

Calculating Dairy Manure Nutrient Application Rates

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Whether your goal is to manage manure application to balance for nitrogen (N) or phosphorus (P), knowing how much nutrient you are applying to your fields is a crucial step toward ideal manure management. Determining the relationship between the volume of manure and the amount of nutrients applied is essential.

This publication describes how to calculate nutrient application rates and calibrate waste-handling equipment. It covers typical equipment found on dairies. Nitrogen is used in the examples, but the same techniques can be used for phosphorus.

Generally, it is desirable to apply no more than 100 pounds of nitrogen per acre at a time. See the publications listed under “For more information” (page 5) to learn how to determine appropriate nutrient application rates for your crop and location.

Doing the calculations

To calculate nutrient application rates, you need to know three things:

- The concentration of nutrients in the manure
- How much manure (pounds or gallons) you have applied
- The area (square feet or acres) that received the application

Calculating rates with a stationary gun

1. Measure the amount of manure applied

Place several straight-sided, flat-bottom buckets in the area where the gun is to apply liquid. Run the gun for a predetermined amount of time (for example, 30

minutes) and then turn off the pump. Pour the contents of all the buckets into one bucket and measure the depth of the liquid. Divide the depth by the number of buckets. The result is the inches of liquid manure applied in 30 minutes. For example, let's say you applied ½ inch in 30 minutes.

2. Measure the area covered

To calculate the area of a circle, multiply the radius squared by 3.14. (The radius is half the diameter.) For example, if your stationary gun covers a circle that is 180 feet across, then the radius is 90 feet. Multiply 90 feet by 90 feet by 3.14 to get the total area in square feet (25,434 square feet). There are 43,560 square feet in an acre, so 25,434 square feet is approximately 0.58 acres:

$$\frac{25,434 \text{ ft}^2}{43,560 \text{ ft}^2/\text{acre}} = 0.58 \text{ acre}$$

3. Convert the inches applied to gallons

If you had an average of ½ inch of liquid manure in your buckets, you can assume you applied ½ inch over the 25,434 square feet.

- a. First, convert the square feet to cubic feet by dividing 25,434 by 24 (½ inch in the bucket is 1/24 of a foot). This is equivalent to 1,059 cubic feet of liquid manure.

$$\frac{25,434 \text{ ft}^2}{24} = 1,059 \text{ ft}^3$$

- b. Now, convert the cubic feet to gallons. There are 7.5 gallons per cubic foot, so multiply 1,059 cubic feet by 7.5. The result is 7,942 gallons pumped in 30 minutes.

$$1,059 \text{ ft}^3 \times 7.5 \text{ gal/ft}^3 = 7,942 \text{ gal}$$

