



Manure Spreading: What You Need To Know

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Manure, it seems every farmer has a pile of it somewhere. It is a valuable resource that can be used both to provide nutrients to crops and to improve your soil, however for many producers it can be challenging to manage. Now, as haying wraps up, is an excellent time to start thinking about your farm's short and long term manure management strategies. Successful manure management takes planning and also requires a thorough knowledge of regulations and guidelines.

Manure application is beneficial in a number of ways. Manure itself contains most nutrients required for plant growth and is an excellent source of nitrogen, phosphorus and potassium, three of the most commonly deficient soil nutrients. Manure is also a great source of organic carbon, an energy source used by soil microbes. Soil microbes are incredibly important as they are responsible for turning organic nitrogen in the soil into inorganic nitrogen, which plants are then able to use. Increasing a soil's organic matter content, through manure application, has been shown to improve the soil's structure as well as increase the water infiltration rate and water holding capacity, all of which lead to a reduction in water run-off. Studies have also shown that manure application may decrease wind and water erosion by coating the soil surface and reducing raindrop impact on the soil. Manure application is often more affordable and more environmentally sustainable than application of commercially produced fertilizers whose manufacture relies heavily on energy from fossil fuels. (source: extension.org)

Manure is grouped into three categories based on moisture content with solid manure having less than 80% moisture, semi-solid 80-90% and liquid greater than 90%. How you apply manure is largely dictated by the moisture content; liquid manures can be injected under the soil surface eliminating the need to incorporate the manure into the soil. Solid and semi-solid manures are most often broadcast onto the soil using a manure spreader or other equipment. The category your manure falls into can also affect the nutrient density, with solid manure being more nutrient dense than liquid manure (source: *Tri-Provincial Manure Application and Use Guidelines: Alberta Version*). Manure's nutrient content can also be affected by the type of animal producing it. For example, manure with 82-90% moisture from poultry and hog barns, respectively contain an average of 5.8kg/m³ and 4.2kg/m³ of usable nitrogen, whereas manure with the same moisture content from beef operations contains only 2kg/m³ (source: *Ontario Ministry of Agriculture and Food*).

The factors mentioned above, as well as year to year variation in nutrient content, can make it difficult to accurately determine how much manure producers should apply. Field tests are available to help estimate the nitrogen content of your manure and full laboratory tests are also available. If you are unable to test your manure prior to application, tables with standard values are available online. Soil samples should also be taken to determine the nutrient needs of your soil. Recommendations for manure application rates, a manure management planner and other useful tools can be found on Alberta Agriculture and Rural Development's website in the information and decision making tools sections (source: *Tri-Provincial Manure Application and Use Guidelines: Alberta Version*). Smartphone apps such as the University of Arkansas's free "Manure Valuator App" can also be useful tools to help determine manure application rates and can even help you compare the cost of commercial fertilizer to the cost of spreading your manure.

Before considering manure application this summer, it is important to understand the rules and regulations surrounding manure management. Manure application and storage is regulated in Alberta under Alberta's Agricultural Operation Practices Act (AOPA). This act is enforced by the Natural Resources Conservation Board (NRCB), a regulatory agency operated by the Government of Alberta. In addition to

Table 3. Concentration of harvested manure characteristics summarized by feeding period for cattle fed in six Nebraska feedlots.

Manure Characteristic	Winter/Spring ^[1]		Summer/Fall ^[1]	
	Mean	CV (%)	Mean	CV (%)
pH	7.55	11	8.03	7
DM (% wb)	71.8	7	76.1	13
Ash (% db)	69.9	20	69.9	18
OM (% db)	30.1	45	30.1	42
Organic carbon (% db)	17.5	45	17.5	42
C : N ratio	13.5	9	13.2	9
Organic N (% db)	1.23	41	1.29	47
Ammonium (ppm db)	494	97	529	91
Nitrate N (ppm db)	4.0	42	20.3	137
Total N (% db)	1.28	43	1.35	47
Phosphorus (% db)	0.64	48	0.64	53
N : P ratio	2.10	18	2.18	15
Potassium (% db)	1.35	39	1.52	39
Sulfur (% db)	0.43	40	0.46	44
Calcium (% db)	1.71	36	1.89	34
Magnesium (% db)	0.59	33	0.62	29
Sodium (% db)	0.33	53	0.32	55
Zinc (ppm db)	276	39	284	58
Iron (ppm db)	10200	36	10900	37
Manganese (ppm db)	320	26	384	31
Copper (ppm db)	65	30	60	52
Soluble salts (mmho/cm)	23.37	44	20.53	35

[1] Values are for 24 and 29 manure samples collected from Winter/Spring (April – June) and Summer/Fall (July – December) cleaning periods, respectively.

