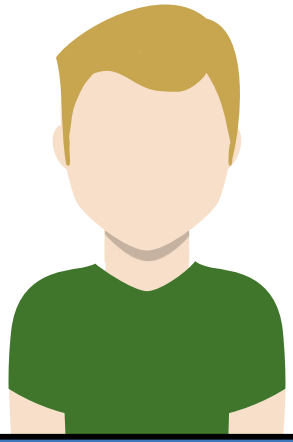
Nitrogen Loss Pathways –
A 4R Focus on Manure

Starting the Conversation…

How to start a conversation with a farmer about increasing retention of manure nutrients.



Your plan calls for a lot of fall applied manure. Have you looked at cover cropping? It could triple your ammonia N retention & capture residual nitrate from this year's crop. It will definitely help offset cover crop costs!

I noticed your neighbor injected manure this spring. Have you talked with them about the fertilizer savings they're expecting? I've heard it usually pays for duck manure, finishing hog manure and some dairy manure.

It's been a wet spring. How are you managing soil compaction? Soil compaction can be detrimental to crop growth and soil loss.

I noticed a bit more soil movement in your fields since last year. With so much of the nutrients needed for your crop stored in the top 2" of the soil, we should look for more ways to protect those nutrients.

I'm impressed with your cover crop stand this spring. Do you worry about immobilization from it? What practices will you do use to overcome any possible problems?

4R BMPs to reduce potential losses from organic nitrogen sources

	Rate	Source	Time	Place
Cover Cropping			✓	✓
Managing Compaction			✓	✓
Soil Nitrate Testing		✓		
Adaptive Management – PSNT, N Modeling	✓			
Tillage (aligned with Conservation Plan)			✓	✓
Low Disturbance Manure Injection				✓
Nitrogen Stabilizers		✓	✓	

Nitrogen Loss Pathways

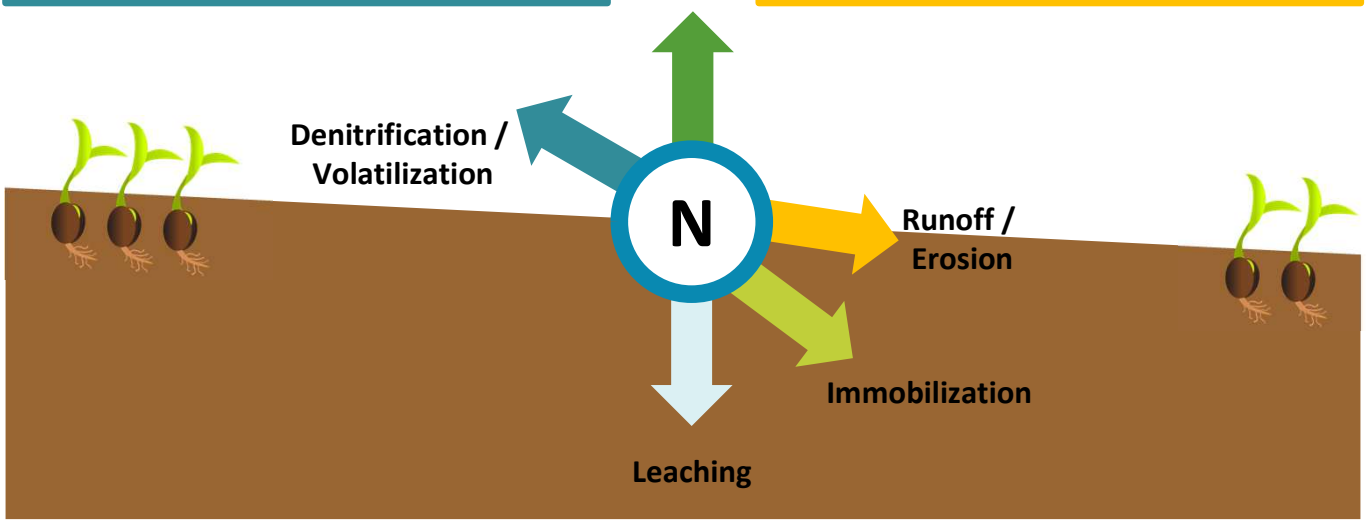
N Loss is Site Specific and impacted by:

- Rainfall timing, amount and intensity
- Soil Nitrate Levels
- Soil Water Holding Capacity
- Soil Conditions – compaction, % clay/silt/sand, current soil moisture, etc.
- Manure Characteristics
- Manure Application Management
- Residue Management
- Presence of Cover Crop & Living Roots

We worry about ***Volatilization*** *losses* when…
- Manure and Urea nitrogen fertilizers are surface applied
- Nitrogen sources are surface applied

We worry about ***Denitrification*** losses when…
- Water-filled pore space exceeds 60%

We worry about ***Erosion & Runoff*** *losses* when…
- Soils have low infiltration rates
- Surface applications of manure and fertilizer are made on unprotected soils
- Conservation plans are not implemented for appropriate rainfall intensity



We worry about ***Leaching*** *losses* when…
- Mineralization and nitrification occur outside of peak uptake periods
- Manures are applied to "bare" soils in fall or early spring
- There is not active root uptake of nutrients

We worry about ***Immobilization*** *losses* when…
- Manure with significant bedding is applied
- High Carbon:Nitrogen ratio crop residues or cover crops are present
- Nitrogen fertilizers are applied in any of the above situations

- On average, 50% of total applied nitrogen is lost through one of these pathways
- Pathway of concern will change from year to year, and within a year