TECHNICAL NOTES

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MANURE SPREADER CALIBRATION

HOW TO CALIBRATE MANURE SPREADERS

Spreading manure on cropland is an excellent way to use farm produced manure. Nutrients contained in manure can be used to supply growing crops with nitrogen, phosphate and other nutrients.

Proper spreading helps make better use of nutrients in manure. It can also help maintain surface and ground water quality by applying the amounts of manure that can best be used by plants.

Manure Application Rates

Manure application rates should be based on crop needs, existing soil nutrient levels and the nutrients in the manure to be spread. Soil tests, manure analysis and crop fertilizer guides can provide this information.

Excess manure application wastes nutrients, and increases potential for groundwater contamination. Knowing the amount of manure the spreader is applying is essential to proper use of manures. Manure spreaders can be calibrated using the following processes.

Calibrating solid or semisolid manure spreaders.

The items needed are:

- A plastic sheet (6 ft. x 6 ft. or 10 ft. x 10 ft. is good, but any size will do)
- A scale (milk or bathroom scale)
- A bucket

1. Weigh the sheet with the bucket on the scale.

2. Lay the sheet in the field where manure will be spread. Place the sheet far enough into the field to get enough distance to put the spreader in gear and bring the tractor up to speed. Most spreaders apply less at the beginning and at the end of the load.

3. Drive the tractor and spreader directly over the sheet.

4. Fold the sheet so that no manure is spilled. Put the sheet in the bucket and weigh both on the scale.

5. Subtract the weight of the empty bucket and sheet (in step 1) from the weight of the sheet and bucket

filled with manure. This number is the weight of the manure collected on the sheet.

6. Repeat the procedure and determine an average for the two weights.

7. From Table 1 (under the size of sheet and pounds of manure on sheet), determine tons of manure applied per acre.

8. If the size of the sheet used or the pounds of manure collected is not on the chart, the following formula should be used to calculate tons per acre.

$$\frac{\text{Pounds of manure} \times 21.8}{\text{Size of sheet in square feet (length x width)}} = \text{tons of manure per acre}$$

TABLE 1. Manure Spreader Rate Calibration

Manure on sheet (lb)	Sheet Size: 6 ft. x 6 ft.	Sheet Size: 10 ft. x 10 ft.
	tons manure/acre	
5	3.0	1.1
6	3.6	1.3
7	4.2	1.5
8	4.8	1.7
9	5.4	2.0
10	6.1	2.2
11	6.7	2.4
12	7.3	2.6
13	7.9	2.8
14	8.5	3.1
15	9.1	3.3
16	9.7	3.5
17	10.3	3.7
18	10.9	3.9
19	11.5	4.1
20	12.1	4.4
21	12.7	4.6
22	13.3	4.8
23	13.9	5.0
24	14.5	5.2
25	15.1	5.4
26	15.7	5.7
27	16.3	5.9
28	16.9	6.1
29	17.5	6.3
30	18.2	6.5
31	18.8	6.8
32	19.4	7.0
33	20.0	7.2
34	20.6	7.4
35	21.2	7.6

TABLE 2. Manure Spreader Capacity

Spreader Size	Tons of Manure
In gallons[1]	
1000	4
2000	8
4000	16
In bushels[2]	
75	2.8
100	3.75
125	4.7
150	5.6
In cubic feet[3]	
100	3
200	6
300	9

[1] 1 gallon manure = 8 pounds
[2] 1bushel manure = 75 pounds
[3] 1 cubic foot manure = 60 pounds

Calibration of Liquid Manure Spreader

The items needed are a yardstick or tape measure and a string or rope.

1. Determine the manure spreader's capacity in tons or gallons using Table 2.

2. Tie the string around the tractor tire at the top of the tire. Mark the ground directly below the string where the tire rests on the ground. Pull the tractor forward until the string is again at the top of the tire (one revolution). Mark the ground again, as before. Using the tape, measure the distance between the two marks made on the ground. This is the distance the tractor moved with one revolution of the tire.

3. Spread the load, counting the number of times the rope comes to the top of the tire. Multiply the number of revolutions the tire made to spread the load by the number of feet the tractor moved in one revolution (step 2). This is the distance traveled to spread the load.

4. Measure the width (in feet) that the spreader is covering with manure.

5. Multiply the distance traveled to spread the load (step 3) by the width the spreader is covering with manure (step 4). Divide that number by 43,560 (the square feet in one acre). This is the number of acres covered.

6. Divide gallons or tons of manure applied (the spreader capacity found in step 1) by the number of acres covered (step 5). The result is the tons or gallons applied to that acreage.

Spreader capacity (step 1) = tons or gallons of manure applied per acre
Acres covered (step 5)

Once the rate being spread has been determined, adjustments in either tractor speed or spreader output may have to be made. After any change is made, the spreader should be recalibrated. It may take several tries to get the proper adjustment to apply the desired rate. When several passes are being made through the field, a small amount of the manure being spread should overlap what is on the ground from the previous pass. Too much overlap leads to over-application and too little gives a low application rate and poor distribution of nutrients. The following example and worksheet can be used to determine the application rate.

Worksheet for Calibrating Solid or Semisolid Manure Spreaders

	Example	Your farm
1. Weight of empty bucket and sheet	_____ lb.	_____ lb.
2. Weight of bucket and sheet with manure	_____ lb.	_____ lb.
3. Weight of bucket, sheet and manure (step 2) minus weight of bucket (step 1)	_____ lb.	_____ lb.
4. Tons applied per acre (from Table 1)	_____ lb.	_____ lb.

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5. If the table in step 4 cannot be used because pounds of manure on sheet or size of sheet are not listed, multiply the pounds of manure on sheet by 21.8, then divide that number by the size of the sheet used (in square feet)		28 lb. x 21.8 / 36 sq. ft.		xx lb. x 21.8 / xx sq. ft.
	=	16.9 tons/acre	=	xx tons/acre

Worksheet for Calibrating Liquid Manure Spreaders

		Example		Your farm
1. Spreader capacity in tons or gallons		_____ tons __4000__ gallons		_____ tons _____ gallons
2. Distance tractor tire covered in one revolution		____15__ ft.		_____ ft.
3. Number of tire revolutions to spread load		____80__ revolutions		_____ revolutions
4. Distance tractor tire covered in one revolution (step 2) multiplied by number of revolutions (step 3)		____15 ft __x__80 revolutions =__1200 ft. traveled		_____ ft._ _____ revolutions _____ ft. traveled
5. Feet traveled to spread load (step 4) multiplied by width manure is spread, divided by the number of square feet in one acre	=	1200ft x 15ft 43,560 sqft/acre ____0.4__ acres	=	__ft x ft 43,560 sqft/acre _____ acres
6. Amount of manure applied (step 1) in gallons or tons divided by acres in which it was applied (step 5)		__4000__ gallons _____ acres		_____ tons/gallons _____ acres
7. Quantity of manure applied per acre	=	10,000 gal/acre	=	_____ tons/gal/acre