Delaware Nutrient Management Program

DELAWARE CONSERVATION PRACTICE STANDARD

CALIBRATING POULTRY LITTER AND OTHER SOLID MANURE SPREADERS

(Reported for each spreader)

DEFINITION

The measurement of the weight of discharged manure over a known area from a manure spreader to determine the actual application rate per acre.

PURPOSES

For purposes of this standard, calibrate manure spreaders for the following reasons:

1. Most spreader manufacturers provide recommendations (either in the user's manual or printed on the spreader) for the spreader settings and travel speeds required for different manure application rates. However, for a given spreader setting, application rates can vary significantly due to manure moisture content, manure type (crust vs. total clean-out), and bedding characteristics. Therefore, the recommendations from spreader manufacturers are only estimates and will not be correct for most farming operations. Only through field calibration can the correct spreader settings be determined to achieve the required application rate.

2. Calibration of a manure spreader will help achieve the maximum economic value of the nutrients in the litter.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all farming operations that land apply poultry litter and other solid manures.

CONSIDERATIONS

Calibration should be performed each season. In addition, calibration should be performed as manure type (crust vs. total cleanout) and moisture content change. Calibration should also be performed to reflect changes in nutrient content of the litter. Factors influencing litter composition include; litter age and storage location, poultry type, composition of diet, litter amendments, and other management-related variables.

Spreaders should be calibrated for each application rate required while operating under calm conditions. The discharge and distribution of dryer manures like poultry litter which contain a large quantity of small particles can be significantly affected by wind, and calibration should be performed under conditions of less than 5 MPH.

Keeping the conveyor chain, end gate, and spinners clean from manure build-up is important to achieve consistent application rates. Also, check and maintain recommended spinner speeds to insure a consistent spread pattern.

Several companies make GPS-based guidance devices for agricultural equipment. These devices provide operators with precision guidance information for accurate driving in either straight or curved fields during fertilizer and manure spreading. Use of these tools will help insure proper swath width between each spreader pass. GPS tracking can also be used effectively for spreader calibration when determining the area covered while spreading.

CRITERIA

General Criteria Applicable to All Purposes

Manure spreaders can be calibrated in one of three ways:

1. Tarp Method - Place a tarp on the field. Spread manure on the tarp, and then weigh the manure collected. This should be repeated three times to determine the average application rate. Excessively smooth tarps like clear plastic will allow manure particles to escape the test area, and may lead to inaccurate results.

2. Swath Width and Distance Method - Determine the weight of a spreader load. Measure the swath width and how far you travel to empty a full load. Use the weight and area covered to determine the application rate.

3. Loads Per Field Method - Determine the weight of a spreader load. Count the number of loads applied to a field. Use the total weight of manure and the number of acres covered to determine the application rate. If you are not able to weigh your spreader, for estimation purposes, you can convert the volume capacity of your equipment to pounds. Although the bulk density of litter can be highly variable, the "average" litter can be converted to pounds using the following formula; 1 cubic foot of litter = 30 pounds and 1 bushel of litter = 35 pounds.

Once the application rate of the spreader is determined, the spreader should be adjusted and the application rate measured again until the desired application rate is achieved. To adjust the application rate, the following can be changed:

- Height of the Endgate - This is usually the most effective way to make changes in the application rate.
- Driving Speed - This approach can be used for spreaders equipped with PTO-driven conveyors. Ground speed should be changed by choosing a different tractor gear, not by increasing or decreasing engine speed. For spreaders that are ground-driven, changing driving speed is not an effect method for adjusting the application rate.
- Speed of the Conveyor - If the spreader is equipped with multiple drive sprockets or has a hydraulic conveyor drive, change the speed of the conveyor drive shaft to increase or decrease the conveyor speed.

For more information on spreader calibration methods, contact one of the University of Delaware Cooperative Extension offices or your County Conservation District.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure successful implementation of this practice. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

OPERATION AND MAINTENANCE

A Site specific operation and maintenance (O&M) plan shall be developed and reviewed with the operator and owner prior to implementation of the practice. The O&M plan shall be consistent with the purposes of the practice, safety considerations, and other instructions provided by the equipment manufacturer.

Equipment shall be operated at speeds and conditions recommended by the manufacturer, and maintenance schedules will be based on the schedules recommended in the operator's manual.

The O&M plan shall detail all safety precautions necessary when operating spreader equipment.

The O&M plan shall provide for record keeping in sufficient detail to document the material used, the date, location, rate, method of

application, and test method performed (including nutrient analysis and calibration results).

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Location of the practice on the conservation map.
2. Calibration results for each spreader and application rate.
3. Application methodology, including timing, equipment, instructions, etc.

REFERENCES

1. March, L., G. Mullins, S. Ambler, and R. Heidel. Manure Spreader Calibration for Rear-discharge Equipment -- Handling Solid and Semi-solid Manures and Poultry Litter. Virginia Tech Fact Sheet 442-004. May, 2009.

2. Worley, J., P. Sumner, and T. Bass. Calibration of Manure Spreaders. University of Georgia Cooperative Extension Service.

3. Glancey, J.L. 2001. Equipment for effective poultry litter management. Delaware Nutrient Management Notes. 2 (1): 1-3.