North Dakota State University

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Nutrient Management News

NDSU Extension Service
North Dakota State University

INSIDE THIS ISSUE:

Special points of interest:

- Check out the Nutrient Management Website at www.ndsu.edu/nm for more information.
- Email Chris at Chris.Augustin@ndsu.edu to receive this newsletter.
- Are you in the process of planning spring manure applications? Contact Chris at 701-652-2951 if you have any questions.
- Last December a number of counterparts across the Midwest got together for a nutrient management symposium. Presentations from the conference can be seen at www.scd.nrcs.usda.gov/technical/CNMP_Conference_2010.html

Winter time Nutrient Management

Well, winter is hopefully halfway over. Now is a great time to plan ahead for the fast approaching growing season. Soil samples taken from last fall provides baseline information for crop fertility programs. If you did not soil sample last fall, you can still take them this spring. Look over past manure nutrient records to give you an idea of what nutrients you will find come spring application time. It is still important to test manure for nutrients prior to your spring application. Figure 1 shows nutrient ranges of various manures.

It is important to use these nutrient values for budgeting manure applications to "X" amount of acres at agronomic rates to meet crop yield goals. NDSU fertilizer recommendations can be found on the web at www.soilsci.ndsu.nodak.edu/franzen/franzen.html or by contacting your local County Agent.

This winter, like last winter has given most of us a lot of snow and some are worried for excessive spring flooding. Now is also the time to prevent spring flooding issues.

Clear snow and ice from drainage pipes. Salt can help with this. Remove snow from drainage areas so water will flow freely and review your operations and maintenance plan. When spring melt is underway, it is important to check drainage ways and dikes for erosion. The containment pond level must also be monitored.

I hope you find these tips useful. For more information contact Chris Augustin at 701-652-2951.

Figure 1. Average nutrient values from various manure types tested by NDSU Soil Testing Lab.

	----------lbs/ton----------		
Manure Type	**Total N**	**P_2O_5**	**K_2O**
Beef (142 Samples)	16.0	7.1	14.5
Beef Range	6.7 - 64.8	1 - 21.6	0.9 - 63.2
Composted Beef (10 Samples)	16.6	13.0	14.3
Composted Beef Range	8- 36	5 - 20.2	9 - 19.8
Sheep (3 Samples)	22.0	14.2	40.8
Turkey (92 Samples)	44.3	41.6	27.4
	--------lbs/1000gallons--------		
Manure Type	**Total N**	**P_2O_5**	**K_2O**
Swine (17 Samples)	21.9	12.5	13.2
Swine Range	10.6 - 41.1	1.2 - 85.5	5 - 23.5
Dairy (19 Samples)	19.5	6.7	12.5
Dairy Range	8 - 40	0.2 - 14.2	1.7 - 24.2
Data collected from NDSU Soil Testing Lab.			

Discovery Farms Blog

A new blog has been started to keep everyone up to date with what is happening on the discovery farms as a well as provide updates on nutrient management issues. You can access the blog at http://www.ag.ndsu.edu/roller/NDDF/ where you can register your email address to get email alerts when a new posting is made.

Dig Deep to Curb Ammonia Emmissions from Manure

Surface applying liquid dairy manure with a side slinger manure spreader.

"dairy farmers who use dairy manure to amend soils could best reduce ammonia emissions by using subsurface injection…"

KIMBERLY, Idaho -- Dairy farmers can greatly reduce ammonia emissions from their production facilities by injecting liquid manure into crop fields below the soil surface, according to research by the U.S. Department of Agriculture (USDA).

These findings, which resulted from a study conducted by soil scientist April Leytem and agricultural engineer David Bjorneberg with USDA's Agricultural Research Service (ARS), could help Idaho dairy farmers increase nitrogen capture in the soil and protect air quality from agricultural ammonia emissions. ARS is USDA's principal intramural scientific research agency.

The scientists work at the ARS Northwest Irrigation and Soils Research Laboratory in Kimberly, Idaho, and conducted their study on four dairy farms in Idaho, a state where the number of milk cows has increased 88 percent in the last decade. They applied liquid dairy manure stored in containment lagoons either by surface broadcasting, using a rolling tine aerator to incorporate manure into the top four inches of the soil surface, or injecting the manure 12 inches below the soil surface.

