



Manure Sampling and Spreader Calibration are Essential to Nutrient Management Plans

Manure is a good fertilizer source and needs to be tested for nutrients prior to cropland applications. Sampling and testing manure within a week of an application is very important to achieve accurate results and meet yield goals. Results are only as good as the sample taken. Sampling solid manure involves taking a dozen or so subsamples with a shovel from various locations within a pile and mixing those samples together in a plastic 5 gallon bucket. A composite sample can then be collected from the bucket, placed in a plastic container from a testing lab. It is important to remember to fill the plastic container about three-quarters

full so there is room for air and expansion. Label the bottle, place the bottle in a plastic bag, fill out all the information of the sheet from that testing laboratory, and mail the sample.

Liquid manure should be agitated for 2 to 4 hours before sampling. About 6 samples should be collected by dipping then poured into a plastic 5 gallon bucket. The samples should be mixed and transferred into a plastic sampling bottle from a manure testing lab. Like solid manure, there should be some air left in the bottle.

After collection, it is recommended to freeze the sample before shipping. If not frozen, pack the sample

in ice and ship in a cooler. This prevents the changing of chemical and biological properties. Labs also recommend sending samples early in the week to avoid weekend layovers and maintain sample integrity. There are many nutrients that can be tested, but at the very least, total nitrogen, phosphorus, and potassium should be tested.

Manure spreader calibration is another important aspect of nutrient management. With the increasing costs of fertilizer it can save producers money and prevents pollution.

Spreader calibration can be completed as easily as weighing the spreader before application, determining

Continued on page 4

Importance of Manure Incorporation

After spreading manure, it is recommended that you incorporate it as soon as possible--within 24 hours. This will reduce odor concerns and conserves the nitrogen that would otherwise be lost to the atmosphere. This will also reduce the runoff of nutri-

ents such as nitrogen and phosphorus, and organic matter in case of rainfall. Incorporation does have the disadvantage of reducing residue cover creating a potential for later soil and nutrient losses.

Whenever manure is spread on a field, the amount of nutrients being applied should be estimated and commercial (purchased) fertilizer applications reduced accordingly.

Continued on page 3

Inside this issue:

NDSU Offers tips to beat high fertilizer prices	2
Sand bedding dairy cattle	3
Containment pond marker management	4

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.
- Do you need manure applied? The Nutrient Management Website has a manure applicator directory.

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NDSU Offers Tips to Beat High Fertilizer Prices

The efficient use of fertilizer and soil testing are two methods to keep fertilizer bills as low as possible, says a North Dakota State University soil science specialist. The key is holding down costs without hurting yields, says Dave Franzen of the NDSU Extension Service.

“The data we have on wheat and corn suggest a 10 percent to 15 percent reduction is justified, if costs are between 30 and 40 cents per pound of nitrogen (N),” Franzen says. “In addition, I recommend that the nitrogen rate formula of 2.5 times yield goal on wheat and 1.2 times yield goal on corn not be based on a wish, but rather on historic data over the last several years.”

For example, agriculture economists use a five-year historic average after looking at the last seven years. The economists then throw out the high-yield year and the low-yield year.

“For dry beans, our data suggest that inoculated fields top out in yield at between 40 and 50 pounds of N, which also includes residual soil nitrate from the soil test,” Franzen says. “Fields not inoculated top out at about 100 pounds of N per acre, but the response curve is so shallow that reducing the N rate (including residual soil nitrate) to 60 to 70 pounds of N offers little risk to farmers of dryland dry beans. Dry beans grown on irrigated, sandy soils still need full rates, but split into multiple applications.”

Soil testing is an important tool for monitoring a field for potential soil problems. Soil testing reveals the nutrient supply capacity of the soil.

“Soil testing is our only reliable tool to help plan an N recommendation,” Franzen says. “All other options for developing an N rate are wild guesses at best.”

Timing is used to help in soils with leaching issues, especially in sandy soils. If a grower places the entire N on preplant and then a heavy thunderstorm hits several weeks into the season, nitrates could leave the root zone and be unavailable for the crop. Splitting N on sandier soils helps provide more season-long availability in most years. Splitting also is used to hedge against the possibility of after peak-season N cost reductions. However, with the current market conditions, later N buying may not result in lower costs.

