



SOIL

Cattle manure application rates

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Quick Facts...

The purpose of this fact sheet is to help you determine the correct manure application rate from a manure analysis provided by your manure supplier.

Manure contains nitrogen in several forms.

Organic nitrogen is the most stable, tied up with carbon and other elements in many compounds such as proteins.

Inorganic nitrogen includes NH^4 , NO^3 and NO^2 and is available to plants immediately and moves into plant roots with water.

Total nitrogen is the mixture of organic and inorganic forms of nitrogen in the manure.

Nitrogen in Manure

Manure contains nitrogen in several forms. *Organic nitrogen* is the most stable, tied up with carbon and other elements in many compounds such as proteins. Organic nitrogen is released (mineralized) from these compounds by microorganisms. Some nitrogen (N) is available quickly, and some takes months or years to be available. The time involved depends on the types of compounds in which N is tied up and the soil environment.

Inorganic nitrogen includes NH^4 , NO^3 and NO^2 . It is available to plants immediately and moves into plant roots with water. *Total nitrogen* is the mixture of organic and inorganic forms of nitrogen in the manure. Some of the total nitrogen is available immediately, while most of it is available later. Although we typically project that 50 percent of total nitrogen in manure is crop available during the first growing season, this is a crude estimate. If the manure is not mixed into the soil immediately, some of the inorganic nitrogen will be lost.

Using This Table

Nitrogen Content of Manure. Use the actual total nitrogen content on a fresh-weight basis (lbs N/ton) from your manure analysis. If you have no analysis available, use the 23 lb/ton column for beef manure, or the 13 lb/ton column for dairy manure, which represent typical analyses for each manure in Colorado.

Desired N Application. Determine how much nitrogen you will need from the manure application. From the total nitrogen the crop will require, subtract any nitrogen contributed from fertilizers, irrigation water, herbicide carriers, previous legume crops, soil organic matter, residual soil nitrate, and previous manure applications.

Example. Assume for this example that a recommended nitrogen application for a corn field is 160 lb N/acre. After other sources of nitrogen are considered, the amount to be supplied by beef manure is 100 lbs N/acre. The manure analysis was 23lbs N/ton of manure. From the table, find the rate of 100 lbs N/acre in the left column and move across to the 23 lbs total N/ton column. The amount of manure to be applied to the field to achieve the desired application is 9 tons per acre.



Example:

Total N required	160 lb N/acre	_____ lb N/acre	_____ lb N/acre
N from other sources (soil test, irrigation water, etc.)	- 60 lb N/acre	- _____ lb N/acre	- _____ lb N/acre
N desired from manure	100 lb N/acre	_____ lb N/acre	_____ lb N/acre
Total N content of manure	23 lb N/ton	_____ lb N/ton	_____ lb N/ton
Manure rate for desired N application (from Table)	9 tons/acre	_____ tons/acre	_____ tons/acre

Table 1: Cattle manure application rates. (This table uses only the total nitrogen content of a manure, so it is an estimate of what will be available to the crop during the growing season. Use it to determine application rates until you can obtain more precise numbers.)

Desired N Application (lbs N/acre)	Nitrogen Content of Manure (lbs of total N per ton manure (fresh weight))														
	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35
50	14	11	9	8	7	6	5	5	4	4	4	3	3	3	3
60	17	13	11	9	8	7	6	6	5	5	4	4	4	4	3
70	20	16	13	11	9	8	7	7	6	6	5	5	5	4	4
80	23	18	15	12	11	9	8	8	7	6	6	6	5	5	5
90	26	20	16	14	12	11	9	9	8	7	7	6	6	5	5
100	29	22	18	15	13	12	11	10	9	8	7	7	6	6	6
110	31	24	20	17	15	13	12	10	10	9	8	8	7	7	6
120	34	27	22	18	16	14	13	11	10	10	9	8	8	7	7
130	37	29	24	20	17	15	14	12	11	10	10	9	8	8	7
140	40	31	25	22	19	16	15	13	12	11	10	10	9	8	8
150	43	33	27	23	20	18	16	14	13	12	11	10	10	9	9
160	46	36	29	25	21	19	17	15	14	13	12	11	10	10	9
170	49	38	31	26	23	20	18	16	15	14	13	12	11	10	10
180	51	40	33	28	24	21	19	17	16	14	13	12	12	11	10
190	54	42	35	29	25	22	20	18	17	15	14	13	12	12	11
200	57	44	36	31	27	24	21	19	17	16	15	14	13	12	11

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If the manure has not been tested and you have no other way of estimating its nitrogen content, use the column for 23 lbs N (for beef) or 13 lbs N (for dairy) per ton of manure. These are average contents for each type of manure in Colorado.

Note: These numbers assume that the manure will be incorporated immediately after application. If incorporation will occur more than one week after application, increase the manure rate by 43 percent (multiply the manure rate by 1.43).

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