

This booklet is prepared by the Minnesota Pollution Control Agency.

The data contained within the booklet is current as of January 1, 2012.

For questions on how to use this booklet, to report errors within the booklet, or to offer suggestions for future printings, please contact your regional Minnesota Pollution Control Agency office.

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Manure Application Rate Guide



Manage Manure Applications to Protect Water Quality and Save Money



Protect Your Water:

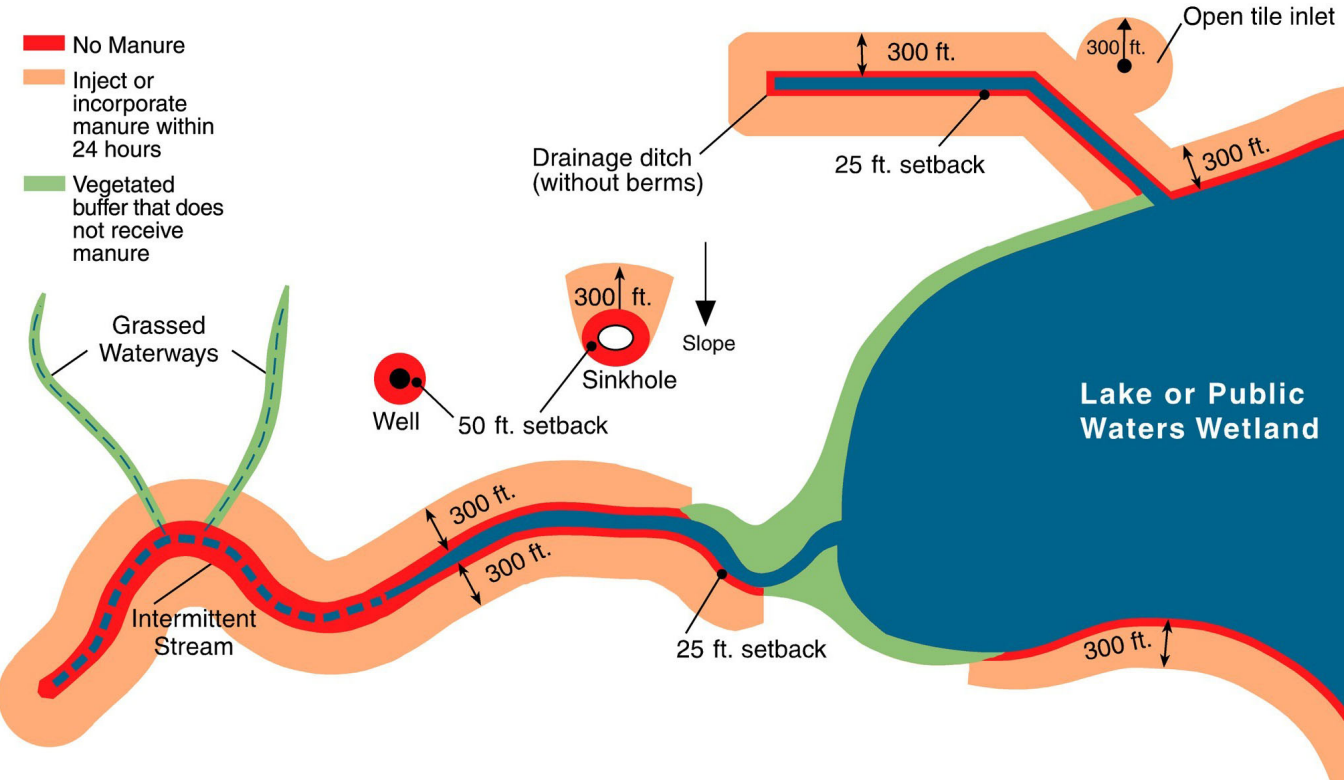
- Ø Protect your well water and nearby surface water by using the correct application rate and observing application setbacks
- Ø Meet state rules and regulations designed to protect water quality

Cut Your Costs:

- Ø Potentially save \$10 - \$40 per acre in N fertilizer costs by using the correct application rate (based on 20 tons/acre of solid manure)
- Ø You can double N fertilizer savings by immediately incorporating your manure

Land Application Setbacks from Waters*

(Further Details on Page 38)



* This graphic summarizes the State setback requirements. County and/or Township requirements may be more restrictive.

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How to Use This Booklet

This booklet is designed to assist anyone applying manure in determining a rate that meets the nitrogen needs of the crop(s) grown.

This booklet should not be used as a substitute for a Manure Management Plan (MMP), but is useful for facilities where a MMP is not required or for those applying manure from facilities where a MMP is not required.

To determine the application rate, first locate the correct chart using the animal and manure type and the method of incorporation at the top of each chart.

Then, identify the manure nitrogen test value in lbs/1000gal or lbs/ton in the far left column.

Next, locate the desired amount of nitrogen you want to be available to the crop(s) grown in the top row of the chart.

Where these two values intersect on the chart is the desired application rate in either 1,000's of gallons per acre or tons per acre.

It is important to note that, due to rounding, applied nitrogen rates may be slightly higher or lower than the values shown in the chart.

EXAMPLE

Sweep injected liquid swine manure with a nitrogen test value of 52 lbs/1,000 gal.
 To obtain 180 lbs of **available** nitrogen the application rate would be 4,500 gal/acre.

Manure Type: Swine Liquids **Incorp.:** Sweep Injection **% Avail:** 80%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
20	4.0	5.0	6.5	7.5	8.0	9.0	9.5	10.0	10.5	11.5	12.5
24	3.0	4.0	5.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
28	2.5	3.5	4.5	5.5	6.0	6.5	6.5	7.0	7.5	8.0	9.0
32	2.5	3.0	4.0	4.5	5.0	5.5	6.0	6.5	6.5	7.0	8.0
36	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
40	2.0	2.5	3.0	4.0	4.0	4.5	4.5	5.0	5.5	5.5	6.5
44	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
48	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
52	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
56	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
60	1.5	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0
66	1.0	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5	4.0
72	1.0	1.5	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5
78	1.0	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0

Estimated Nutrient Content of Liquid and Solid Manure*

Animal Type	Liquid Manure (lbs/1000 gal)			Solid Manure (lbs/ton)		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
<i>Beef</i>						
Feeder Cattle/Slaughter Steer	29	18	26	11	7	11
Cow	20	16	24	7	4	7
Calf	27	18	24	9	4	8
<i>Dairy</i>						
Milk Cow	31	15	19	10	3	6
Heifer	32	14	28	10	3	7
Calf	27	14	24	10	3	5
<i>Swine</i>						
Nursery	25	19	22	13	8	4
Finishing	58	44	40	22	22	17
Farrowing	15	12	11	14	6	4
Gestation	25	25	24	9	7	5
<i>Poultry</i>						
Layers	57	52	33	34	51	26
Broilers	63	40	29	46	53	36
Turkey - Tom	53	40	29	40	50	30
Turkey - Hen	60	38	32	40	50	30

* When possible actual manure test results should be used in place of these estimates

