ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

ANR-889

Calibrating Poultry Litter Spreaders

Alabama produces more than 1.7 million tons of poultry broiler litter annually. Most of this is spread as fertilizer on cropland and forages. Poultry broiler litter is typically about a 3-3-2 fertilizer. To be used effectively by the crop, poultry litter, like any other fertilizer, must be applied uniformly at the recommended rate. This means that the truck driver or Certified Animal Waste Vendor (CAWV) must

- Know the rate to be applied
- Know the nutrient content of the litter
- Control the quantity of the litter spread
- Control the uniformity of the litter spread

Alabama CAWVs are required to follow a nutrient management plan (NMP) when applying litter to any crop on any farm. Without a NMP, recommended application rates may be severely restricted to protect surface and groundwater from leaching and runoff. Rates can vary from around 1 ton per acre up to around 3 tons per acre per application depending on the soil, soil test report, crop grown, time of year, and other factors. To apply litter uniformly and accurately, spreader trucks must be calibrated.

Litter spreaders can discharge litter at varying rates depending on

- Forward speed
- PTO speed
- Gear box settings
- Discharge opening
- Width of spread
- Overlap patterns/swath width

Using simple calibration procedures to define settings and travel speed, truck drivers and CAWVs can determine the rate and the uniformity of litter being applied.

Method 1. Know the load weight and spreadable acres in the field.

This method may be the easiest way to calibrate a spreader, but it can lead to problems in large fields where multiple loads must be applied. If you know how much litter is on the truck and how many acres you can spread on, the driver simply goes over the field 3 or more times and spreads the load uniformly. For example, if the bed holds 5 tons and there are 5 spreadable acres in the field, going back and forth throughout the field in a checkerboard pattern until the field is covered in at least 3 passes assures that exactly 1.0 ton per acre is uniformly spread over the entire field. This is time consuming and impractical for large fields.

If you don't know how much your truck holds, have it weighed. A rough estimation can be made by calculating the volume in the truck bed (cubic feet) and multiplying this by 31. *Poultry broiler litter weighs around 31 pounds per cubic foot.*

Method 2. Use a tarp or ground cover.

Another very simple way of estimating poultry litter application is to spread a large ground cover or tarpaulin in the field and collect the litter that falls on it. To do this you will need

- A bucket
- A plastic sheet, tarp, or old bedsheet (8 x 8 feet, 10 x 10 feet, 9 x 12 feet, etc.). Always measure purchased tarps; sometimes the dimensions on the package are before hemming.
- Scales

To measure the rate of application, use the following procedure:

1. Weigh the bucket to determine the empty weight; record this tare weight to be used later.
2. Locate a large, reasonably smooth, flat area where litter is to be applied.
3. Spread the sheet or tarp smoothly on the ground and secure the ends and sides with bricks or pins so that wind and spreader wheels will not move it.

4. Place flags in line with the center of the ground cover to enable the driver of the truck to travel in a straight line (Figure 1).

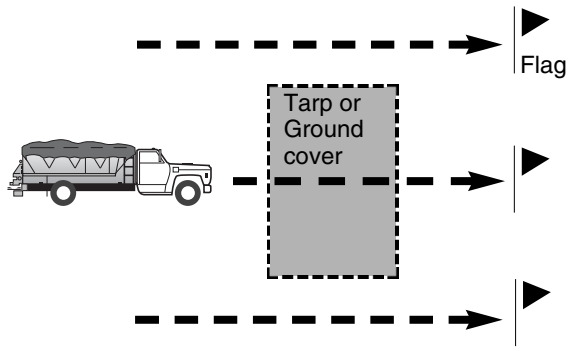


Figure 1. The tarp method

5. Start driving the spreader truck at normal application speed toward the ground cover, allowing the litter to begin leaving the spreader at an even, normal rate well before reaching the ground cover.
6. With rear outlet spreader trucks, make three passes. The first pass should be directly over the center of the ground cover. The remaining two passes should be on opposite sides of the first pass and should overlap as you would if spreading in a large field. If you usually drive in a circular pattern around a field, make all three passes in the same direction.
7. Collect all litter on the ground cover and pour into the bucket.
8. Weigh the bucket containing litter and subtract the empty bucket weight. *This is pounds of litter on tarp or ground cover.*
9. Use the following formula or refer to Table 1 to determine tons of litter applied per acre:

$$\frac{\text{(lb. litter on tarp) x 21.8}}{\text{sq. ft. in tarp}} = \text{tons/acre}$$