“In most years, there is no difference in efficiency between fall and spring applications,” Franzen says. “However, in years such as last winter, when the autumn period was long and the winter was warm, there can be considerable potential for losses. Applying N in the fall is usually cheaper than a spring application, but not always. A fall application is not recommended on sandy soils.”

Because of higher prices, there may be sellers at a producer’s door touting off-brand products. Franzen advises producers to be wary of some product claims.

“Always ask to see the data,” Franzen says. “If the data consists of testimonials or company generated data, I would not buy the product. If the data includes replicated university trials with significant positive responses, then I might try a test strip, but not try it on a large number of acres the first year, unless there was a lot of good data generated over a series of years.”

Source: Dave Franzen, (701) 231-8884, david.franzen@ndsu.edu
Editor: Rich Mattern, (701) 231-6136, richard.mattern@ndsu.edu



Soil sampling with a 12inch hand probe and 4 feet Guidings probe



Sand lane at a dairy.



Sand separator at a dairy.

Sand Bedding Dairy Cattle

Released November 9, 2009

ST. PAUL, Minn. — Sand bedding is very popular with many dairy producers—until it comes to handling sand-laden manure. Sand is very comfortable for cows to lie on in well designed and managed freestalls. But sand-laden manure is difficult to handle and abrasive to concrete and manure handling equipment.

There are several options for handling sand-laden manure. Dairy producers need to consider how their sand-laden manure handling fits into the overall bedding and manure handling system, with environmental regulations, and with possible odor concerns. The system must be economical to build and operate. Minnesota dairy producers need to plan for handling manure in very cold weather.

Manure handling systems include collection from manure alleys and holding areas, transport to treatment and/or storage, manure storage and land application to recycle the manure nutrients. Sand systems may include sand-manure separation so that some sand can be reused for bedding.

A skid loader with a half-tire blade is a very common method for collecting sand-laden manure from freestall alleys. Alleys are scraped while the cows are being milked. The skid loaders can push the sand-laden manure directly

into a concrete lined storage or into a manure transfer line that goes either to storage or treatment.

Sand-laden manure can be transported from the barn using scrapers, augers, flush flumes, pumps or gravity flow. Gravity flow systems require sufficient drop (at least 10 feet of height difference) between the barn and the storage to work well.

A Michigan State University Extension publication described practices for removing stored sand-laden dairy manure for land application. One method skimmed off liquids and removed the remaining sand-laden manure with a skid or front end loader. This method required both liquid and solid manure handling equipment. Other options for handling sand-laden manure have been developed, including “weeping” walls, mechanical separators and sand lanes. Dairy producers using mechanical separators or sand lanes can reuse the separated sand for bedding.

Weeping wall is a general term for different types of manure structures with porous walls, panels or screened outlets that allow wastewater and urine to weep or seep out of the sand-laden manure. The liquids drain into a lined storage until land applied.

Dairy producers interested in recycling sand have two options, mechanical

sand separators or sand lanes. Both systems use recycled wastewater.

Mechanical separators (page 2) typically recover 80 to 95 percent of the sand. Sand-laden manure is brought to the separator, mixed with recycled wastewater and agitated. The sand separates and settles to the bottom of the separator, then is removed.

Sand lanes (page 2) are long, gently sloping shallow concrete lanes where sand-laden manure and flush wastewater spread out, and the sand settles out along the lane. A skid loader is used to remove the settled sand from the sand lane. The wet sand is piled into stacks to drain multiple times, then allowed to dry before being reused for bedding.

For a more detailed article, visit the University of Minnesota Extension dairy website at <http://www.extension.umn.edu/dairy> and look for the article titled “Sand-laden Manure Handling Options.”

<http://www.extension.umn.edu/extensionnews/2009/sand-laden-manure.html>

Source: Kevin Janni is dairy educator with University of Minnesota Extension.

Editor: Catherine Dehdashti, (612) 625-0237, ced@umn.edu

Importance of Manure Incorporation

From page 1

Manure should not be applied near wells, streams, ponds, sinkholes, or other areas where there is a potential risk of water contamination. The recommended distance will vary from state to state, but 100 feet will generally be a good starting point.

Many options exist for immediately incorporating slurry manure into the

soil during application. Similar options are now available for solid manures. Some of these equipment options also conserve residue cover. Immediate incorporation using methods to conserve residue is generally the ideal option.

Jill Heemstra, University of Nebraska
<http://www.extension.org/faq/41603>



Incorporating manure with a tandem disk on manure fertility plots.