Sources – Manure Management in MN (MN Extension Service 2007) & MWPS-18 Sec 1 (2004)

Nitrogen Availability and Loss, as Affected by Method of Manure Application and Animal Species

Year Available	% of Total Nitrogen Available Per Year				
	Broadcast Incorporation Timing			Injection	
	After 96 hrs.	12 to 96 hrs.	Within 12 hrs.	Sweep	Knife
Beef					
Year 1	25	45	60	60	50
Year 2	25	25	25	25	25
Lost	40	20	5	5	10
Dairy					
Year 1	20	40	55	55	50
Year 2	25	25	25	25	25
Lost	40	20	10	5	10
Swine					
Year 1	35	55	75	80	70
Year 2	15	15	15	15	15
Lost	50	30	10	5	15
Poultry					
Year 1	45	55	70	70	70
Year 2	25	25	25	25	25
Lost	30	20	5	5	5

Nitrogen Needs and Removal for Various Crops*

Crop	Yield	Crop Last Year	Crop 2 years ago	Max N Needed	Max N Removed
Corn	Any	Corn	No Alfalfa	180	---
Corn	Any	Corn	Alfalfa	130	---
Corn	Any	Soybeans	No Alfalfa	140	---
Corn	Any	Alfalfa	Any	80	---
Corn Silage	Any	Corn	Corn	180	---
Corn Silage	Any	Corn	Alfalfa	130	---
Corn Silage	Any	Alfalfa	Any	80	---
Wheat	60 - 69 bu	Corn	No Alfalfa	110	---
Wheat	60 - 69 bu	Soybeans	No Alfalfa	90	---
Oats	81 - 100 bu	Corn	No Alfalfa	70	---
Oats	81 - 100 bu	Soybeans	No Alfalfa	30	---
Sweet Corn	8 - 9 ton	Corn	Any	120	---
Sweet Corn	8 - 9 ton	Soybeans	Any	90	---
Soybeans	50 bu	Any	Any	---	175
Alfalfa	5 ton	Any	Any	---	252
Grass/Legume	4 ton	Any	Any	---	174

* The nitrogen needs values, in this chart, represent the upper-end of typical crop nitrogen needs and may not be the best nitrogen recommendation for every case. To obtain specific nitrogen recommendations please refer to the applicable University of Minnesota publication(s).

Manure Type: Swine Liquids

Incorp: After 4 days

% Avail: 35%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
8	21.5	28.5	35.5	43.0	46.5	50.0	53.5	57.0	60.5	64.5	71.5
12	14.5	19.0	24.0	28.5	31.0	33.5	35.5	38.0	40.5	43.0	47.5
16	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
20	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
24	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
28	6.0	8.0	10.0	12.0	13.5	14.5	15.5	16.5	17.5	18.5	20.5
32	5.5	7.0	9.0	10.5	11.5	12.5	13.5	14.5	15.0	16.0	18.0
36	5.0	6.5	8.0	9.5	10.5	11.0	12.0	12.5	13.5	14.5	16.0
40	4.5	5.5	7.0	8.5	9.5	10.0	10.5	11.5	12.0	13.0	14.5
44	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
48	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.0	10.5	12.0
52	3.5	4.5	5.5	6.5	7.0	7.5	8.0	9.0	9.5	10.0	11.0
56	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
60	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
66	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
72	2.5	3.0	4.0	5.0	5.0	5.5	6.0	6.5	6.5	7.0	8.0
78	2.0	3.0	3.5	4.5	5.0	5.0	5.5	6.0	6.0	6.5	7.5
84	2.0	2.5	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.0	7.0

Manure Type: Swine Liquids

Incorp: 12 – 96 hours

% Avail: 55%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
8	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
12	9.0	12.0	15.0	18.0	19.5	21.0	22.5	24.0	26.0	27.5	30.5
16	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
20	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
24	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
28	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
32	3.5	4.5	5.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	11.5
36	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
40	2.5	3.5	4.5	5.5	6.0	6.5	7.0	7.5	7.5	8.0	9.0
44	2.5	3.5	4.0	5.0	5.5	6.0	6.0	6.5	7.0	7.5	8.5
48	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
52	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
56	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
60	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
66	1.5	2.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
72	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
78	1.5	2.0	2.5	3.0	3.0	3.5	3.5	3.5	4.0	4.0	4.5
84	1.5	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.5

Manure Type: Swine Liquids

Incorp: Within 12 hours **% Avail:** 75%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
8	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
12	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
16	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
20	4.0	5.5	6.5	8.0	8.5	9.5	10.0	10.5	11.5	12.0	13.5
24	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
28	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
32	2.5	3.5	4.0	5.0	5.5	6.0	6.5	6.5	7.0	7.5	8.5
36	2.0	3.0	3.5	4.5	5.0	5.0	5.5	6.0	6.5	6.5	7.5
40	2.0	2.5	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0	6.5
44	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
48	1.5	2.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
52	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
56	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
60	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
66	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
72	1.0	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5
78	1.0	1.5	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5
84	1.0	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0

Manure Type: Swine Liquids

Incorp: Sweep Injection % Avail: 80%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
8	9.5	12.5	15.5	19.0	20.5	22.0	23.5	25.0	26.5	28.0	31.5
12	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	21.0
16	4.5	6.5	8.0	9.5	10.0	11.0	11.5	12.5	13.5	14.0	15.5
20	4.0	5.0	6.5	7.5	8.0	9.0	9.5	10.0	10.5	11.5	12.5
24	3.0	4.0	5.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
28	2.5	3.5	4.5	5.5	6.0	6.5	6.5	7.0	7.5	8.0	9.0
32	2.5	3.0	4.0	4.5	5.0	5.5	6.0	6.5	6.5	7.0	8.0
36	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
40	2.0	2.5	3.0	4.0	4.0	4.5	4.5	5.0	5.5	5.5	6.5
44	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
48	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
52	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
56	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
60	1.5	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0
66	1.0	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5	4.0
72	1.0	1.5	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5
78	1.0	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0
84	1.0	1.0	1.5	2.0	2.0	2.0	2.0	2.5	2.5	2.5	3.0

Manure Type: Swine Liquids

Incorp: Knife Injection

% Avail: 70%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
8	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
12	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
16	5.5	7.0	9.0	10.5	11.5	12.5	13.5	14.5	15.0	16.0	18.0
20	4.5	5.5	7.0	8.5	9.5	10.0	10.5	11.5	12.0	13.0	14.5
24	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.0	10.5	12.0
28	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
32	2.5	3.5	4.5	5.5	6.0	6.5	6.5	7.0	7.5	8.0	9.0
36	2.5	3.0	4.0	5.0	5.0	5.5	6.0	6.5	6.5	7.0	8.0
40	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
44	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
48	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
52	1.5	2.0	2.5	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
56	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
60	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
66	1.5	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.5
72	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
78	1.0	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5
84	1.0	1.5	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5