10. If the application rate is not within the desired range, make adjustments in the travel speed, discharge openings, chain speed, overlap patterns, or a combination of these settings. Each time you make adjustments, recalibrate the spreader to determine the new rate of application.

This procedure works well for dry litter. To determine the rate of application for wet litter and semisolid manures, make the following adjustments:

- Weigh both the bucket and the ground cover to obtain a tare weight (Step 1).
- Place both the ground cover and the litter in the bucket together to be weighed (Step 8).
- Subtract the weight of the bucket and the ground cover from the total weight to get the weight of the manure.

Table 1. Using a Tarp or Ground Cover to Determine Tons of Litter Per Acre

Pounds of litter on ground cover	Size of tarp or ground cover			
	8x8'	10x10'	9x12'	10x12'
	Tons of litter applied per acre			
1	0.3	0.2	0.2	0.2
2	0.7	0.4	0.4	0.4
3	1.0	0.6	0.6	0.5
4	1.4	0.9	0.8	0.7
5	1.7	1.1	1.0	0.9
6	2.0	1.3	1.2	1.1
7	2.4	1.5	1.4	1.3
8	2.7	1.7	1.6	1.4
9	3.1	2.0	1.8	1.6
10	3.4	2.2	2.2	1.8
11	3.7	2.4	2.2	2.0
12	4.1	2.6	2.4	2.2
13	4.4	2.8	2.6	2.4
14	4.8	3.0	2.8	2.5
15	5.1	3.3	3.0	2.7
16	5.4	3.5	3.2	2.9
17	5.8	3.7	3.4	3.1
18	6.1	3.9	3.6	3.3
19	6.5	4.1	3.8	3.4
20	6.8	4.4	4.0	3.6
21	7.2	4.6	4.2	3.8
22	7.5	4.8	4.4	4.0

Method 3. Use the pan method to determine the uniformity of application.

Most old spreader trucks don't do a uniform job of distributing litter behind them. A spreader pattern that is too narrow or too wide can also create problems. This can result in streaks of dark, green growth between streaks of not-so-green growth. When this happens, customers are not very happy, poultry litter is wasted, and the risk of leaching and runoff increases. Sometimes, simple adjustments to the divider plate, chain speed, spinner speed, or gate opening can correct the problem. Determining the uniformity of application is also a precise way of determining the best width of the spreader passes across a field. Fertilizer dealers use this method to precisely calibrate their spreaders for chemical fertilizer that has to be applied uniformly at low rates.

The pan method involves more effort than the other methods. To use it you will need 11 of the

same size plastic pans. Rectangular dishpans work well. Use the following procedure:

1. Place pans 3 feet apart (Figure 2). Pans on either side of the center pan should be 6 feet from center to allow the spreader truck to pass over the center pan.