Commentary from the CAFO Corral

When to pump the runoff pond is one of the most important decisions in operating a manure management system. Manure storage ponds are rather predictable. They fill at a steady rate and have little influence from precipitation. Runoff ponds, however, can go from almost dry to full in a single rain event, and can swing from one extreme to the other from one year to the next. A poor decision may result in a full pond, wet lots, potential overflow violations and costly emergency pumping. A good pond management plan will help minimize application costs while maximizing the value of the runoff water. What makes up a “good” pond management plan is as varied as the climate in North Dakota and as unique as each runoff containment system. However, one of the keys to any good plan is having the right tools to make appropriate management decisions. One of these tools is the pond level marker. This marker has two purposes. The first is to monitor the depth of water in the pond to see how fast it fills up. The second is to mark the Maximum Operating Level to know when the pond needs to be pumped.

One of the most common pond markers is simply a post painted with different colors every foot. A saw mark or pin is placed at the maximum operating level, which indicates how full the pond can get and still be able to contain a one-time storm event (Figure 1). This storm event ranges from 3.5 inches to 4.2 inches in 24 hours. To determine the elevation for your pond, contact the engineer who designed the system. Another way to indicate pond elevation is to mark along the side slope. This works especially well if there is a concrete pad that runs along the pond (Figure 2). To mark one foot in vertical elevation, you must move along the side slope 27 inches for 2:1 slopes, 38 inches for 3:1 slopes or 49 inches for 4:1 slopes. If you have a pond with a compacted clay liner or synthetic liner, you won’t be able to just drive a post in for a marker since this would damage the liner. In these situations, it is recommended to set the base of the marker in concrete and place the marker in the pond. (Figure 1). This may be easiest in the winter when the pond is frozen over. The marker should be of a long-lasting, durable material that can stand up to the wet conditions and ice movement during the winter.

Once your marker is installed, you should regularly record the pond elevation and any rainfall, which is also a requirement for all large concentrated animal feeding operations (CAFOs). Tracking the pond level and its response to rainfall will give you another tool for determining if the runoff pond needs to be pumped. With this information you can make better management decisions this fall to avoid having an overflow next spring.

Karl Rockeman- North Dakota Department of Health, 701-328-5225

From page 1

the spread area, and weighing the empty spreader.

$$\text{Tons/acre} = (\text{lbs of Manure}/2000\text{lbs}) \div (\text{Area Applied ft}^2/43560)$$

If a large scale is unavailable then spreading the manure on a plastic sheet of known dimensions can be effective as well. Anchor the sheet down with rock or stakes. Weigh the sheet in a plastic bucket prior to the application. Apply the manure and weigh again with the manure collected on the sheet.

$$\text{Tons/Acre} = (\text{lbs of Manure on Sheet} \times 21.8) \div \text{Plastic Sheet ft}^2$$

For added simplicity a sheet that is 21.8 ft² needs no math. The weight in pounds is equal to tons per acre (3’ x 7’4” or 4’ x 5’6” are sheet dimensions that are close to 21.8 ft²). The sheet method should be replicated 3 or more times and averaged to account for variability.

Remember, in order to maintain manure spreader calibration, be sure to record the tractor gear, engine RPM, and spreader settings as you calibrate. After a little trial and error you will be ready to apply the proper amount of nutrients and meet your crop yield goals.

For more information, contact Chris Augustin at 701-652-2951 or chris.augustin@ndsu.edu.

Chris Augustin

663 Hwy. 281 N.

P.O. Box 219

Carrington, ND 58421

Phone: 701-652-2951

Fax: 701-652-2055

Email: Chris.Augustin@ndsu.edu

Teresa Dvorak

1041 State Ave.

Dickinson, ND 58601

Phone: 701-483-2348

Fax: 701-483-2005

Email: Teresa.Dvorak@ndsu.edu

Ron Wiederholt

663 Hwy. 281 N.

P.O. Box 219

Carrington, ND 58421

Phone: 701-652-2951

Fax: 701-652-2055

Email: Ron.Wiederholt@ndsu.edu

Shafiqur Rahman

Room 106 Agricultural and
Biosystems Engineering Building

North Dakota State University

Department 7620

P.O. Box 6050

Fargo, ND 58108

Phone: 701-231-8351

Fax: 701-231-1008

Email: S.Rahman@ndsu.edu