Manure Type: Swine Solids

Incorp: After 4 Days

% Avail: 35%

Manure Application Rate (ton/acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	85.5	114.5	143.0	171.5	185.5	200.0	214.5	228.5	243.0	257.0	285.5
4	43.0	57.0	71.5	85.5	93.0	100.0	107.0	114.5	121.5	128.5	143.0
6	28.5	38.0	47.5	57.0	62.0	66.5	71.5	76.0	81.0	85.5	95.0
8	21.5	28.5	35.5	43.0	46.5	50.0	53.5	57.0	60.5	64.5	71.5
10	17.0	23.0	28.5	34.5	37.0	40.0	43.0	45.5	48.5	51.5	57.0
12	14.5	19.0	24.0	28.5	31.0	33.5	35.5	38.0	40.5	43.0	47.5
14	12.0	16.5	20.5	24.5	26.5	28.5	30.5	32.5	34.5	36.5	41.0
16	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
18	9.5	12.5	16.0	19.0	20.5	22.0	24.0	25.5	27.0	28.5	31.5
20	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
22	8.0	10.5	13.0	15.5	17.0	18.0	19.5	21.0	22.0	23.5	26.0
24	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
26	6.5	9.0	11.0	13.0	14.5	15.5	16.5	17.5	18.5	20.0	22.0
28	6.0	8.0	10.0	12.0	13.5	14.5	15.5	16.5	17.5	18.5	20.5
30	5.5	7.5	9.5	11.5	12.5	13.5	14.5	15.0	16.0	17.0	19.0

Manure Type: Swine Solids

Incorp: 12-96 hours

% Avail: 55%

Manure Application Rate (ton /acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	54.5	72.5	91.0	109.0	118.0	127.5	136.5	145.5	154.5	163.5	182.0
4	27.5	36.5	45.5	54.5	59.0	63.5	68.0	72.5	77.5	82.0	91.0
6	18.0	24.0	30.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	60.5
8	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
10	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
12	9.0	12.0	15.0	18.0	19.5	21.0	22.5	24.0	26.0	27.5	30.5
14	8.0	10.5	13.0	15.5	17.0	18.0	19.5	21.0	22.0	23.5	26.0
16	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
18	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
20	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
22	5.0	6.5	8.5	10.0	10.5	11.5	12.5	13.0	14.0	15.0	16.5
24	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
26	4.0	5.5	7.0	8.5	9.0	10.0	10.5	11.0	12.0	12.5	14.0
28	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
30	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0

Manure Type: Swine Solids

Incorp: Within 12 hours **% Avail:** 75%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	40.0	53.5	66.5	80.0	86.5	93.5	100.0	106.5	113.5	120.0	133.5
4	20.0	26.5	33.5	40.0	43.5	46.5	50.0	53.5	56.5	60.0	66.5
6	13.5	18.0	22.0	26.5	29.0	31.0	33.5	35.5	38.0	40.0	44.5
8	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
10	8.0	10.5	13.5	16.0	17.5	18.5	20.0	21.5	22.5	24.0	26.5
12	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
14	5.5	7.5	9.5	11.5	12.5	13.5	14.5	15.0	16.0	17.0	19.0
16	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
18	4.5	6.0	7.5	9.0	9.5	10.5	11.0	12.0	12.5	13.5	15.0
20	4.0	5.5	6.5	8.0	8.5	9.5	10.0	10.5	11.5	12.0	13.5
22	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0
24	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
26	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.5
28	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
30	2.5	3.5	4.5	5.5	6.0	6.0	6.5	7.0	7.5	8.0	9.0

Manure Type: Dairy Liquids

Incorp: After 4 days

% Avail: 20%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	50.0	66.5	83.5	100.0	108.5	116.5	125.0	133.5	141.5	150.0	166.5
8	37.5	50.0	62.5	75.0	81.5	87.5	94.0	100.0	106.5	112.5	125.0
10	30.0	40.0	50.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0
12	25.0	33.5	41.5	50.0	54.0	58.5	62.5	66.5	71.0	75.0	83.5
14	21.5	28.5	35.5	43.0	46.5	50.0	53.5	57.0	60.5	64.5	71.5
16	19.0	25.0	31.5	37.5	40.5	44.0	47.0	50.0	53.0	56.5	62.5
18	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
20	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
22	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
24	12.5	16.5	21.0	25.0	27.0	29.0	31.0	33.5	35.5	37.5	41.5
26	11.5	15.5	19.0	23.0	25.0	27.0	29.0	31.0	32.5	34.5	38.5
28	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
30	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
32	9.5	12.5	15.5	19.0	20.5	22.0	23.5	25.0	26.5	28.0	31.5
34	9.0	12.0	14.5	17.5	19.0	20.5	22.0	23.5	25.0	26.5	29.5
36	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
38	8.0	10.5	13.0	16.0	17.0	18.5	19.5	21.0	22.5	23.5	26.5
40	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0

Manure Type: Dairy Liquids

Incorp: 12 - 96 hours

% Avail: 40%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	25.0	33.5	41.5	50.0	54.0	58.5	62.5	66.5	71.0	75.0	83.5
8	19.0	25.0	31.5	37.5	40.5	44.0	47.0	50.0	53.0	56.5	62.5
10	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
12	12.5	16.5	21.0	25.0	27.0	29.0	31.0	33.5	35.5	37.5	41.5
14	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
16	9.5	12.5	15.5	19.0	20.5	22.0	23.5	25.0	26.5	28.0	31.5
18	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
20	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0
22	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
24	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	21.0
26	6.0	7.5	9.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.0
28	5.5	7.0	9.0	10.5	11.5	12.5	13.5	14.5	15.0	16.0	18.0
30	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
32	4.5	6.5	8.0	9.5	10.0	11.0	11.5	12.5	13.5	14.0	15.5
34	4.5	6.0	7.5	9.0	9.5	10.5	11.0	12.0	12.5	13.0	14.5
36	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
38	4.0	5.5	6.5	8.0	8.5	9.0	10.0	10.5	11.0	12.0	13.0
40	4.0	5.0	6.5	7.5	8.0	9.0	9.5	10.0	10.5	11.5	12.5

Manure Type: Dairy Liquids

Incorp: Within 12 hours

% Avail: 55%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	18.0	24.0	30.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	60.5
8	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
10	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
12	9.0	12.0	15.0	18.0	19.5	21.0	22.5	24.0	26.0	27.5	30.5
14	8.0	10.5	13.0	15.5	17.0	18.0	19.5	21.0	22.0	23.5	26.0
16	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
18	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
20	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
22	5.0	6.5	8.5	10.0	10.5	11.5	12.5	13.0	14.0	15.0	16.5
24	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
26	4.0	5.5	7.0	8.5	9.0	10.0	10.5	11.0	12.0	12.5	14.0
28	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
30	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0
32	3.5	4.5	5.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	11.5
34	3.0	4.5	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
36	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
38	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
40	2.5	3.5	4.5	5.5	6.0	6.5	7.0	7.5	7.5	8.0	9.0