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enforcing AOPA, the NRCB also regulates and issues permits for confined feeding operations (CFO's) such as feedlots and dairy barns. AOPA covers a number of topics related to manure storage and handling for both cow-calf and confined feeding operations. Some of the regulations within the act apply only to CFO's while others apply to all livestock producers, therefore it is important to know how your operation is classified before perusing any activities, such as manure application, regulated under the AOPA (source: *Manure Application and Alberta's Agricultural Operation Practices Act*).

The way manure is spread onto fields is subject to the regulations within the AOPA. Manure spread onto traditionally cultivated land must be incorporated within 48 hours of application according to AOPA legislation. Forages, direct seeded crops and frozen or snow covered land are exempt from this rule. Due to the high risk of water contamination during the spring run-off, it is not recommended to apply manure during the winter season. (source: *Manure Application and Alberta's Agricultural Operation Practices Act*). Liquid manure injected below the soil surface is considered to be incorporated. Incorporation reduces odors and decreases ammonia volatilization helping to preserve the nitrogen content of your manure. Incorporation also increases contact between manure and soil microbes allowing for increased decomposition and therefore greater nutrient availability in addition to helping prepare the seed bed for new crops (source: *Tri-Provincial Manure Application and Use Guidelines: Alberta Version*).

One of the most important sections of the AOPA discusses manure application setbacks. Setback rules were put into place to minimize the risk of water contamination and reduce nuisance impacts neighbours experience as a result of manure application. Setbacks can vary based on the landscape, the time of year and whether or not the manure will be incorporated. In order to protect ground water supplies, manure must not be applied within 30 meters, or 100ft, of water wells regardless of the method of application. When using liquid manure injection, manure must not be applied within 10 meters of a common water body such as a river, lake or marsh, where not all surrounding land is owned by the individual applying manure. This setback distance increases to 30 meters when manure is applied to the soil surface and incorporated within 48 hours. It becomes more complicated to determine setbacks when manure is not being incorporated as the slope of the land must also be considered. The minimum setback from common water bodies for land with a 4% slope is 30 meters. This increases to 60 meters on land with a 4-6% slope and 90 meters for land with a 6-12% slope. Manure application is prohibited on land with a slope greater than 12%. When manure is incorporated within 48 hours there is no minimum setback from neighbouring residences. If the manure will not be incorporated, the minimum setback from any occupied structure not owned by the producer is 150 meters. Buildings such as homes, schools and churches are considered to be occupied structures. In order to minimize potential complaints from neighbours, producers are encouraged to contact neighbouring landowners prior to manure application. The AOPA also sets nitrate-nitrogen limits and limits on soil salinity levels (source: *Manure Application and Alberta's Agricultural Operation Practices Act*).

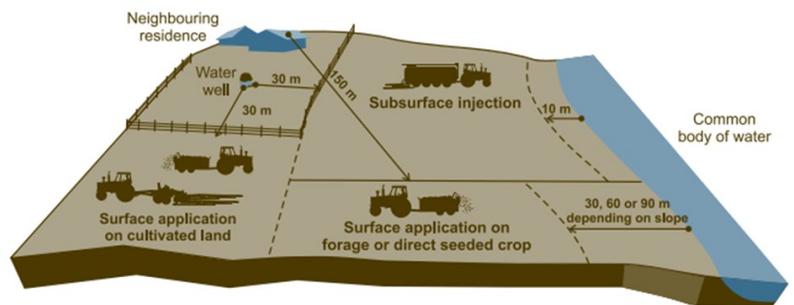


Figure 4.4.1 Summary of Manure Application Setback Distances Prescribed Under AOPA

Manure is a valuable resource that when used properly can improve your soil and provide nutrients for your crops. Proper attention to regulations can help prevent negative environmental impacts and reduce nuisance impacts to neighbouring homeowners. For additional information on manure handling and storage regulations producers can contact the Natural Resources Conservation Board or visit their website at nrcb.ca.

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