

Step 8. MONITOR

Monitoring is the process of observing and recording. By using the records you've collected as a base, you can monitor your management practices for trends in your operation.

Monitoring helps you to determine if crops and livestock are receiving the proper nutrients. Paying attention to what monitoring reveals will help you adjust inputs and reduce negative environmental impact. Monitoring will also increase your confidence in the value of nutrient cycling within your operation.

Over time, you'll find a balance and can settle into a routine of closely monitoring important items while having confidence that other items are taking care of themselves. For example, monitoring soil conditions, manure and application rates for several years will give you confidence in what application rate your soils and crops will handle without negative yield impact or runoff issues.

WHAT TO MONITOR FOR

SOIL	<ul style="list-style-type: none"> Increasing or decreasing soil phosphorus and potassium levels over a 10-year period Pre side-dress nitrogen tests to indicate nitrogen available for uptake by crops Compacted soils caused by application method or timing
CROPS	<ul style="list-style-type: none"> Yields and whether they are increasing or being maintained Side-by-side comparisons are put in place and evaluated
WATER	<ul style="list-style-type: none"> Monitoring tile outlets before, during and after liquid application at 1-hr intervals 24-48 hrs after application to ensure that water is not contaminated with manure Regular water sampling of wells (testing for fecal coliform, nitrates)
MANURE	<ul style="list-style-type: none"> Manure analysis consistency each time the storage is emptied Seasonal variability of manure analysis Effect of manure/feed additives on dry matter, nitrogen and/or phosphorus content of manure
FEED	<ul style="list-style-type: none"> Feed additives and whether they are changing the nitrogen, phosphorus and/or micronutrients composition in the manure – feed ration analysis will detect changes in nutrient content of feed
LIVESTOCK	<ul style="list-style-type: none"> Livestock production numbers, weight gains, milk or meat production per cycle or changes in reproduction rates – changes in predicted numbers or changes in production will have an effect on nutrients generated Change in production due to management changes such as phase feeding
BUFFER STRIPS	<ul style="list-style-type: none"> Effectiveness of buffer strips – look for evidence of erosion and/or sedimentation or evidence of concentrated flow to show that a grassed waterway may be more effective Intense or high rainfall events result in surface runoff, contaminating water
RURAL NEIGHBOURS	<ul style="list-style-type: none"> Comments/complaints from neighbours (positive or negative) Odour comparisons – whether odours from storage and application are acceptable
CONTINGENCY PLANS	<ul style="list-style-type: none"> The response(s) of those involved in the operation to a problem Whether everyone involved in the operation knows where to find the list of contact numbers in the event of a spill
ECONOMICS	<ul style="list-style-type: none"> Economical feasibility of the management practices required for the NMP Reduction in commercial fertilizer costs Cost share and/or realize partial nutrient value of manure in manure agreements

Monitoring should take place whenever nutrients are applied to land. Most often, monitoring is simply a visual inspection just to make sure things are happening as planned.



HOW TO MONITOR

STORAGE VOLUME

Monitoring storage volume will make it much easier to determine acreage requirements. Manure production is estimated from MSTOR, but like all averages, differences in water usage and production often result in an overestimate or underestimate of manure produced.

Monitor volume as storage builds. For a sample format, see the record-keeping chapter, page 96.

Keep yearly records of volume applied by custom applicators, or removed by manure brokers.



Manure storages should be routinely inspected for cracks and structural integrity.

Manure in tile effluent will show up as discoloured water. Generally, the more discolouration, the more manure in the effluent.

APPLICATION RATE AND UNIFORMITY

It's wise to periodically monitor manure application rates and uniformity. Here are some tips.

- ▶ One way to get a good look at spread pattern is to use a plastic sheet, then take a picture.
- ▶ Generally, a 10 to 15% overlap is required with irrigation guns when used with washwaters and other materials of less than 1% dry matter. On a reel, the width of spread pattern will become narrower as the hose winds around the reel.
- ▶ To get uniform application across a field, traditional box spreaders must go wheel to wheel.
- ▶ Depending on distance of a splash plate to the nozzle, a tanker will often spread higher volumes at each edge of the spread pattern and lower volumes behind the tanker
 - ▷ this spray pattern is similar to what happens when your thumb is too close to the opening of a garden hose.
- ▶ With injection units, look to see whether the volume increases in the other injection units if one of the units is plugged
 - ▷ do you know when an injection unit is plugged?
- ▶ Your equipment dealer may be able to assist in improving uniformity, e.g., splash plate setup, or the right incorporation or injection tooth for your soil types.

For more information, see the Best Management Practices book, *Manure Management*.

MANURE APPLICATION ON TILED LAND – TILE OUTLETS

When applying liquid manure to tile-drained land, **monitor tile outlets to ensure that manure is not entering surface water through preferential flow.** Look for discolouration of tile flow, relative to pre-application condition.

Tiles should be observed on a regular basis. Here's a suggested schedule for observation:

- ▶ prior to application to determine the quality and quantity of flow (ideally there will be no flow)
- ▶ 10–20 minutes after start of application
- ▶ once each hour, if rate is greater than 20,000 gal/hr
- ▶ once each 20,000 gallons if hourly application rate is less.

As an alternative to having a person monitor, consider using automated continuous monitors.

Monitor tile outlets to ensure that manure is not entering surface water through preferential flow.



ODOUR

Monitor for:

- ▶ wind direction
- ▶ smell (how bad is the smell and how long does it last?)
- ▶ complaints (family, neighbours).

CROP RESPONSE

Side-by-side comparison is one of the best methods of testing new practices. In side-by-sides, you can measure crop response using plot comparisons of yield and economics to assess:

- ▶ requirement of starter fertilizer when soil test levels are high
- ▶ impact of timing on incorporation for nitrogen utilization
- ▶ impact of additional nitrogen over that provided by manure (testing different rates)
- ▶ impact of crop rotation and/or cover crops.

Set up and assess trials.

For side-by-sides, each plot should:

- ▶ have at least two replications in the field
- ▶ compare only one practice at a time (comparing more than one change will make it difficult to assess effectiveness of any one change)
- ▶ be in an area of the field where the site characteristics (slope, soil type, etc.) are similar
- ▶ be harvested and have yield data recorded
- ▶ be subjected to economic analyses to compare the plots.

Monitoring doesn't take much effort, but it can minimize problems and allow you to respond quickly in case of an accident.



Side-by-side comparisons are a great way to test new practices.



Field trials are a great way to verify BMPs for your operation and site conditions. Follow guidelines for on-farm trials to generate reliable and transferable information.

It is best to monitor for runoff from fields and farmsteads during or immediately after storm events.