Manure Type: Dairy Liquids

Incorp: Sweep Injection

% Avail: 55%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	18.0	24.0	30.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	60.5
8	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
10	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
12	9.0	12.0	15.0	18.0	19.5	21.0	22.5	24.0	26.0	27.5	30.5
14	8.0	10.5	13.0	15.5	17.0	18.0	19.5	21.0	22.0	23.5	26.0
16	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
18	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
20	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
22	5.0	6.5	8.5	10.0	10.5	11.5	12.5	13.0	14.0	15.0	16.5
24	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
26	4.0	5.5	7.0	8.5	9.0	10.0	10.5	11.0	12.0	12.5	14.0
28	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
30	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0
32	3.5	4.5	5.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	11.5
34	3.0	4.5	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
36	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
38	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
40	2.5	3.5	4.5	5.5	6.0	6.5	7.0	7.5	7.5	8.0	9.0

Manure Type: Dairy Liquids

Incorp: Knife Injection

% Avail: 50%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	20.0	26.5	33.5	40.0	43.5	46.5	50.0	53.5	56.5	60.0	66.5
8	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
10	12.0	16.0	20.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	40.0
12	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
14	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
16	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0
18	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
20	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
22	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
24	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
26	4.5	6.0	7.5	9.0	10.0	11.0	11.5	12.5	13.0	14.0	15.5
28	4.5	5.5	7.0	8.5	9.5	10.0	10.5	11.5	12.0	13.0	14.5
30	4.0	5.5	6.5	8.0	8.5	9.5	10.0	10.5	11.5	12.0	13.5
32	4.0	5.0	6.5	7.5	8.0	9.0	9.5	10.0	10.5	11.5	12.5
34	3.5	4.5	6.0	7.0	7.5	8.0	9.0	9.5	10.0	10.5	12.0
36	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
38	3.0	4.0	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
40	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0

Manure Type: Dairy Solids

Incorp: After 4 days

% Avail: 20%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	150.0	200.0	250.0	300.0	325.0	350.0	375.0	400.0	425.0	450.0	500.0
4	75.0	100.0	125.0	150.0	162.5	175.0	187.5	200.0	212.5	225.0	250.0
6	50.0	66.5	83.5	100.0	108.5	116.5	125.0	133.5	141.5	150.0	166.5
8	37.5	50.0	62.5	75.0	81.5	87.5	94.0	100.0	106.5	112.5	125.0
10	30.0	40.0	50.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0
12	25.0	33.5	41.5	50.0	54.0	58.5	62.5	66.5	71.0	75.0	83.5
14	21.5	28.5	35.5	43.0	46.5	50.0	53.5	57.0	60.5	64.5	71.5
16	19.0	25.0	31.5	37.5	40.5	44.0	47.0	50.0	53.0	56.5	62.5
18	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
20	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
22	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
24	12.5	16.5	21.0	25.0	27.0	29.0	31.0	33.5	35.5	37.5	41.5
26	11.5	15.5	19.0	23.0	25.0	27.0	29.0	31.0	32.5	34.5	38.5
28	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
30	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5

Manure Type: Dairy Solids

Incorp: 12 - 96 hours

% Avail: 40%

Manure Application Rate (ton/acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	75.0	100.0	125.0	150.0	162.5	175.0	187.5	200.0	212.5	225.0	250.0
4	37.5	50.0	62.5	75.0	81.5	87.5	94.0	100.0	106.5	112.5	125.0
6	25.0	33.5	41.5	50.0	54.0	58.5	62.5	66.5	71.0	75.0	83.5
8	19.0	25.0	31.5	37.5	40.5	44.0	47.0	50.0	53.0	56.5	62.5
10	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
12	12.5	16.5	21.0	25.0	27.0	29.0	31.0	33.5	35.5	37.5	41.5
14	10.5	14.5	18.0	21.5	23.0	25.0	27.0	28.5	30.5	32.0	35.5
16	9.5	12.5	15.5	19.0	20.5	22.0	23.5	25.0	26.5	28.0	31.5
18	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
20	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0
22	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
24	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	21.0
26	6.0	7.5	9.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.0
28	5.5	7.0	9.0	10.5	11.5	12.5	13.5	14.5	15.0	16.0	18.0
30	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5

Manure Type: Dairy Solids

Incorp: Within 12 hours **% Avail:** 55%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	54.5	72.5	91.0	109.0	118.0	127.5	136.5	145.5	154.5	163.5	182.0
4	27.5	36.5	45.5	54.5	59.0	63.5	68.0	72.5	77.5	82.0	91.0
6	18.0	24.0	30.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	60.5
8	13.5	18.0	22.5	27.5	29.5	32.0	34.0	36.5	38.5	41.0	45.5
10	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
12	9.0	12.0	15.0	18.0	19.5	21.0	22.5	24.0	26.0	27.5	30.5
14	8.0	10.5	13.0	15.5	17.0	18.0	19.5	21.0	22.0	23.5	26.0
16	7.0	9.0	11.5	13.5	15.0	16.0	17.0	18.0	19.5	20.5	22.5
18	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
20	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
22	5.0	6.5	8.5	10.0	10.5	11.5	12.5	13.0	14.0	15.0	16.5
24	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
26	4.0	5.5	7.0	8.5	9.0	10.0	10.5	11.0	12.0	12.5	14.0
28	4.0	5.0	6.5	8.0	8.5	9.0	9.5	10.5	11.0	11.5	13.0
30	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0

Manure Type: Beef Liquids

Incorp: After 4 days

% Avail: 25%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	40.0	53.5	66.5	80.0	86.5	93.5	100.0	106.5	113.5	120.0	133.5
8	30.0	40.0	50.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0
10	24.0	32.0	40.0	48.0	52.0	56.0	60.0	64.0	68.0	72.0	80.0
12	20.0	26.5	33.5	40.0	43.5	46.5	50.0	53.5	56.5	60.0	66.5
14	17.0	23.0	28.5	34.5	37.0	40.0	43.0	45.5	48.5	51.5	57.0
16	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
18	13.5	18.0	22.0	26.5	29.0	31.0	33.5	35.5	38.0	40.0	44.5
20	12.0	16.0	20.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	40.0
22	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
24	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
26	9.0	12.5	15.5	18.5	20.0	21.5	23.0	24.5	26.0	27.5	31.0
28	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
30	8.0	10.5	13.5	16.0	17.5	18.5	20.0	21.5	22.5	24.0	26.5
32	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0
34	7.0	9.5	12.0	14.0	15.5	16.5	17.5	19.0	20.0	21.0	23.5
36	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
38	6.5	8.5	10.5	12.5	13.5	14.5	16.0	17.0	18.0	19.0	21.0
40	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0