Over the three-day study period, the greatest concentration of emissions was recorded during the 48 hours immediately following the manure applications, with the majority of emissions occurring within 24 hours. Surface broadcasts resulted in average ammonia concentrations of 0.17 milligrams of nitrogen per cubic meter, and shallow incorporation resulted in average ammonia emission rates of 0.16 milligrams of nitrogen per cubic meter.

Fields where manure had been amended using subsurface injection had average ammonia concentrations of 0.06 milligrams of nitrogen per cubic meter-65 percent lower than emission rates resulting from soil amendments via shallow incorporation or surface broadcast.

Leytem and Bjorneberg concluded that dairy farmers who use dairy manure to amend soils could best reduce ammonia emissions by using subsurface injection, and that immediately incorporating manure deep into the soils during its application can limit losses of manure nitrogen from ammonia volatilization.

April Leytem and David Bjorneberg, Kimberly Idaho ARS Extension.org

What Is a Vegetative Treatment System?

Injecting liquid dairy manure with an umbilical cord feeding hose.

Runoff from livestock barnyards and feedlots can kill fish and cause algae blooms in lakes and streams. A Vegetative Treatment System (VTS) can be an economical alternative to retention (holding) ponds for controlling runoff from a livestock waste facility.

A Vegetative Treatment System (VTS) refers to a combination of treatment steps for managing runoff. It treats runoff by settling, infiltration, and nutrient use. Individual components of a VTS include, a settling structure, an outlet structure, a distribution system and a Vegitate Treatment Area, when put together we consider it a VTS.

Vegetative Treatment Area

A Vegetative Treatment Area (VTA) is an area of perennial vegetation, such as a grass or a forage. The VTA is used to treat runoff from a feedlot or barnyard. It treats runoff by settling, infiltration, and nutrient use. It treats runoff by settling, infiltration, and nutrient use.

A VTA is commonly confused with vegetative buffer (or filter) strips. A buffer strip is a narrow strip of vegetation (usually 30-60 feet wide), between cropland and a stream or other surface water. Runoff passes through buffers with some "filtering" of pollutants, but no attempt is made to control solids or flow.

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What Is a Vegetative Treatment System?

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A VTS, however, collects runoff from a barnyard or feedlot, separates the solids from the liquids, and uniformly distributes the liquid over the vegetated area. Little or no runoff should leave a VTS.

The first step in a VTS is to collect runoff from a open lot or barnyard area in a sediment settling structure, usually a basin. Such basins are very effective for removing most solids. The runoff then flows into a VTA whose soil treats and stores the runoff. Once the runoff is in the soil, natural processes allow plants to use the nutrients.

The general idea behind this technology is that the plants will take up the nutrients contained in the runoff and that natural factors will eliminate undesirable components such as pathogens. There are many different types of VTA's, level, infiltration basins, sloped, sprinkler, dual and multiple systems, etc.

How is a Vegetative Treatment Area Different From a Buffer Strip?
The critical aspect of the VTA is that is has been designed and sized to treat the runoff nutrients generated by the lot--letting runoff flow uncontrolled across the nearest pasture or crop field is not likely to achieve the desired treatment. The runoff needs to be released in a controlled manner. This control is what differentiates a VTA from grass filter/buffer strips. Controls also need to be put in place to eliminate any discharge from the VTA.

Designing a Vegetated Treatment Area
VTA's must be graded to achieve uniform distribution. To achieve this, the existing landscape will need to be altered (leveled, graded, terraced, etc). If the site requires a great deal of work to create a functional VTA, the costs will obviously be higher than a site that requires only minimal alteration. Essentially, the VTA replaces the holding pond for storing (and utilizing) the nutrients and the liquid volume. In a holding pond this is impounded in a pond, in the VTA, the storage is a fraction of the available water holding capacity in the root zone.

Nitrogen Removal
The percent of the nitrogen removed from the runoff is directly related to the size of the VTA in relation to the size of the feedlot or barnyard as well as the distance that the runoff flows across the VTA. Increases in size of the VTA and flow distance remove more nitrogen. Up to 80% removal can be expected, depending on the design used. Maintaining the system so that the flow is uniform across the VTA, rather than becoming channelized, is also important to the performance of the system. Regular harvesting of the vegetation from the VTA preserves its ability to remove nutrients. Grazing a VTA is not acceptable, as this does not remove nutrients from the system.

