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- Timing setbacks/isolation.
- Manure/effluent nutrients and other constituents.
- System performance.

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Land Application Equipment

Developing an environmentally friendly land application system for manure requires proper management and careful review of application equipment. The producer’s willingness to consider manure and other livestock byproducts as a nutrient resource rather than as waste is critical. Manure application equipment must be selected and managed as fertilizer-spreading equipment rather than waste disposal equipment. A producer’s primary objective needs to be efficient use of manure nutrients.

The appropriate management of a manure application system determines if that type of application equipment will continue to be used after it has been purchased. The proper location and selection of application sites and of equipment is no assurance that problems will be eliminated. Manure spreading or spraying activities must be planned and managed to prevent nuisances and an adverse impact on groundwater, surface water, public health, and plants. The prevention of adverse impacts is accomplished by managing

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Degradation of any aspect of the environment warrants re-evaluation of the use of a selected manure application system.

Equipment calibration

You can avoid the potentially adverse effects of overfertilization on ground and surface water by applying only the amount of manure, effluent, or wastewater necessary to maintain soil fertility for crop production. The calibration, or combination of settings and travel speed needed to uniformly apply manure, bedding, or wastewater at a desired rate, of manure-spreading equipment is important because it tells you the amount of manure and wastewater that you are applying to an area. Knowledge of the application rate and nutrient concentration of manure nutrients lets you apply manure at agronomic rates.

Why calibrate?

- Verify actual application rates
- Troubleshoot equipment operation
- Determine appropriate overlaps
- Evaluate application uniformity
- Identify “hot spots” or areas of deficient application
- Monitor changes in equipment operations, such as usage and “wear and tear”
- Determine changes in manure consistency or “thickness”

Simply put, calibration enables producers to know how much manure they are applying. Knowing the actual application rate allows them to apply manure and nutrients at specific rates that meet the needs of growing crops. Calibration also ensures that rates do not exceed state or local regulatory limits or the conditions expressed in a livestock facility’s operating permit.

Regular calibration can be used to troubleshoot problems that may be occurring in an application system. Application rates, uniformity coefficients,

spread widths, and application patterns can be compared to previous calibration results, highlighting specific operational conditions that may require maintenance, repair, or replacement. At a minimum, equipment that applies manure, litter, or lagoon effluent should be calibrated annually. For larger operations, producers should consider a more frequent schedule.

During calibration, the required or appropriate overlap can be determined. Overlap distances and travel lane widths are best determined by measuring the distribution of applied material across the spread pattern. Rain gauges, tarps, or disposable baking pans can be used to collect the applied manure before it is weighed or measured. Many times, visual estimates of desired overlap can be misleading. Due to variations in spreader volume and changes in manure moisture content and density, this is especially true when calibrating litter or solid manure spreaders. Sprinkler overlaps, typically calculated to be the points where an area is receiving less than half of the average catch across the spread width, generally vary between 50 to 80, depending on sprinkler type and wind conditions.

Ensuring application uniformity is extremely important to meeting a crop's nutrient requirements while protecting the environment. Application equipment should be maintained and operated so it applies a given application rate as evenly as possible across a field. "Hot spots" or areas of overapplication due to operator error and noncalibrated or worn equipment may increase the occurrence of runoff or ponding, an accumulation of nutrients or metals, crop lodging, or excessive nutrients moving into shallow groundwater. Areas of low application will not produce the realistic yield that could be achieved on the site, leaving unused nutrients that accumulate or are lost to the environment.

As equipment is used and gets older, it loses efficiency, increasing the need for calibration. The loss of efficiency or performance may result in poorer application uniformity or changes in application rate. These factors are compounded due to the solids, acidity, and salts found in manure, litter, and wastewater. To monitor system performance, irrigation systems that pump liquids with high solids or with significant crystal buildup should be calibrated on a regular basis.

Lastly, equipment should be calibrated in response to changes in manure "thickness." When a manure storage is emptied, a higher amount of solids will be removed and applied to fields. As the manure density increases, re-calibrate the equipment to ensure that the application rate is within acceptable limits. Spreaders should also be re-calibrated when a material is applied that is wetter or drier than the litter or manure spread during the previous calibration.

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Calibrating your spreader...is a simple, effective way to use the nutrients in manure more effectively.