Manure Type: Beef Liquids

Incorp: 12 - 96 hours

% Avail: 45%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	22.0	29.5	37.0	44.5	48.0	52.0	55.5	59.5	63.0	66.5	74.0
8	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
10	13.5	18.0	22.0	26.5	29.0	31.0	33.5	35.5	38.0	40.0	44.5
12	11.0	15.0	18.5	22.0	24.0	26.0	28.0	29.5	31.5	33.5	37.0
14	9.5	12.5	16.0	19.0	20.5	22.0	24.0	25.5	27.0	28.5	31.5
16	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
18	7.5	10.0	12.5	15.0	16.0	17.5	18.5	20.0	21.0	22.0	24.5
20	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
22	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
24	5.5	7.5	9.5	11.0	12.0	13.0	14.0	15.0	15.5	16.5	18.5
26	5.0	7.0	8.5	10.5	11.0	12.0	13.0	13.5	14.5	15.5	17.0
28	5.0	6.5	8.0	9.5	10.5	11.0	12.0	12.5	13.5	14.5	16.0
30	4.5	6.0	7.5	9.0	9.5	10.5	11.0	12.0	12.5	13.5	15.0
32	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
34	4.0	5.0	6.5	8.0	8.5	9.0	10.0	10.5	11.0	12.0	13.0
36	3.5	5.0	6.0	7.5	8.0	8.5	9.5	10.0	10.5	11.0	12.5
38	3.5	4.5	6.0	7.0	7.5	8.0	9.0	9.5	10.0	10.5	11.5
40	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0

Manure Type: Beef Liquids

Incorp: Within 12 hours **% Avail:** 60%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
8	12.5	16.5	21.0	25.0	27.0	29.0	31.5	33.5	35.5	37.5	41.5
10	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
12	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
14	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
16	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	19.0	21.0
18	5.5	7.5	9.5	11.0	12.0	13.0	14.0	15.0	15.5	16.5	18.5
20	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
22	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
24	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
26	4.0	5.0	6.5	7.5	8.5	9.0	9.5	10.5	11.0	11.5	13.0
28	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.0	10.5	12.0
30	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
32	3.0	4.0	5.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
34	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
36	3.0	3.5	4.5	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
38	2.5	3.5	4.5	5.5	5.5	6.0	6.5	7.0	7.5	8.0	9.0
40	2.5	3.5	4.0	5.0	5.5	6.0	6.5	6.5	7.0	7.5	8.5

Manure Type: Beef Liquids

Incorp: Sweep Injection

% Avail: 60%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
8	12.5	16.5	21.0	25.0	27.0	29.0	31.5	33.5	35.5	37.5	41.5
10	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
12	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
14	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
16	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	19.0	21.0
18	5.5	7.5	9.5	11.0	12.0	13.0	14.0	15.0	15.5	16.5	18.5
20	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
22	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
24	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
26	4.0	5.0	6.5	7.5	8.5	9.0	9.5	10.5	11.0	11.5	13.0
28	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.0	10.5	12.0
30	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
32	3.0	4.0	5.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
34	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
36	3.0	3.5	4.5	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
38	2.5	3.5	4.5	5.5	5.5	6.0	6.5	7.0	7.5	8.0	9.0
40	2.5	3.5	4.0	5.0	5.5	6.0	6.5	6.5	7.0	7.5	8.5

Manure Type: Beef Liquids

Incorp: Knife Injection

% Avail: 50%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
6	20.0	26.5	33.5	40.0	43.5	46.5	50.0	53.5	56.5	60.0	66.5
8	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
10	12.0	16.0	20.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	40.0
12	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
14	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
16	7.5	10.0	12.5	15.0	16.5	17.5	19.0	20.0	21.5	22.5	25.0
18	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
20	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
22	5.5	7.5	9.0	11.0	12.0	12.5	13.5	14.5	15.5	16.5	18.0
24	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
26	4.5	6.0	7.5	9.0	10.0	11.0	11.5	12.5	13.0	14.0	15.5
28	4.5	5.5	7.0	8.5	9.5	10.0	10.5	11.5	12.0	13.0	14.5
30	4.0	5.5	6.5	8.0	8.5	9.5	10.0	10.5	11.5	12.0	13.5
32	4.0	5.0	6.5	7.5	8.0	9.0	9.5	10.0	10.5	11.5	12.5
34	3.5	4.5	6.0	7.0	7.5	8.0	9.0	9.5	10.0	10.5	12.0
36	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
38	3.0	4.0	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
40	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0

Manure Type: Beef Solids

Incorp: After 4 days

% Avail: 25%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	120.0	160.0	200.0	240.0	260.0	280.0	300.0	320.0	340.0	360.0	400.0
4	60.0	80.0	100.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	200.0
6	40.0	53.5	66.5	80.0	86.5	93.5	100.0	106.5	113.5	120.0	133.5
8	30.0	40.0	50.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	100.0
10	24.0	32.0	40.0	48.0	52.0	56.0	60.0	64.0	68.0	72.0	80.0
12	20.0	26.5	33.5	40.0	43.5	46.5	50.0	53.5	56.5	60.0	66.5
14	17.0	23.0	28.5	34.5	37.0	40.0	43.0	45.5	48.5	51.5	57.0
16	15.0	20.0	25.0	30.0	32.5	35.0	37.5	40.0	42.5	45.0	50.0
18	13.5	18.0	22.0	26.5	29.0	31.0	33.5	35.5	38.0	40.0	44.5
20	12.0	16.0	20.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	40.0
22	11.0	14.5	18.0	22.0	23.5	25.5	27.5	29.0	31.0	32.5	36.5
24	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
26	9.0	12.5	15.5	18.5	20.0	21.5	23.0	24.5	26.0	27.5	31.0
28	8.5	11.5	14.5	17.0	18.5	20.0	21.5	23.0	24.5	25.5	28.5
30	8.0	10.5	13.5	16.0	17.5	18.5	20.0	21.5	22.5	24.0	26.5

Manure Type: Beef Solids

Incorp: 12 - 96 hours

% Avail: 45%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	66.5	89.0	111.0	133.5	144.5	155.5	166.5	178.0	189.0	200.0	222.0
4	33.5	44.5	55.5	66.5	72.0	78.0	83.5	89.0	94.5	100.0	111.0
6	22.0	29.5	37.0	44.5	48.0	52.0	55.5	59.5	63.0	66.5	74.0
8	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
10	13.5	18.0	22.0	26.5	29.0	31.0	33.5	35.5	38.0	40.0	44.5
12	11.0	15.0	18.5	22.0	24.0	26.0	28.0	29.5	31.5	33.5	37.0
14	9.5	12.5	16.0	19.0	20.5	22.0	24.0	25.5	27.0	28.5	31.5
16	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
18	7.5	10.0	12.5	15.0	16.0	17.5	18.5	20.0	21.0	22.0	24.5
20	6.5	9.0	11.0	13.5	14.5	15.5	16.5	18.0	19.0	20.0	22.0
22	6.0	8.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	20.0
24	5.5	7.5	9.5	11.0	12.0	13.0	14.0	15.0	15.5	16.5	18.5
26	5.0	7.0	8.5	10.5	11.0	12.0	13.0	13.5	14.5	15.5	17.0
28	5.0	6.5	8.0	9.5	10.5	11.0	12.0	12.5	13.5	14.5	16.0
30	4.5	6.0	7.5	9.0	9.5	10.5	11.0	12.0	12.5	13.5	15.0

