Section 5
Manure Application Management

Analyze Both the Manure and Soil Prior to Manure Application

Greenhouse Gas Benefit

Nitrous oxide emissions from soils during land application of manure can be reduced by appropriate manure application rates and utilizing manure application equipment, which prevents pooling of liquid nutrients. To guarantee that the right amount of nutrients are applied to the crop, it is essential to test the nutrient content of the manure. Also, testing the soil indicates how much nitrogen and other nutrients are already present in the soil. Both of these practices allow the operator to calculate the proper amount of nutrients needed for crop growth. To obtain more information on how to properly conduct soil and manure testing, see AAFRD's Environmental Manual for Crop Producers in Alberta (Agdex 100/25-1)[31].

Apply Manure Rates that Match Crop Nutrient Requirements

Greenhouse Gas Benefit

Over application of manure can substantially increase nitrous oxide losses from soils because manure adds nitrogen and carbon to the soil, both of which promote denitrification. Applying manure at rates that supply plant demands for growth can greatly reduce nitrous oxide emissions. Also, applying manure when needed by the crop increases nitrogen use efficiency by the plant, thereby reducing nitrogen losses.

Economic work completed by the Canadian Pork Council illustrates how manure compares to a commercial nitrogen fertilizer.

Nitrogen Rate (lbs) [1]	Gallons/acre	Manure Price/acre[2]	Urea Price/acre[3]
90	3,000	$25.50	$37.82
180	6,000	$51.00	$75.64
270	9,000	$76.50	$113.46

[1] Nitrogen content of the manure: 30 lbs N/1000 gallons
[2] Application cost: $0.0085/gallon
[3] Urea cost: $425.26/tonne based on August 2003 numbers

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Timing of Manure Application to Reduce Nutrient Losses

Greenhouse Gas Benefit

The proper timing of manure application to land is essential to ensure maximum nitrogen use efficiency by the crop occurs and to minimize nitrous oxide emissions. Ideally, the best time to apply manure is in the spring, or as close to crop seeding as possible. Applying manure in the fall increases the amount of nitrogen lost from the soil over the winter and in early spring.

Another practice to consider that maximizes nutrient use and minimizes GHG emissions is to apply manure during crop growth and development. Research done by the Prairie Agricultural Machinery Institute (PAMI) indicates that post-emergent manure injection, under the right conditions, will cause minimal crop damage and increase yield[32]. In crop application of manure reduces GHG emissions by improving nutrient efficiency of the growing crop, which reduces the amounts of nitrogen lost to the atmosphere as nitrous oxide and/or as ammonia gas.

Inject Manure to Minimize Ammonia Nitrogen Loss

Greenhouse Gas Benefit

Injecting manure increases nutrient use efficiency by the crop by increasing the amount of nitrogen available. This reduces the risks associated with runoff and losses to waterways and in the atmosphere via volatilization during surface application. In terms of reducing GHG emissions, manure injection reduces manure nitrogen loss to the atmosphere through volatilization and denitrification. This contrasts with surface application of manure (broadcast) where research indicates that as much as 30 percent of manure nitrogen can be lost to the atmosphere[33].

Impact on Odour

Injecting manure beneath the soil surface can effectively reduce odours by trapping the gases and by allowing for microbial processes to change the gases into less odourous ones[34].

Credit: Reduced Tillage Linkages