Calibrating Poultry Litter Spreading Equipment

Proper nutrient management is a vital part of any agricultural enterprise, particularly for those using manure nutrients. Advances in soil, plant, and environmental sciences and nutrient management techniques have enhanced our ability to develop nutrient management plans that enable producers to maximize use of manure nutrients and minimize potential risks to water and soil quality.

Proper use of nutrients from animal manures is not only important for preserving soil, water and environmental quality, but it has become important for economic reasons as the cost of commercial fertilizers continues to increase. Application of nutrients beyond crop needs not only increases the potential for nutrient loss from fields, it is also waste of valuable fertilizer that could be sold and generate revenue. Calibrating litter spreaders (knowing the rate of litter application under certain conditions) is important to assure proper nutrient management and maximize the economical use of manure nutrients.

Calibration of manure and litter spreaders typically uses techniques designed for calbrating commercial fertilizer spreaders. Precision calibration for commercial fertilizer spreaders is very important for obvious economic reasons. But calibrating litter spreaders can vary because of differences in material density, handling and flow characteristics, and particle size, especially when spreading cake-out litter.

One of the most recommended methods of litter spreader calibration is referred to as the "tarp method." The procedure outlined below is a modified version of the tarp method that works well for poultry litter spreader calibration. One person can easily preform spreader calibration in only a few minutes.

Materials needed: Six small plastic tarps of the same size (most common sizes, such as 8'x 8', 8' x 10' or 10' x 12', will work), a bucket or other weighing container, a scale and a calculator.

Step 1: Place the six tarps in a row on a flat area. Pin the corners and centers of the tarps where they meet with spikes or heavy weights. Do not overlap the tarps.

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Step 2: Drive the spreader over the center of the six tarps (where the third and fourth meet). Operate the spreader several yards before and after you drive over the tarps. Operate the spreader as you would in the field, and record gear selection, engine RPMs, spreader gate opening, spreader hydraulic flow control setting, or any other information that could affect the rate of litter application.

Step 3: Assess the spread pattern of litter on the tarps. Estimate the width of the area of heaviest application and the width of lesser application on the edges of the spread pattern. Use this information to estimate the distance needed between spreader passes to get a uniform application over all tarps. On later passes, overlap the thin edges of the spread pattern, but do not overlap the areas of heaviest application.

Practice trials at Mississippi State University show drastically different spread patterns and rates of application between litter from a complete house cleanout and caked litter removed between flocks with litter cake-out equipment. Be sure to calibrate equipment using the type of litter you will apply.

Step 4: Make a pass on each side of the first pass at the appropriate distance estimated in Step 3. If you do it at the correct distance, you will get an even application of litter across all areas between the centerline of the second and third pass.

Step 5: Collect the litter deposited on each of the four middle tarps individually. You can pour the litter into a bucket (pictured above), or simply fold the tarp up with the litter inside, and place the tarp and litter in the bucket. If you do this, be sure to weigh and record the weight of the bucket and tarp together before spreading the litter on the tarps. The four middle tarps represent what the average application rate would be in the field when you consider overlapping passes. The outer two tarps are for helping to evaluate spread pattern width, particularly for caked litter, which is often wider than the middle four tarps.

Step 6: Weigh the bucket and litter (or bucket, tarp, and litter). Record the empty weight of the bucket before collecting the litter on the tarp. Subtract the weight of the empty bucket (or bucket + tarp) to calculate the weight of the litter material applied. Do this for each of the four middle tarps. For example, the bucket and the litter in the picture above weigh 9.75 pounds, and the empty bucket weighed 1.75 pounds. So, the litter applied to the tarp weighed 8 pounds.

Step 7: Calculate the rate of application for each of the four middle tarps. Use this equation (taken from the Poultry Waste Management Handbook):

$$\frac{\text{(pounds of litter on tarp) x 21.78}}{\text{area of the tarp (square feet)}} = \text{tons of litter/acre}$$

For example, 8 pounds of litter multiplied by 21.78 and divided by 80 (our tarps in this example were 8 feet x 10 feet) equals an application rate of 2.18 tons of litter per acre (21.78 is a constant previously determined).

Step 8: Repeat the procedure several times to get a reliable average. If the rate of application is higher or lower than the desired rate based on nutrient management planning, then make equipment adjustments (RPMs, flow controls, gate opening) and/or drive the equipment faster or slower.

This procedure is inexpensive. The tarps used in our calibration trial cost $5 each, for a total of $30. The small dial scale was purchased at the local cooperative for $35, but you can use any reliable scale you may already have. Most people have buckets around the farm, and most people already own a simple handheld calculator. Most cell phones also have built in calculators. So, total costs should be less than $70, and you can use the tarps and scale over and over to do future calibrations if equipment, litter type or desired rate of application changes.

Reference

Collins, E. R., J. C. Barker, L. E. Carr, H. L. Brodie and J. H. Martin, Jr., 1999. Chapter 7: Application Equipment. in Poultry Waste Management Handbook. Natural Resource, Agriculture, and Engineering Service (NRAES), Ithaca, New York.

By **Dr. Craig D. Coufal**, Assistant Extension Professor, Poultry Science; and **Herb Willcutt**, Extension Professor, Ag & Biological Engineering

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