Manure Type: Beef Solids

Incorp: Within 12 hours **% Avail:** 60%

Manure Application Rate (ton/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
2	50.0	66.5	83.5	100.0	108.5	116.5	125.0	133.5	141.5	150.0	166.5
4	25.0	33.5	41.5	50.0	54.0	58.5	62.5	66.5	71.0	75.0	83.5
6	16.5	22.0	28.0	33.5	36.0	39.0	41.5	44.5	47.0	50.0	55.5
8	12.5	16.5	21.0	25.0	27.0	29.0	31.5	33.5	35.5	37.5	41.5
10	10.0	13.5	16.5	20.0	21.5	23.5	25.0	26.5	28.5	30.0	33.5
12	8.5	11.0	14.0	16.5	18.0	19.5	21.0	22.0	23.5	25.0	28.0
14	7.0	9.5	12.0	14.5	15.5	16.5	18.0	19.0	20.0	21.5	24.0
16	6.5	8.5	10.5	12.5	13.5	14.5	15.5	16.5	17.5	19.0	21.0
18	5.5	7.5	9.5	11.0	12.0	13.0	14.0	15.0	15.5	16.5	18.5
20	5.0	6.5	8.5	10.0	11.0	11.5	12.5	13.5	14.0	15.0	16.5
22	4.5	6.0	7.5	9.0	10.0	10.5	11.5	12.0	13.0	13.5	15.0
24	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
26	4.0	5.0	6.5	7.5	8.5	9.0	9.5	10.5	11.0	11.5	13.0
28	3.5	5.0	6.0	7.0	7.5	8.5	9.0	9.5	10.0	10.5	12.0
30	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0

Manure Type: Poultry Liquids

Incorp: After 4 days

% Avail: 45%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
40	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
42	3.0	4.0	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
44	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
46	3.0	4.0	5.0	6.0	6.5	7.0	7.0	7.5	8.0	8.5	9.5
48	3.0	3.5	4.5	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
50	2.5	3.5	4.5	5.5	6.0	6.0	6.5	7.0	7.5	8.0	9.0
52	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.5	7.5	8.5
54	2.5	3.5	4.0	5.0	5.5	6.0	6.0	6.5	7.0	7.5	8.0
56	2.5	3.0	4.0	5.0	5.0	5.5	6.0	6.5	6.5	7.0	8.0
58	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
60	2.0	3.0	3.5	4.5	5.0	5.0	5.5	6.0	6.5	6.5	7.5
62	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
64	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
66	2.0	2.5	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0	6.5
68	2.0	2.5	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
70	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	5.5	6.5
72	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	5.0	5.5	6.0
74	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0

Manure Type: Poultry Liquids

Incorp: 12 - 96 hours

% Avail: 55%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
40	2.5	3.5	4.5	5.5	6.0	6.5	7.0	7.5	7.5	8.0	9.0
42	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
44	2.5	3.5	4.0	5.0	5.5	6.0	6.0	6.5	7.0	7.5	8.5
46	2.5	3.0	4.0	4.5	5.0	5.5	6.0	6.5	6.5	7.0	8.0
48	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
50	2.0	3.0	3.5	4.5	4.5	5.0	5.5	6.0	6.0	6.5	7.5
52	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
54	2.0	2.5	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0	6.5
56	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
58	2.0	2.5	3.0	4.0	4.0	4.5	4.5	5.0	5.5	5.5	6.5
60	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
62	2.0	2.5	3.0	3.5	4.0	4.0	4.5	4.5	5.0	5.5	6.0
64	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
66	1.5	2.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
68	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.5
70	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
72	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
74	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0

Manure Type: Poultry Liquids

Incorp: Within 12 hours

% Avail: 70%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
40	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
42	2.0	2.5	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.0	7.0
44	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
46	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0
48	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
50	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
52	1.5	2.0	2.5	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
54	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	5.0	5.5
56	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
58	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
60	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
62	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5
64	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
66	1.5	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.5
68	1.5	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0
70	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	3.5	4.0
72	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
74	1.0	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	4.0

Manure Type: Poultry Liquids

Incorp: Sweep Injection

% Avail: 70%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
40	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
42	2.0	2.5	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.0	7.0
44	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
46	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0
48	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
50	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
52	1.5	2.0	2.5	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
54	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	5.0	5.5
56	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
58	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
60	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
62	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5
64	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
66	1.5	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.5
68	1.5	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0
70	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	3.5	4.0
72	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
74	1.0	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	4.0

Manure Type: Poultry Liquids

Incorp: Knife Injection

% Avail: 70%

Manure Application Rate (1,000 gal/acre)											
Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
40	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
42	2.0	2.5	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.0	7.0
44	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
46	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0
48	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
50	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
52	1.5	2.0	2.5	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
54	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	5.0	5.5
56	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
58	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
60	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
62	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5
64	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5
66	1.5	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.5
68	1.5	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0
70	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5	3.5	3.5	4.0
72	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
74	1.0	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	4.0

Manure Type: Poultry Solids

Incorp: After 4 days

% Avail: 45%

Manure Application Rate (ton/acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
30	4.5	6.0	7.5	9.0	9.5	10.5	11.0	12.0	12.5	13.5	15.0
32	4.0	5.5	7.0	8.5	9.0	9.5	10.5	11.0	12.0	12.5	14.0
34	4.0	5.0	6.5	8.0	8.5	9.0	10.0	10.5	11.0	12.0	13.0
36	3.5	5.0	6.0	7.5	8.0	8.5	9.5	10.0	10.5	11.0	12.5
38	3.5	4.5	6.0	7.0	7.5	8.0	9.0	9.5	10.0	10.5	11.5
40	3.5	4.5	5.5	6.5	7.0	8.0	8.5	9.0	9.5	10.0	11.0
42	3.0	4.0	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
44	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
46	3.0	4.0	5.0	6.0	6.5	7.0	7.0	7.5	8.0	8.5	9.5
48	3.0	3.5	4.5	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
50	2.5	3.5	4.5	5.5	6.0	6.0	6.5	7.0	7.5	8.0	9.0
52	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.5	7.5	8.5
54	2.5	3.5	4.0	5.0	5.5	6.0	6.0	6.5	7.0	7.5	8.0
56	2.5	3.0	4.0	5.0	5.0	5.5	6.0	6.5	6.5	7.0	8.0
58	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
60	2.0	3.0	3.5	4.5	5.0	5.0	5.5	6.0	6.5	6.5	7.5
62	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
64	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0

