

Step 6. TAKE ACTION

It's time to put your nutrient management plan to work. It may not be followed exactly as planned due to unforeseen circumstances, change in conditions and so forth. But now you have a solid framework for nutrient use in your operation, and a path to meet the goals set out at the beginning of the process.

- ▶ Write down or obtain a computer printout of your plan.
- ▶ If a consultant or third party prepared the plan, have them go over the details of the plan with you and anyone else involved in the farm operation.
- ▶ Keep the plan in a location where it can be easily accessed for review.
- ▶ Prioritize the actions and prepare to acquire resources that are not yet in place (e.g., if manure is to be custom-applied, but no custom applicator has been contacted yet).

No two farms are the same, which is why no simple recommendation will fit every situation.

And remember, before you add nutrients to your cropland, that proper application includes a consideration of **all** of the following:

- ▶ crop needs
- ▶ field conditions
- ▶ weather
- ▶ season
- ▶ neighbour concerns.



Have your NMP advisor review the operational details of your plan with you.

PLANNING YOUR NUTRIENT APPLICATION



Calibrate to ensure that you're applying at the planned rate.

Ensure that application equipment matches your storage and handling system.

How many days – whether between harvest and winter, or between snowmelt and spring planting – are available for applying manure? How many days will you need, considering the number of loads you can handle in a day?

Calibrate manure application equipment.

Often overlooked, calibrating your nutrient application equipment is an essential step in supplying the recommended levels of nutrients to your crops.

Spreader calibration works in combination with soil and manure testing and nutrient management planning to ensure proper application rates of manure and commercial fertilizers.

Many farmers estimate how much manure is spread by counting the number of loads being applied to a field, based on the spreader capacity. Although a good place to start, it does not take into account uniformity of application or the different densities of the manure or whether the spreader is being filled to meet the manufacturer's specifications.



The table below presents estimated densities of the manure to convert volume of the spreader to weight of manure. A better option is to weigh several typical load(s) of manure and use this measurement for your calculations.

An accurate estimate of manure application rates requires more than simply counting the loads.

DENSITIES OF DIFFERENT TYPES OF MANURE

TYPE OF MANURE	WEIGHT PER CUBIC FOOT (LBS)	WEIGHT PER BUSHEL (LBS)
LIQUID	62.4	80
SEMI-SOLID	60	76
THICK SOLID MANURE	50	64
LIGHT SOLID MANURE	35	45
DRY POULTRY LITTER	25	30

You can use several methods to measure your spreading rates. One quick method for solid manure involves weighing the manure applied onto a sheet of plastic placed in the path of the spreader. A method for liquid manure uses a straight-walled pail to measure depth of application. The following table on Calibrating Manure Spreaders shows how to convert the measurements to application.

New methods are being introduced to quickly and accurately determine what's being applied. For liquid manure, in-line flow-meters are available that can instantly give you an application rate in gallons per hour. GPS technology is available to combine flow-meter information with application width and groundspeed information to give an instant gallons-per-acre readout.

CALIBRATING MANURE SPREADERS			
SOLID MANURE Calibrations Using a 40 x 48 in. Sheet (Opened Feedbag)		LIQUID MANURE Calibrations Using a Straight-Walled Pail	
MANURE PER SHEET (lbs)	APPLICATION RATE (tons/acre)	DEPTH OF MANURE IN PAIL (inches)	APPLICATION RATE (gallons/acre)
1	1.6	$\frac{1}{10}$	2,265
2	3.2	$\frac{1}{8}$	2,825
3	4.8	$\frac{1}{4}$	5,650
4	6.4	$\frac{1}{3}$	7,550
5	8.0	$\frac{3}{8}$	8,500
7	11.2	$\frac{1}{2}$	11,325
10	16	$\frac{5}{8}$	14,150
15	24	$\frac{3}{4}$	17,000
20	32	1	22,650

To convert:

Imperial gallons to US gallons, multiply by 1.201

Imperial gallons/acre to litres/hectare, multiply by 11.2



An alternative method for calibrating liquid manure is to weigh the manure and use the same method as the sheet. When using a round straight-walled container, the area is calculated from the inside rim diameter. The formula for area is πr^2 (3.1417 X square of radius) and assumes that a gallon of liquid manure weighs 10 lbs.

