



# Manure Sampling, Analysis & Interpretation

Accurate manure analyses are essential for proper nutrient management planning but manure analyses are only as good as the sample taken. Most manure testing laboratories request a pound or quart of sample and only a very small amount of this sample is analyzed to determine the nitrogen (N), phosphorus (P) and potassium (K) content. Yet, the results are used to determine the nutrients applied across the whole farm for the spreading season. This fact sheet is a guide for getting the most accurate N, P, and K quantities from your manure testing program.

## Sample from the spreader

Sampling from the manure spreader gives the most accurate representation of what is actually applied to the field. It also avoids the dangers of personal injury associated with sampling manure storages.

### *Solid manure*

Sample by scooping manure out of the spreader with a pitchfork, shovel or plastic container and avoid large pieces of bedding. Select 4-8 scoops from different places in the spreader, mix well, and draw a sample from this mixture. For daily spread operations sample from three different loads over course of a week or month to generate three independent samples for submission to the laboratory. Solids from piles or bedded packs are highly variable and each different section of the pile or pack should be sampled separately (3 samples per section).

### *Liquid and slurry manure*

Samples should be taken as soon as possible after loading (unless the spreader has a well-functioning agitator) (Figure 1). If a slurry storage (>6% solids) is not well-agitated prior to spreading the nutrient content can be highly variable. In these cases sample when manure is pulled from the top, middle and bottom portions of the storage (3 samples per section), or when the manure visibly changes in solids content. Keep logs that can show to

which fields manure from each section of the storage was applied. Sludge that accumulates on the bottom of storages should be tested and spread as a separate manure source.

Figure 1: Sampling from the spreader directly before application will give the most accurate estimates of manure nutrients applied to the field.



## Sample annually or every major event

If there are no previous sample records, samples should be taken at least twice during the first year and then every spreading event. New York Concentrate Animal Feeding Operation (CAFO) regulations require sampling at least once per year and spreading event.

## Submit three samples

Outliers happen in manure analyses. To make sure management plans are not being based on outlier analyses, it is recommended to take at least three samples and have them analyzed separately. The three manure analyses should be compared to identify outliers and if present, outliers should be discarded when determining average manure nutrient content.

## Freeze the samples

Fill the plastic sample container provided by the laboratory 2/3<sup>rd</sup>s full (Figure 2). Keep the samples cool until they can be put in a freezer to slow down microbial activity. After the three samples are frozen, send them to the laboratory. It is best to mail samples early in the week to avoid thawing in the post office.



Figure 2: Fill sample container 2/3<sup>rd</sup>s full and freeze sample.

## What to analyze?

A manure sample should at a minimum be analyzed for:

- Total Kjeldahl nitrogen (TKN).
- Ammonium nitrogen.
- Total phosphorus.
- Total potassium.
- Percent solids.
- Bulk density.

## Interpreting the analysis

Manure analyses can be reported in many different ways. Useful conversion factors from test results reported "as is" are:

- Lbs/ton = % \* 20
- Lbs/ton = ppm \* 0.002
- Lbs/1000 gallons = % \* 83.4
- Lbs/1000 gallons = ppm \* 0.00834
- Lbs/1000 gallons = 0.24 lbs/ton
- Lbs/ton = 4.17 lbs/1000 gallons

Most manure test results are reported "as is" or on a wet basis. If reported on a dry basis,

- "As-is" = (dry weight / % solids) \* 100

To determine manure N credits, both the ammonium-N and the organic-N content of the manure should be known, in addition to method and timing of application. For guidance in determining N credits from manure see [Factsheet #4: Nitrogen Credits from Manure](#). To determine fertilizer equivalents of manure P and K values should be reported in P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O. To convert:

- P<sub>2</sub>O<sub>5</sub> = P x 2.27 and K<sub>2</sub>O = K x 1.2

## Using the results

### Nutrient planning and fertilizer reduction

Accurate manure analyses taken annually allow a planner to use a 3-year running average or the prior year analysis for accurate planning of current-year manure applications. If the nutrient needs of the crop are known, and the spreader is calibrated, manure N, P and K can be applied with sufficient accuracy to meet crop needs and reduce the need for fertilizers. For guidance on manure spreader calibrations see [Factsheet #18: Manure Spreader Calibration](#).

### Manure Value Estimates

Accurate manure analyses allow for calculation of the fertilizer replacement value of a manure application (Table 1). Manure value estimates can be combined with fertilizer application

costs for hauling distance break-even analyses or compared with manure handling operational and ownership costs to negotiate the terms of a manure export agreement. For more information on valuing the nutrients in manure see [Factsheet #61: Valuing Manure N, P and K Applications](#).

Table 1: Accurate manure analysis allows for calculation of the economic value of manure (an example).

	Manure nutrient (lbs/1000 gallon)	Manure value (\$/1000 gallon) <sup>†</sup>
Ammonium-N	8.45	\$ 4.23
Organic-N	2.50	\$ 1.27
P <sub>2</sub> O <sub>5</sub> equivalent	7.13	\$ 4.28
K <sub>2</sub> O equivalent	21.21	\$ 14.85
Total value		\$ 24.62
Total value	10,000 gallons/acre	\$ 246.22/acre
Total value	5000 gallon spreader	\$ 123.11/load

<sup>†</sup> Nutrients were valued at \$0.50, \$0.60 and \$0.70 per pound of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O respectively.

## Tracking Farm Management Impacts

Testing and recording annual manure analyses can increase your understanding of the nutrient content of the manure and impacts of management changes (Figure 3).

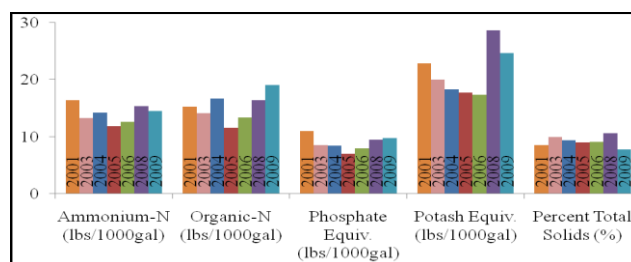


Figure 3: Accurate manure analyses allow managers to track impacts of management changes over time.

## Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University  
Cooperative Extension

Nutrient Management Spear Program  
<http://nmssp.cals.cornell.edu>

Patty Ristow, Quirine Ketterings, Dale Dewing,  
Peter Wright, Karl Czymbek

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