Manure Type: Poultry Solids

Incorp: 12 - 96 hours

% Avail: 55%

Manure Application Rate (ton/acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
30	3.5	5.0	6.0	7.5	8.0	8.5	9.0	9.5	10.5	11.0	12.0
32	3.5	4.5	5.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	11.5
34	3.0	4.5	5.5	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.5
36	3.0	4.0	5.0	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0
38	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
40	2.5	3.5	4.5	5.5	6.0	6.5	7.0	7.5	7.5	8.0	9.0
42	2.5	3.5	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
44	2.5	3.5	4.0	5.0	5.5	6.0	6.0	6.5	7.0	7.5	8.5
46	2.5	3.0	4.0	4.5	5.0	5.5	6.0	6.5	6.5	7.0	8.0
48	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
50	2.0	3.0	3.5	4.5	4.5	5.0	5.5	6.0	6.0	6.5	7.5
52	2.0	3.0	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.5	7.0
54	2.0	2.5	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0	6.5
56	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
58	2.0	2.5	3.0	4.0	4.0	4.5	4.5	5.0	5.5	5.5	6.5
60	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
62	2.0	2.5	3.0	3.5	4.0	4.0	4.5	4.5	5.0	5.5	6.0
64	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5

Manure Type: Poultry Solids

Incorp: Within 12 hours

% Avail: 70%

Manure Application Rate (ton/acre)

Manure N Test	Desired Available N (lbs/acre)										
	60	80	100	120	130	140	150	160	170	180	200
30	3.0	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.5
32	2.5	3.5	4.5	5.5	6.0	6.5	6.5	7.0	7.5	8.0	9.0
34	2.5	3.5	4.0	5.0	5.5	6.0	6.5	6.5	7.0	7.5	8.5
36	2.5	3.0	4.0	5.0	5.0	5.5	6.0	6.5	6.5	7.0	8.0
38	2.5	3.0	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0	7.5
40	2.0	3.0	3.5	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
42	2.0	2.5	3.5	4.0	4.5	5.0	5.0	5.5	6.0	6.0	7.0
44	2.0	2.5	3.0	4.0	4.0	4.5	5.0	5.0	5.5	6.0	6.5
46	2.0	2.5	3.0	3.5	4.0	4.5	4.5	5.0	5.5	5.5	6.0
48	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.0	5.0	5.5	6.0
50	1.5	2.5	3.0	3.5	3.5	4.0	4.5	4.5	5.0	5.0	5.5
52	1.5	2.0	2.5	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.5
54	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	5.0	5.5
56	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
58	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
60	1.5	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	5.0
62	1.5	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5
64	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5

Minimum State Setback Requirements for Sensitive Areas ^a

Sensitive Area	No Incorporation or Incorporation after 24 hrs	Injection or Incorporation within 24 hrs
Lake	300 ft ^b	25 ft ^d
Perennial Stream	300 ft ^b	25 ft ^d
Intermittent Stream	300 ft ^c	25 ft ^d
Protected Wetlands (10+ acres)	300 ft ^c	25 ft ^d
Drainage Ditches (no berms)	300 ft ^c	25 ft ^d
Sinkhole (no berms/diversions)	300 ft up / 50 ft down	50 ft
Mine, Quarry, or Gravel Pit	50 ft	50 ft
Open Tile Intakes (including rock/blind inlets)	300 ft	0 ft
Road Ditches	No application directly into the road ditch	
High Phosphorus Soils	Permit may be needed – No soil-P buildup at some sites	
DWSMA/Wellhead Protection	Permit may be needed	
Steeply Sloping Land	Permit may be needed	
Non-Protected Wetlands	Consider developing a management strategy	
Frequently Flooded Soils	Consider developing a management strategy	
High Water Table Soils	Consider developing a management strategy	
Coarse-Textured Soils	Consider developing a management strategy	
Shallow Soils Over Bedrock	Consider developing a management strategy	

^a County and/or NPDES permit requirements may be more restrictive

^b 100 ft non-manured vegetated buffer can be used instead of the 300 ft setback (non-winter)

^c 50 ft non-manured vegetated buffer can be used instead of the 300 ft setback (non-winter)

^d Where soil phosphorus exceeds 21 ppm Bray or 16 ppm Olsen, phosphorus must be managed to prevent buildup over a 6 year period.

Short-Term Manure Stockpile Requirements

Location Restrictions

Feature	Requirement
Waters of the State, Tile Intakes, Road Ditches, Sinkholes, Non-Farmed Wetlands, and Rock Outcroppings	Setback of 300 ft of flow distance and at least 50 ft horizontal distance
Private well	Setback of 100 ft*
Public Water Supply Well	Setback of 1,000 ft
Shoreland or Floodplain	Stockpiling is prohibited
Land with greater than a 6% slope	Stockpiling is prohibited
Land with greater than 2 % slope and no clean water diversions and erosion control measures	Stockpiling is prohibited
Land where soil texture to a depth of five feet, except the plow layer, is entirely coarser than a sandy-loam	Stockpiling is prohibited
Sand/Gravel Pits, Quarries, On Bedrock	Stockpiling is prohibited
Drain Tile with less than 3 ft of soil cover	Setback of 100 ft

* Setback increases to 200 ft if the well has less than 50 ft of watertight casing and is not cased through a confining layer at least 10 ft thick

Other Restrictions

- § Each stockpile must not exceed agronomic needs of the crops on 320 acres
- § Maintain 2 ft separation from the base of the stockpile to the seasonal high water table
- § Stockpile must be removed within one year (otherwise considered a permanent stockpile)
- § Must have vegetated cover or cropping history for at least one full growing season prior to re-use of the stockpiling site
 - Exemption: If stockpiled for less than 10 consecutive days and no more than 6 times per year, or within open lots with less than 100 animal units.

Minimum State Soil Phosphorus Requirements ^e

Bray P1 (ppm) ^d	< 22	22-75	76-150	> 150
Olsen (ppm) ^d	< 17	17-60	61-120	> 120
More than 300 ft from waters ^a	No Phosphorus management requirements	No Phosphorus management requirements	No Phosphorus management requirements	Permit required if over 300 AU ^c
Less than 300 ft from waters ^a	No Phosphorus management requirements	Prevent long-term build-up of Soil P ^b	Prevent long-term build-up of Soil P ^b Permit required if over 300 AU ^c	Prevent long-term build-up of Soil P ^b Permit required if over 300 AU ^c

^a Lakes, rivers, streams, intermittent streams, protected wetlands, or unbermed drainage ditches. Also includes tile intakes when soil P levels are above 75 Bray (60 Olsen) or at a CAFO or NPDES permitted site above 21 Bray (16 Olsen)

^b The rate and frequency of manure applications must not allow soil phosphorus build-up over a six year period. Single year applications can be based on crop nitrogen needs if remaining phosphorus is removed by subsequent crops. This typically results in manure applications only 1 - 3 times in a six year period (see next page for more information).

^c Only if over 300 AU. MMP must describe how phosphorus will be managed to prevent phosphorus transport (diet manipulation, soil conservation, fewer applications, etc.).

^d If soil test are in lbs/acre divide by 2 for approximate levels in ppm. If the Mehlich III test is used, the values in the table columns are approximately <30, 31-90, 91-180, >180.

^e Restrictions do not apply if a 100 ft non-manured vegetative buffer along lakes and streams, or a 50 ft non-manured vegetative buffer along intermittent streams, protected wetlands, and unbermed drainage ditches is maintained.