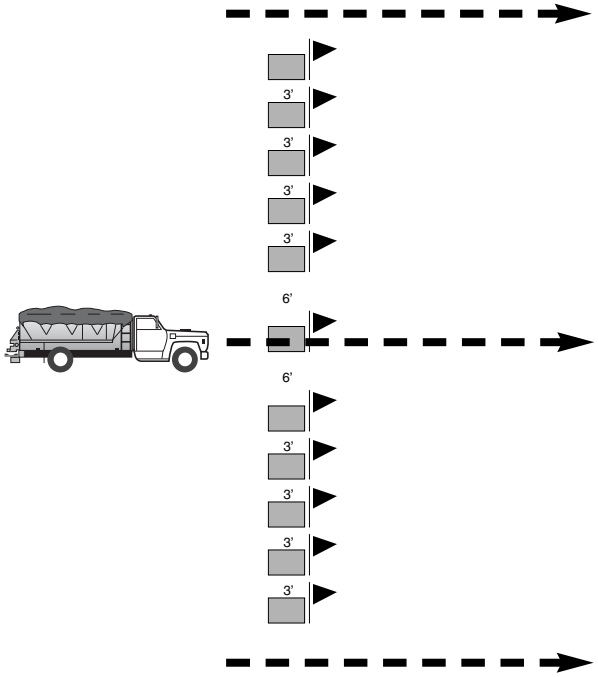


Figure 2. The pan method

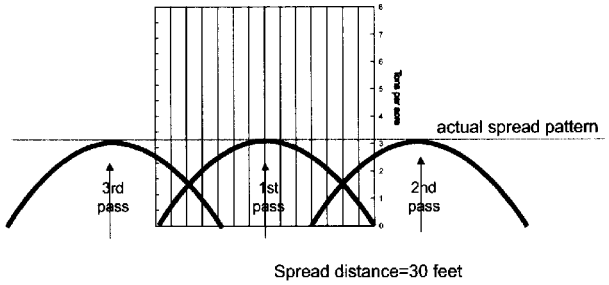
2. Place a flag at each pan so the pans can be returned to the same spot later.

3. Make three passes over the pans as you did with the ground cover. The first pass should be over the center pan and the other two passes on either side of the pans at your estimated, appropriate spread distance.

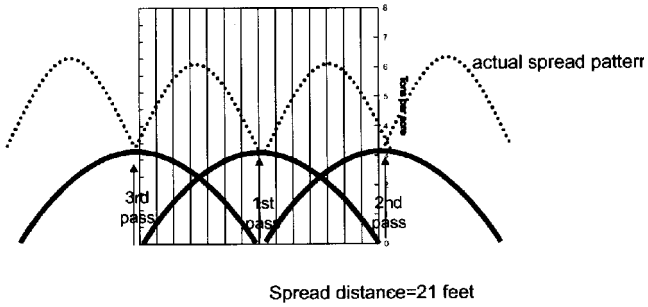
4. Compare the amount of litter in each pan. Use visual inspection or weigh the litter using a top-loading, portable balance that will weigh accurately in grams. Weights can be plotted to get a visual image of the uniformity of application (Figure 3).

5. If distribution is not uniform, adjust either the swath width or the deflector plate to obtain an even distribution of litter. The deflector plate determines where the litter will be deposited on the spinners. Move the deflector plate toward the front of the truck or spreader and more litter will be deposited toward the center of the spinners. Move the deflector toward the back of the truck or spreader so more litter will be deposited toward the outer edges of the spinners. This procedure may require several trial-and-error passes before you can obtain an acceptable distribution.

Example: Ideal pass width



Example: Pass width too narrow



Example: Pass width too wide

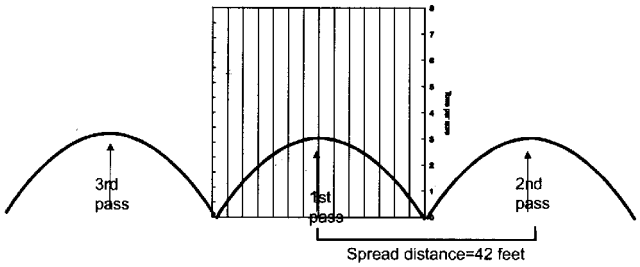


Figure 3. Adjusting uniformity of distribution using the pan method

Summary

By measuring the application rate and uniformity of litter spreading, the customer can be assured of getting the amount of needed crop nutrients and of reducing environmental risks. These measurements, called calibration, can be accomplished with little time and very little expense.

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