MANAGING FOR MANURE CONSISTENCY IN APPLICATION

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BECKY LARSON

Biological Systems Engineering
UNIVERSITY OF WISCONSIN–MADISON

UW Extension
University of Wisconsin–Extension

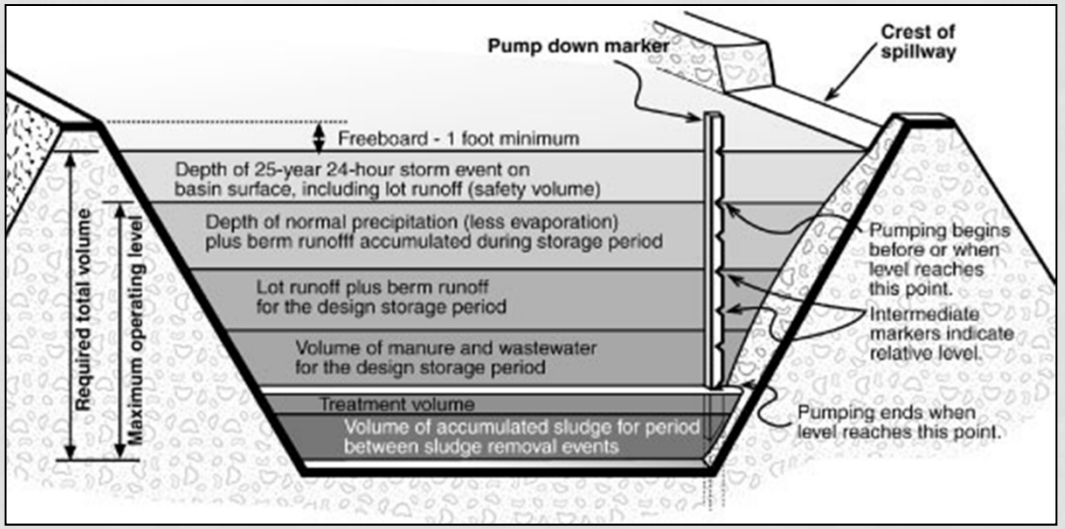
MANURE INCONSISTENCIES

- Manure has distinct variation in solids & nutrient content
- Can cause inconsistencies in application (over and under application in manure) and environmental consequences or crop yield losses
- Application rates are determined by manure analysis results, particularly application of additional nitrogen based on applied manure rates
- Consistency in manure can reduce application inconsistencies
- Agitation and sampling frequency are key aspects to reducing these inconsistencies
- Further steps down the line are not effective if the values for application are incorrect

MANURE VARIATION

Caused by:

- Animal type
- Diet
- Additional by-products
- Bedding material
- Storage



WHY IS MANURE CONSISTENCY IMPORTANT?

- Consistency in manure is critical for
  - Environmental health
  - Regulations in application
  - Adequate application rates for crop needs

STORAGE IMPACTS

- Stratification
- Settling of solids and nutrients
- Increased solids and phosphorus in settled material
- Nitrogen losses

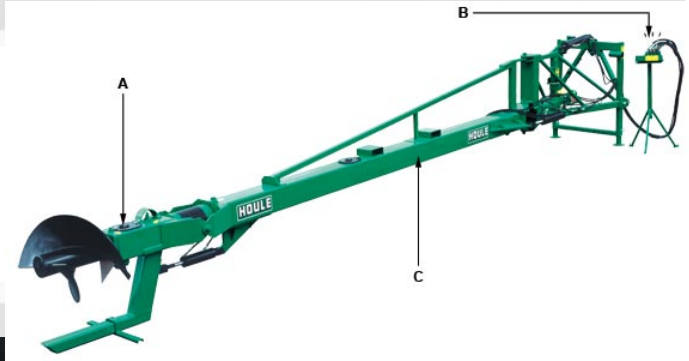
PROCESSING IMPACTS

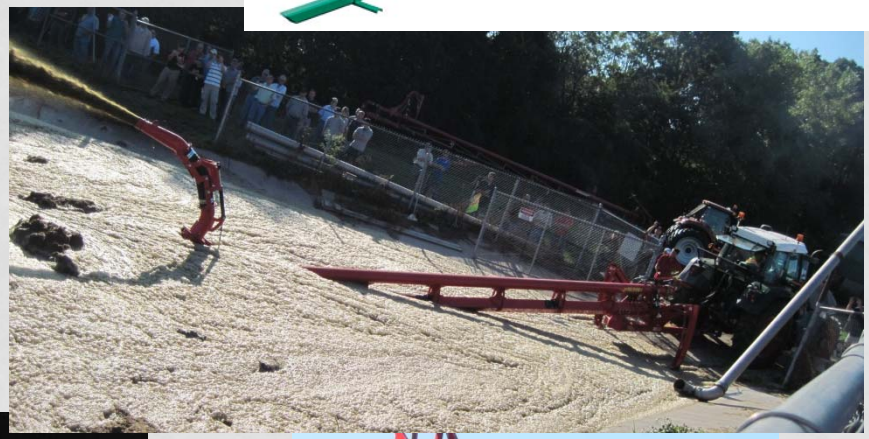
- Solid removal can impact settling velocities and agitation/re-suspension
  - Effect nutrient content
- Sand removal