Phosphorus Removal
Phosphorus removal is directly related to solids removal. One literature review that summarized a large number of research projects, found an average of 70% phosphorus removal. Use of a solids settling basin before the runoff enters the VTA will result in a much lower amount of phosphorus that needs to be treated by the VTA. The settling basin does need to be cleaned out on a regular basis and the material land applied appropriately or utilized in another manner. If solids are not settled out prior to entering the VTA, the maintenance of the VTA itself is increased and the solids have potential to damage the vegetation.

The most common application for VTAs, in the past, have been for smaller, unregulated feedlots. Interest in their use for larger, permitted operations is growing and there is a body of evidence to suggest that a properly engineered and maintained VTS can perform as well as conventional treatments. Their use, as with any other technology is likely to be an individual decision dependent on site specific factors, interests and skills of the operator, and acceptance by regulators.

Chris Henry and Rick Koelsch, University of Nebraska Extension
Extension.org

Various grasses and forages planted below an animal feeding facility used as a vegetative treatment area.
Photo courtesy of Shafiqur Rahman

"The general idea behind this technology is that the plants will take up the nutrients contained in the runoff and that natural factors will eliminate undesirable components such as pathogens."

Various grasses and forages planted below an animal feeding facility on a gradual slope used as a vegetative treatment area.
Photo courtesy of Shafiqur Rahman

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We are on the Web!
www.ndsu.edu/nm

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Commentary from the CAFO Corral

Over the past few years Nutrient Management Plans have evolved into a useful tool for the producer for managing the manure produced on the operation. It has also become an important part of the approval of the operation and will continue to become more important in the permitting process, especially for the facilities that will be covered under the NDPDES livestock permit in the future.

As most people know the nutrient management plan is a document that is always changing with increased knowledge. One of the issues of the past has been the size of the fields included in the plan. The soil sampling protocol as recommended by the NDSU Extension Service indicates that fields should be a maximum of 160 acres to achieve the best results from soil testing. NDSU recommendations also call for a minimum of twenty composite samples for each field. In reviewing numerous plans over the years, there have been fields included in plans with 320 acres or more. Fields this size are difficult to obtain quality results from the soil tests with the common field sampling that occurs in most fields. Not having a good representative result hinders the calculation for agronomic reuse of the nutrients generated enabling the crop producer to get the most from the resource.

We have also seen issues with numerous small fields in a plan, making it confusing for the producer and others that need to use the plan. One of the suggestions has been to combine numerous small fields and submit them as one field in the nutrient management plan. The best approach to the nutrient planning is to select the fields that will be spread on a yearly basis. An example of this is if your facility generates enough manure to cover 500 acres, select the fields that will add up to this amount of acreage on a three year rotational basis.

Finally, one other question that comes up is what land can be included in the nutrient management plan. It is best to use cropland acres, because the application rate can be on the higher end of nutrient usage. However, hayland and pasture land may be included in the nutrient management plan. Keep in mind that rates will be reduced on this type of land and the plan must indicate these rates.

In summary, the best results for soil sampling are from fields less than 160 acres. Also, all available acres can be used in the nutrient management plan.

Brady Espe – North Dakota Department of Health
701-328-5228

Upcoming Events

NDSU Feedlot School: Carrington Research Extension Center, January 27 and 28. Topics include, “ Feeds and animal requirements”, “Bunk reading”, “Nutrient Management”, “Facility management”, “Treatments and health programs”, and many more. For more information, contact Joel Lemer at 701-652-2581.

Morton County Manure Management Workshop: Farm Credit Services of Mandan, February 22, 1:00pm CT. Topics include, “CAFO Regulations Update”, “Nutrient Management Record Keeping”, “Manure Application Technologies”, and “Manure Spreader Calibration”. For more information, contact Rachel Fast at 701-667-1163.

Feedlot Management Workshop: Valley City Winter Show, March 1, 1:00 pm. Topics include, “What is happening with EPA rules”, “The money side”, “Value of manure”, and “Producer Panel”. For more information, contact Lori Frank at 701-845-3114.

Thanks for reading this issue of Nutrient Management News! You may distribute this in any manner you see fit. If you would like to receive future copies, email me (chris.augustin@ndsu.edu) to be added to the list.