and soil conditions post application and in early spring.

**Question:** Explain that further?

*Answer:* NMan software has numerous factors that can be selected to see the impact of different incorporation rates and application timings. There are too many to

discuss here. Here are the underlying principals. Manure with high levels of ammonia will be subject to greater potential losses if applied during a warmer part of the fall as the soil temperature will support some conversion to nitrate N. If applied late under cold soil conditions. That conversion is very slow so more ammonia may be retained. This is why you need a manure test and time of application to make a judgment call on what may happen. If the manure has low ammonia and predominantly organic N then this is released at very slow rate over many months. Only 25 to 30% under ideal conditions maybe released into plant available Nitrate N in the year of application.

**Question:** How do we assess Nitrate from fall applied manure in the spring?

*Answer:* The use of the Pre-sidedress Nitrate Soil Test (PSNT) taken at 4-5 leaf corn can be used to determine the level of Nitrate and subsequent requirements for supplemental N applications

**Question:** Is there any other way to determine the N available earlier, say in March or April for preplant applications or topdressing N on wheat?

*Answer:* We can do a Potentially Mineralizable Nitrogen test (PMN). It requires a representative sample taken in early spring and submitted to the lab. We incubate the sample for one week then measure the Ammonium N. We can rank the result as low, medium or high. The results will alert you to the presence of a pool of possible available N. What is left to determine is the impact that spring weather will have on the conversion of this pool of N. As an example we can tell you there is a large pool present, what we can't determine is whether a sufficient amount will actually release in time to meet crop needs. But it will indicate a potential to do so. It is much like disease development. You can have a high pathogen load but never have the conditions develop in the host crop to cause an infection. Here with the PMN we can indicate a high source load of potential N you will have to surmise if conditions are present to allow it to release in situ and on time. Release will be dependant on soil and air temperature during the critical crop demand period.

**Question:** Manure N management in the fall for next spring seems hopeless?

*Answer:* No, not hopeless just requires more diligent consistent effort to measure and manage some pertinent information to arrive at an appropriate credit by weighing factors and being reasonable with the assumptions. You first must understand manure N components, and the impact of application timing. It is folly to throw your hands in the air and take no N credits for the succeeding crop.

**Question:** Would the use of cover crops make it easier to manage fall applied manure N?

*Answer:* It is a good practice to sequester available N. The value of the practice then becomes release of N from the cover crop to the succeeding crop. This may actually add some complexity and it will depend on the cover crop, C/N ratios and when it is destroyed. Research is on-going as to the dynamics of the N release timing. Legumes tend offer more N credits as cover crops than non legumes research has not shown consistent N credit advantage to non legumes. Oil seed radish and spring cereals usually provide an earlier release of N. Crops like Ryegrass take up large quantities of N but release it very slowly in the next cropping season. Cover crops may create more problems with residue management, delayed soil warming, delay N release, harbour pests like slugs and impede equipment or planting operations. However cover crops established to mop up fall manure applications on erodable fields has a huge environmental impact and may be a stewardship advantage for some funding programs in vulnerable watersheds.