A 319(h) Nonpoint Source Water Quality Project

Land Application of Feedyard Manure and Compost

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Objective

Sustain and support the long-term availability of off-site manure transfers as a manure- and nutrient-management tool for cattle feeders without increasing the risk of nonpoint-source (NPS) water pollution in cattle-feeding-intensive watersheds.
Audiences

• Third-party contractors
  o Feedyard manure-harvesting personnel
  o Manure haulers/spreaders
  o Composters

• Farmers
  o Historical manure users
  o Those “on the bubble”

• Agencies
  o USDA-NRCS
  o EPA R6, TSSWCB, TCEQ
  o SWCDs
CALIBRATING MANURE AND COMPOST SPREADERS

“What we said” = “What we did”
Why Calibrate?

How well does the spreader’s output match the whole-field target?
The Methods

Whole-field vs. Single-pass
Whole-Field Calibration

- Really not a “spreader calibration” per se
- Stacking 5,000 tons in the corner of a 500-acre pivot
- Target application = 10 tons/acre (as received)
- But does the truck put out 10 tons/acre?
Single-Pass Calibration

• Helps answer that question
• Helps:
  o Match spreader output to whole-field application target
  o Avoid shorting, overapplication
  o Optimize overlap of adjacent swaths
  o Optimize ground speed or engine RPM
Calibration Demos
Single-Pass Calibration Kit

- Collection tarps
  - 112” x 28” = 1/2,000 acre (centerline)
  - 56” x 56” = 1/2,000 acre (offset)
- Tarp weights
- Weighing tarp
- Fisherman’s scale
1 lb on CL tarp = 1 ton/acre
Consistently Inconsistent

**Measured vs. Target Application Rate**
Average 13.3 tons per acre +/- 7 tons per acre (n=18)
Compost Application vs Tarp Position
(Single Pass Method, Application Rate 3 Tons/acre)

- Left of Center
- Center
- Right of center

Tons/acre

1 1.5 2 2.5 3

1 2 3
There’s More To It

Accounting for overlap of adjacent passes
How do you calculate application rate when there is overlap by the spreader?

Tarp Configuration

25ft

Application width 40ft
Mean Application Rate

- Spreader capacity (tons), $C_T$
- Time to empty (minutes), $t_D$
- Ground speed (mph), $v$
- Distance between adjacent pass centerlines (feet), $X$
Mean Application Rate

\[
\overline{AR} = \frac{495 \cdot C_T}{X \cdot v \cdot t_D}
\]
13 ton spreader capacity; empties in ~5 minutes
Rule of Thumb

To optimize uniformity, the spacing between adjacent passes should be about $\frac{1}{2}$ the width of the spreader pattern, if ground speed and discharge speed permit.
Compost Application Measurement With Overlap (Application Rate 2 Tons/Acre)

Avg of Left & Right Tarp Measurements  Avg of Center Tarp Measurements

Tons/acre

1 2 3 4 5 6

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