

Liquid Manure Applicator Calibration

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Introduction

Sioux County, Iowa, has by far the highest concentration of livestock in northwest Iowa. According to the 1997 Census of Agriculture, there were 174,053 cattle and calves, and 762,294 hogs and pigs.

Land application of manure can create environmental risks to surface and ground water. The main objective of the Sioux County Manure Project is to (a) identify problems with manure application, and (b) develop information that livestock producers can use to improve management of manure as a fertilizer source, match manure nutrient application to crop needs, and reduce negative environmental impacts.

This segment of the project was developed to evaluate the actual rate of manure applied to a field and to compare that rate with the rate a producer thought was being applied.

Materials and Methods

Manure applicator tanks on the farm were weighed, full and empty, using portable weigh pads. To estimate gallons applied, the total of pounds applied was divided by 8.5. Total distance of the application was measured in the field by use of a measuring wheel. Distance/application \times width/application was used to calculate number of acres applied/tankful of manure. Total gallons applied/acre then was calculated.

Applicators were asked how many gallons they thought their manure applicator held and how many gallons/acre they were targeting for application. Not all applicators provided that information.

Results and Discussion

Table 1 shows the results of 15 applicators that were weighed and had gallons of capacity calculated. Average actual capacity of the manure tanks was 15% less than expected. The range of actual to expected gallons/tank was 71–101%. Sixty percent of the applicators were differed more than 10% in expected capacity.

Table 2 shows the results of applicators that supplied target application rate figures on a per-acre basis. It compares actual application rates to targeted rates producers were applying. Range for applied to targeted rate was 92–137%, with an average of 102% of targeted gallons applied. Only one applicator was more than 10% off the targeted rate of application.

Planning manure applications to match crop nutrient needs is important. However, these data indicate that it also is critical to calibrate manure applicator tanks to insure that application rates match planned rates.

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Table 1. Expected and measured capacities of liquid manure applicator tanks in northwest IA, 2001.

Applicator number	Measured capacity, Gallons	Expected capacity, Gallons	Measured capacity/Expected capacity
1	4162	4250	0.979
2	5450	6000	0.908
3	2350	3150	0.746
4	5785	7500	0.771
5	5510	7400	0.744
6	3760	4200	0.895
7	4345	4200	1.034
8	3675	4000	0.918
9	5090	4800	1.060
10	4020	5000	0.804
11	3261	4200	0.776
12	3768	4800	0.785
13	2200	3100	0.709
14	5967	7300	<u>0.817</u>
		Average:	0.849

Table 2. Targeted and actual application rates of liquid manure/acre in northwest IA, 2001.

Applicator number	Rate applied/acre	Target rate/acre	Applied rate/Target rate/acre
2	4085	4000	1.021
3	5859	6000	0.976
4	3664	3750	0.977
5	3670	4000	0.918
6	3241	3500	0.926
7	3845	3500	1.099
8	2722	3000	0.907
9	4800	3500	<u>1.371</u>
		Average:	1.024