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CC276 Farm Energy Tips - Use Energy Wisely - Alternative "N" Sources

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Farm Energy Tips

USE ENERGY WISELY

Alternative "N" Sources

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Manure and Legumes

There are some alternatives which can be used to reduce dependence on commercially supplied nitrogen. At one time, manure and legumes supplied nearly all of the nutrients used to grow crops. With rising fertilizer costs and the need for energy conservation, these sources are again being discussed.

Livestock Wastes

Livestock manure can be a valuable fertilizer source. However, if manure must be transported for long distances (more than five miles) transportation costs may be more than the benefits derived from the fertilizer.

The amount of nitrogen in manure varies depending on how it is stored and handled (Table 1). However, the phosphorus and potassium content remains relatively constant. Due to the nitrogen content variation, the application rate (tons per acre) must be carefully planned to assure that the proper amount of nitrogen is applied to meet crop needs.

As a rule of thumb, you can usually expect to obtain about five pounds of nitrogen per ton (2.5 kg/t) (wet weight) of manure. A yearling steer on feed will produce about six wet tons (5450 kg) of manure per year, containing about 50 pounds (23 kg) of nitrogen. Suppose you want to apply 125 pounds of nitrogen per acre (140 kg/ha) over 160 acres (64.7 ha). This would require 20,000 pounds (9070 kg) of nitrogen. Using five pounds of nitrogen per ton (2.5 kg/t) of wet manure, you would need 4,000 tons (3630 t) applied at 25 wet tons per acre (56 t/ha). This is equivalent to the yearly manure production from about 700 steers.

Table 1. Approximate application rates of beef cattle residue taken from different management systems.

System	Residue form	Rate to supply 100 lb (45.4 kg) nitrogen[a]	
		tons/acre[b]	
		dry weight	wet weight[c]
Bedded barn	solid	20	65
Unpaved lot	solid	16	29
Storage bunker[d]	solid	2.5	12.5
Holding pond[d]	liquid	2.0	81
Anaerobic lagoon[d]	liquid	2.7	43
Aerobic lagoon or oxidation ditch[d]	liquid	3.2	107
Pit[d]	slurry	3.5	29
Runoff control pond	liquid	15	1010

[a] *Available to crops.*

[b] *To convert to metric tons per hectare (t/ha), multiply by 2.241*

[c] *Wet weight values are highly dependent on moisture content.*

[d] *From paved lots or confinement housing.*

Problems with the soil may arise if livestock manure spread on cropland is not managed carefully. Application of a high rate of manure per acre can cause a buildup of salt levels in the soil, particularly when livestock are fed a high salt diet.

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Leo E. Lucas, Director

To avoid this, laboratory tests of the particular manure and soil should be obtained before application. Commercial laboratories will perform this analysis, but make sure you indicate what type of test you want. You should specify tests for: water content; electrical conductivity; pH; Na, Ca, and Mg content; in addition to N, P, and K. These tests will allow you to plan proper manure application rates, thus avoiding future soil problems. The importance of these tests cannot be over-emphasized. Contact your county agent for assistance in interpreting test results and planning proper manure application rates.

Slow release of nitrogen from decaying organic matter increases the chance of polluting ground water when heavy applications are made on the same field year after year. Nitrogen leaching into the ground water may occur because the release of nitrogen continues after the growing and harvesting seasons, even though the crop is no longer using it. Keep in mind too, that manure applied in previous years is still releasing nitrogen this year. It has been found that as much available nitrogen can be added to the soil from previous years' application as was released from the current years' spreading.

How much manure is too much on each field depends on the type of manure, soil type, percolation rate, slope, rainfall, crop, and time of year that it is spread. Here are some guidelines to consider when spreading manure:

Winter spreading is not recommended. However, it can be done on fields that are fairly level and that are not subject to flooding or standing water. Fields with somewhat steeper slopes that have terraces or other runoff-control structures to reduce pollution may also be suitable for winter spreading. Consequently, there is much land that can't be used for spreading during the winter.

Summer spreading on spring planted crops is possible when liquid manure is available, and spread through irrigation systems. For the farmer, fall spreading after harvest is probably the most convenient time to apply manure. The ground is crop-free and able to absorb the manure, thereby reducing runoff. However, on permeable soils, potential for ground water pollution is greater at this time.

Manure storage structures are becoming increasingly popular. Eight months of residue accumulation during the winter, spring and summer should be allowed when figuring storage space. Preferably, the manure should be spread in the spring, but fall spreading is also possible. In either case, the manure should be *immediately* incorporated by disking or plowing to conserve nitrogen.

Another way of spreading liquid manure is to irrigate crops from the storage system. This will apply water and nitrogen when the crop needs it the most, but about one-fourth of the nitrogen will be lost because it can't be incorporated. This is still better than losing 80% of the nitrogen from an open lagoon and not getting any fertilizer benefit from it.

Crop Rotation

Crop rotation with a legume is another way you may be able to reduce demand for nitrogen fertilizer. Rotation systems were in use long before commercial fertilizers were available. These systems were the primary means of putting nitrogen into the soil. A common rotation might consist of a legume, corn, and small grain. Where possible, some farmers are reconsidering the use of legume crops, such as alfalfa, not only to reduce fertilizer needs, but to increase forage production as well.

The disadvantages of a crop rotation system come to light when we realize that total production is decreased when corn or other grain crops cannot be grown continuously on the same land. To maintain current production levels, more marginal land would have to be farmed to make up for the extra acres (hectares) required by crop rotation. This would mean increased energy consumption in the form of irrigation, tillage, and harvesting.

We recommend using crop rotation wherever feasible, but, on an overall basis, it is probably not going to save significant amounts of energy while maintaining current levels of production.

By using livestock manure and/or crop rotation system wherever economically feasible as a fertilizer source, you can be on your way toward "Using Energy Wisely," and getting the most from your fertilizer sources.

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