

Maximizing Manure Nutrient Use Efficiency

Canadian Pork Council - Cedric Macleod



Karen Bolton: Saskatchewan Agriculture, Food and Rural Revitalization

In-crop application of manure reduces greenhouse gas production and maximizes manure benefits

Sitting on the combine gives producers lots of time to think about the crop management decisions that were made this year, which ones to make again and which ones will require modification. One of the decisions you may be thinking about while watching the grain flow into the feeder house, is how well did your manure work as a fertilizer replacement, and can you make it work even better? The good news is that manure IS a resource and only becomes a problem when treated otherwise; the trick is to manage it accordingly and make as many dollars as you can doing so.

Dollars, cents and greenhouse gases

Field applied manure can be a source of greenhouse gases (GHG), however, emissions can be minimized by using simple and agronomically beneficial management techniques. The most important agronomic factor for reducing GHG emissions is focusing on manure nutrient use efficiency in the field, during and following application. Economically, it makes sense to apply manure at rates that match crop requirements. Nitrogen fertilizer prices will continue to increase with the price of natural gas. Bottom line, manure nitrogen used inefficiently will require purchasing more fertilizer nitrogen, leaving fewer dollars in your pocket.

So the question becomes, how does one maximize manure use efficiency?

The major factor affecting GHG emissions from land applied manure is simply how much nitrogen is being applied. Over-application of manure can result in significant emissions and will not maximize the economic potential for nutrient use. The first step is to test the nutrient content of your manure prior to application; and take regular samples during pump out to verify what nutrients are actually going down the pipe. Nutrient balances will vary during pump out so it is important to quantify this variation to aid in management for subsequent years. Secondly, test your soil to know what nitrogen is already present. Thirdly, select an appropriate nitrogen application rate for the crop you are growing and subtract the soil test nitrogen. The final step, after you know what you have in the soil and the additional manure nitrogen needed, work to get to an accurate application rate. By applying only what the crop can use, you will spread your manure out over the farm, reduce GHG emissions and your reliance on expensive chemical fertilizers. As a follow-up, a small pop-up fertilizer application at seeding will be recommended for most crops, and manured land is no exception. Don't put crops grown on manured land at a disadvantage by forgetting basic agronomic principles.

Timing Manure Applications

The second factor affecting GHG emissions is application timing. Spring time constraints require many producers to apply manure during the fall, although spring application will generally result in more efficient manure nitrogen use. If fall application is necessary, applying manure LATE into the fall will help to minimize losses. Much like anhydrous ammonia, liquid hog manure nitrogen has to be converted from ammonium to nitrate in order to be leached; conversion will be slow in cool soils and leaching will be minimized. However, ammonium

will become ammonia gas if surface applied and not incorporated. Injecting manure will keep the nitrogen in the soil system where it belongs and not in the atmosphere. Ammonia, although NOT a greenhouse gas, can become nitrous oxide if deposited in aquatic systems, so minimizing ammonia losses will minimize incidental GHG production. If possible, manure should be applied in the spring prior to seeding, but caution must be taken to prevent soil compaction caused by heavy tanker spreaders. Drag-line systems will help to minimize soil compaction and provide some time saving benefits, making spring application a little more attractive.

In-crop manure application

In-crop manure application is practiced widely on forage land, but is seldom practiced within small grain production systems. Applying manure to coincide with crop requirements will improve nutrient use efficiency, minimize GHG emissions and provide new risk management options. Research conducted by the University of Saskatchewan and PAMI, suggest that in-crop application will cause minimal crop damage under the right conditions. The time window between seeding and harvest could, potentially, be filled with manure application. Waiting to apply manure according to crop growing conditions will further maximize the benefits of your manure nutrient resource.

At the end of the year, efficient manure management can result in more dollars in your pocket. Consider storage covers to conserve manure nitrogen, eliminate storage odors and reduce manure volume. With rising fertilizer prices, consider what manure nutrients are worth in grain production systems. Nutrient conservation is key, remember, the more nutrient you have, the less you have to buy, the more you have to use, or perhaps even sell.