Phosphorus Removal by Various Crops

Crop	P ₂ O ₅ Removal	
Alfalfa	10.8	lbs/ton
Barley (grain)	0.41	lbs/bu
Barley (grain & straw)	0.55	lbs/bu
Clover	10.7	lbs/ton
Corn (grain)	0.34	lbs/bu
Corn silage	3.8	lbs/ton
Edible beans	0.01	lbs/lb
Grass hay or pasture	8.9	lbs/ton
Grass/legume	11.2	lbs/ton
Oats (grain)	0.25	lbs/bu

Crop	P ₂ O ₅ Removal	
Oats (grain & straw)	0.32	lbs/bu
Peas	0.01	lbs/lb
Potatoes	0.14	lbs/cwt
Rye (grain)	0.44	lbs/bu
Rye (grain & straw)	0.59	lbs/bu
Soybeans	0.82	lbs/bu
Sugar beets	0.961	lbs/ton
Sweet corn	11	lbs/ton
Wheat (grain)	0.53	lbs/bu
Wheat (grain & straw)	0.64	lbs/bu

How to Calculate Crop P₂O₅ Removal Over a Six Year Period

Step 1

Determine average P uptake during the crop rotation (multiply expected yields by values above).

Ex: 170 bu Corn - [170 * 0.34] = 58 lbs P₂O₅ removed per year

45 bu Soybeans - [45 * 0.82] = 37 lbs P₂O₅ removed per year

Average = 48 lbs P₂O₅ removed per year

Step 2

Determine the amount of P₂O₅ that is typically applied in manure applications.

Ex: 4000 gals/ac * 35 lbs P₂O₅ /1000 gals * 0.8 = 112 lbs P₂O₅ applied

Step 3

Divide step 2 by the average in step 1; Ex: 112/48 = 2.3

Then take 6 years divided by this result and round down to the nearest whole number.

Ex: 6 years/2.3 = 2.6 (manure can be applied 2 out of 6 years without expecting soil P build-up).

Manure Spreader Calibration

Solid Manure

Step 1

Weigh the spreader both empty and full.

Subtract the empty weight from the full weight to determine the tons of manure per load.

Step 2

Calculate how many acres are covered by one load - multiply the distance traveled by the width of the spread.

Example: $800 \text{ ft traveled} \times 20 \text{ ft spread} = 16,000 \text{ sq ft} = 0.37 \text{ acres per load}$
 $6 \text{ tons per load} / 0.37 \text{ acres covered per load} = 16 \text{ tons/acre}$

Alternative to Step 2

Calculate how many loads it takes to cover a field when going at a known tractor speed.

Example: $30 \text{ loads} \times 6 \text{ tons per load} = 180 \text{ tons applied}$
 $180 \text{ tons applied} / 11 \text{ acres covered} = 16 \text{ tons/acre}$

Liquid Manure

Step 1

Determine 1000's of gallons per load by multiplying tank volume by 90%.

Step 2

Determine acres covered per load using the same procedure as in Step 2 for solid manure.

How to Take a Manure Sample

Liquid samples can be taken by dipping a plastic cup or small can attached to a pole, and solid samples can be taken with a pitchfork, shovel, or plastic glove. You will need a clean 5 gallon bucket for mixing sub-samples, as well as a sample bottle/container from the lab. After mixing many sub-samples in the bucket, transfer a smaller sample to the lab bottle/container.

Sample Source	Method
Loaded Liquid Tanker or Solids Spreader	Take sub-samples from many loads and mix in bucket to get a representative sample. Avoid large chunks of manure.
Liquid Manure Storage Structures	Take sub-samples from many depths and locations and mix in bucket to get a representative sample. Avoid sampling the bottom foot, edges, scum, and debris.
Stockpile or Manure Pack	Take many sub-samples from different depths and locations and mix together in bucket to get a representative sample. Avoid sampling the outer 1 ½ feet.
Scrape and Haul	Scrape the floor or lot at many locations and mix together in bucket to get a representative sample. Avoid areas very close to waterers, drains, or feedbunks.
Litter	Take many sub-samples to the depth of the floor throughout the house and mix together in bucket to get a representative sample. Avoid areas very close to feeders or waterers.
Overhead Irrigation, Traveling Gun, or Towed Hose.	Prior to application place many catch pans or buckets in the field, or take many sub-samples at the pump, and mix in one bucket to get a representative sample.

For more information, refer to U of MN publication “Livestock Manure Sampling”.

Land Application of Manure Record Keeping Requirements*

100 – 299 AU ^a	300 or More AU	
Manure test results	Manure test results	Manure P ₂ O ₅ available
Field ID & acreage	Field ID & acreage	Fertilizer P ₂ O ₅ applied
Date, method, incorp. timing, and rate of manure application	Crop grown, previous crop, yield goal, N needs of the crop	Total lbs N available/acre to crops (manure + fertilizer)
Carry-over N from previous manure applications	Date, method, incorp. timing, and rate of manure application	Total lbs P ₂ O ₅ available/acre to crops (manure + fertilizer)
Manure N available to crops	Carry-over N from previous manure applications	Soil P test dates and results
Fertilizer N applied	Manure N available to crops	Commercial applicator name
Total lbs N available/acre to crops (manure + fertilizer)	Fertilizer N applied	Soil nitrate testing results (if recommended by U of M)

^a No records are required if less than 100 AU

Transferred-Ownership of Manure	
Feedlot Owner Requirements	Cropland Manager Requirements
Manure transfer date and amounts	Manure test results (from feedlot)
Manure test results (provide to recipient)	Stockpiling practices and locations (stockpile owner)
Who manure was transferred to	Field locations & acreage
Stockpiling practices (from recipient)	Date, method, incorporation timing, and rate of manure application
Field locations (from applicator)	N & P ₂ O ₅ applied (account for all sources)
Application rates/acre (from applicator)	Soil P test dates and results

* Records of manure application must be kept for a minimum of 3 years.

However, if manure is applied in sensitive areas or if the manure is generated at a CAFO or NPDES permitted facility, the records must be kept for a minimum of 6 years.

Spill Response

What To Do If You Have a Spill

- Tend to all injuries first and foremost!!!
- Plug culverts and tile inlets that manure could enter
- Contain the spill by creating berms to stop the manure flow
- Contact the Minnesota Duty Officer (**1-800-422-0798**) with:
 - § the location, date, and time of spill,
 - § what was spilled and the approximate amount spilled,
 - § which local officials have been notified (sheriff, fire dept., etc.),
 - § the responsible party,
 - § any surface water(s) impacted,
 - § what has happened or is happening now, and;
 - § a call back number.
- Contact the County Feedlot Officer or MPCA
- Recover pooled manure and solids; get a pump truck if necessary
- Scrape large accumulations; leave vegetation if possible
- If spilled on the road, recover what is possible and scrape/sweep the remainder off of the road
- Work areas of bare soils and re-seed