Calibrating liquid manure applicators

1. Set a series of straight-walled pails in the path of application of the spreader.
2. Measure depth of liquid in pails. Take an average.
3. See the table on page 87 to estimate application rate.



Calibrating solid manure spreaders

1. Spread several plastic sheets (40 x 48 in.) within spread pattern of spreader.
2. Drive by the plastic sheets at normal speed.
3. Collect the sheets and weigh them. Note the average.
4. Use the table on page 87 to determine the application rate in tons/acre.

For more detailed information, see the Ontario Ministry of Agriculture, Food and Rural Affairs factsheet on how to calibrate a liquid manure spreader. It shows equations to calculate travel speed based on application rate required, width of application, and time it takes to apply a load. See also the Best Management Practices book, *Manure Management*, Order no. BMP-16.

All nutrient application equipment needs to be checked regularly to assess uniformity of spread pattern and proper rates of application.

Calibrating nutrient applicators (spreaders)

1. Assess the uniformity of spread pattern from commercial fertilizer applied with:
 - **drills/planters** – rate delivered should be uniform across equipment width
 - **broadcast equipment** – typically, relative delivery rates should be higher immediately behind spreader, and drop steadily as the distance from point of spreading increases
 - ▷ where delivery rates are inconsistent, consult operator's manual for adjustment.
2. Determine effective spreading width:
 - for drills/planters, the effective spreading width is the width of the equipment
 - for equipment with spread patterns where delivery rates drop off as the distance from the point of spreading increases
 - ▷ the spreading width is determined by the distance between the point on the right and left side of the swath, where the application rate is one-half the rate through the centre section of the swath.
3. Calibrate:
 - method #1
 - ▷ fill the equipment to a given level
 - ▷ travel a distance until area covered is equal to one acre
 - ▷ determine amount of nutrients required to refill to the given level
 - method #2
 - ▷ weigh the equipment
 - ▷ spread several acres
 - ▷ reweigh the equipment
 - ▷ divide weight difference by number of acres covered.

Note: area covered is determined by multiplying the effective spreading width by the distance traveled.





If wet weather is forecast, delay application or restrict to areas with the least risk of runoff.

Pay attention to the weather forecast.

Weather plays an important role in determining the number of days available for application. Weather, combined with soil moisture and drying conditions, impact manure nutrient (especially nitrogen) availability. Weather forecasts are useful when planning manure application.

Other weather considerations could include wind direction (especially if there are residences downwind), wind speed (irrigation of <1% dry matter materials), relative humidity and of course, probability of precipitation. This information should be recorded at the time of application (see record-keeping section). Local weather forecasts, though not always reliable, are more accurate than in the past.

Thunderstorms are often forecast in spring, but frequently don't materialize. Grower experience in following weather patterns has always been important in farm task management. If thunderstorms or rain are forecast when you're planning a manure application, consider a change in approach. For example, have a second tractor begin incorporating behind the manure tanker as soon as conditions allow, instead of waiting an extra day. Or, in a no-till situation, apply manure to a field with least risk of surface runoff.

Although there are many weather sources, an online source for farm weather can be found at: www.farmzone.com/report/LongTerm (weathernetnetwork.com).



Fall spreading will reduce N-value in manure.

WINTER APPLICATION

Winter application of manure cannot always be avoided. When storage sizing is less than adequate or when conditions occur that result in the storage being full before spring application, then winter application becomes a contingency.

The challenge is to find where manure can be applied that will result in the least risk of manure entering watercourses. When applying manure in winter, consider:

- ▶ are there any alternative storages in the neighbourhood that could be utilized?
- ▶ is there any land base where manure could be incorporated immediately?
- ▶ where owned equipment is not adequate, could manure be incorporated using a custom applicator?
- ▶ if solid manure must be surface-applied (on snow), where is the field with the least runoff potential to a watercourse?
- ▶ have separation distances been doubled when manure is applied in winter conditions?

The specific requirements for winter spreading are set out in section 48 of the Nutrient Management Act Regulation.

When fields are near rural residences, avoid application approaching and during weekends and other community events.

Good neighbour policy: notifying your neighbours of your intent to apply will ease concerns.

Many farm operations emit odours. Most conflicts occur between livestock operations and neighbours. Unfortunately, such conflicts are not always handled as constructively as they might. Conflict can be prevented: it takes a little know-how, a few skills and techniques, plus the right attitude.

The key to preventing problems is **good planning, careful management and neighbourly relations.**

Site planning

By following planning principles that take neighbours' concerns into consideration, livestock odours are less likely to become a point of contention.

Principles to consider:

- meet MDS distance formula
- locate storage system and lanes downwind from rural neighbours where possible
- keep storage out of main view – plant trees to remove dust and aerosol particulates from air and increase dilution.

For more information, see the Ontario Ministry of Agriculture, Food and Rural Affairs factsheet on odour control in livestock and poultry farms.

Keep trees 30 metres (100 ft) from fan barns and 60 metres (200 ft) from naturally ventilated barns to avoid impacting ventilation systems.



The Kaisers address their neighbours' concerns with good rapport and communications. They back up what they say with comprehensive planning and BMPs for manure and other nutrients.

Neighbourly communications

Get to know your neighbours. Help them feel comfortable enough to talk to you directly about their concern. This will help prevent the need for third-party involvement. Also,

- ▶ try to limit spreading to two or possibly three times a year: the less often odour is noticed, the less likely the concern
- ▶ where possible, incorporate manure immediately after spreading
- ▶ avoid application on hot, humid days to reduce the chance that their windows are open – morning spreading is often the best time
- ▶ avoid spreading manure on weekends, or just before the weekend
- ▶ take wind direction and speed into account when spreading near neighbours
- ▶ notify neighbours (by telephone and/or through a note in their mailbox) to let them know in advance of your manure spreading plans, so they can plan around the event accordingly if they so wish (e.g., not hang their laundry outside)
- ▶ participate in and host special events in the neighbourhood (e.g., a summer barbecue).

With these considerations, many of today's livestock producers are building respect and fostering unity within the rural community.

For more ideas, see the ministry factsheet on farm and neighbour relations, Order no. 05-001.



When it comes to manure and neighbours, the good news is that BMPs for retaining manure nutrients, such as immediate incorporation and spreading on cooler days, will also reduce odours during application.

HOW TO APPLY

There are some key considerations when applying nutrients.

If a custom applicator is applying manure, review your nutrient management plan with the applicator (specifically rates, separation distances and special site features).

Where suitable, pre-till tile-drained lands before applying liquid manure – it will break up large pores and reduce infiltration to tiles. Care and consideration should be given to soil conservation. Maintain as much residue cover as possible.

Incorporate manure as soon as possible following application (ideally the same day as application).

Conduct tile drain inspections to assess manure losses. If manure becomes visible at the tile outlets, stop application immediately.



Surface-applied liquid manure should be pre-tilled or immediately incorporated to reduce nutrient loss.

PREVENTING PREFERENTIAL FLOW

For manure on tile-drained soils, choose one or more of the following options.

- ▶ Monitor tile drains and take appropriate action – stop application, block outlets (for at least 72 hrs) and remove contaminated water (e.g., with a vacuum tanker).
- ▶ Pre-till to break macropores.
- ▶ Apply at a rate of less than 3,600 gal/ac (40 m³/ha).
- ▶ Apply liquid manure/organic material over a “representative” tile and observe the tile outlet for manure.
- ▶ Treat tile effluent to remove contaminant (e.g., biofilter, dispersion sandwich).
- ▶ Note that solid manure in tiles can also become an issue when rainfall occurs shortly after application.
- ▶ **Stop application immediately** if discolouration is observed, then implement contingency plan.