AGITATION/MIXING PRACTICES

- Key to obtaining uniformity in manure applications
- Can limit variability significantly
  - Dou et al. 2001
  - 6-8% variability without agitation
  - 20-30% variability with no agitation
  - Limited data
- How much agitation is enough agitation?

MANURE AGITATION

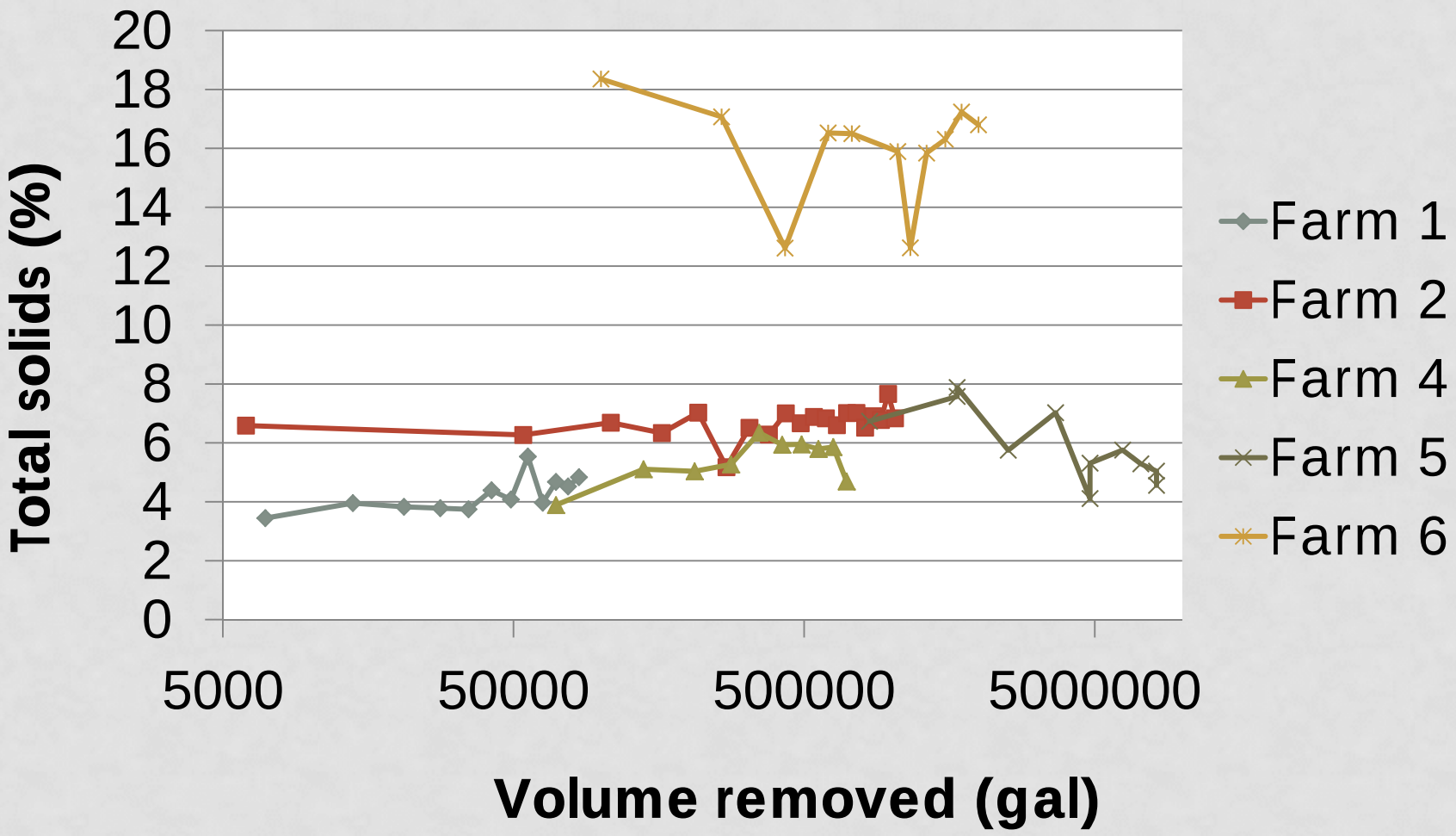




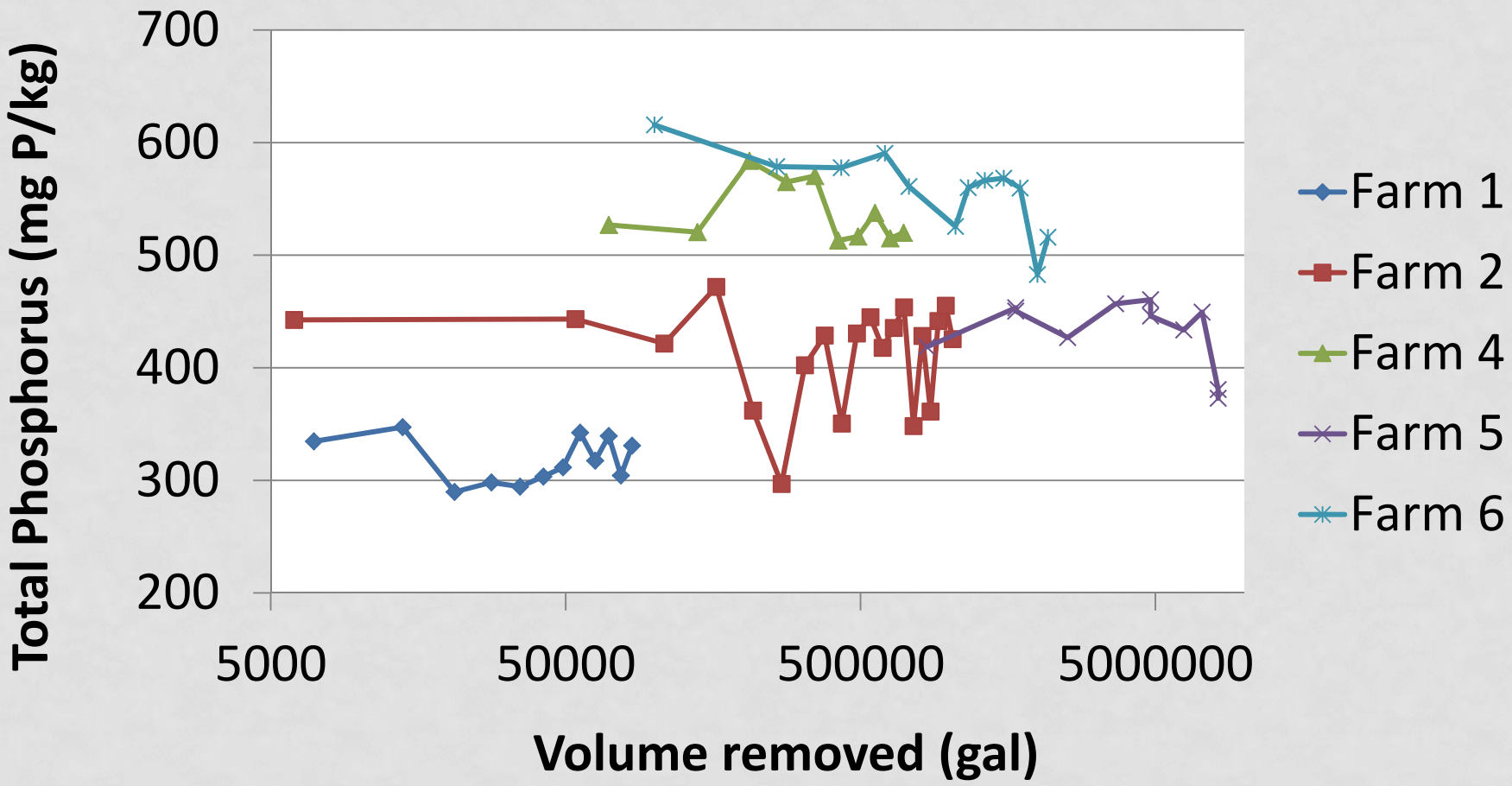
PRELIMINARY DATA
FARM MANURE STORAGE DETAILS AND AGITATION PRACTICES

- Farm 1 – 1.5 million gallon storage at capacity, small boat agitator (2000 gpm)
- Farm 2 – 1.2 million gallons 95% full, Houle agitator
- Farm 4 – 5 million gallons 80% full, boat agitator
- Farm 5 – 7 million gallon storage at 80% capacity, Houle 40’ agitator moving around pit edge (move once an hour)
- Farm 6 – 1.5 million gallon storage at capacity, boat agitator run constantly

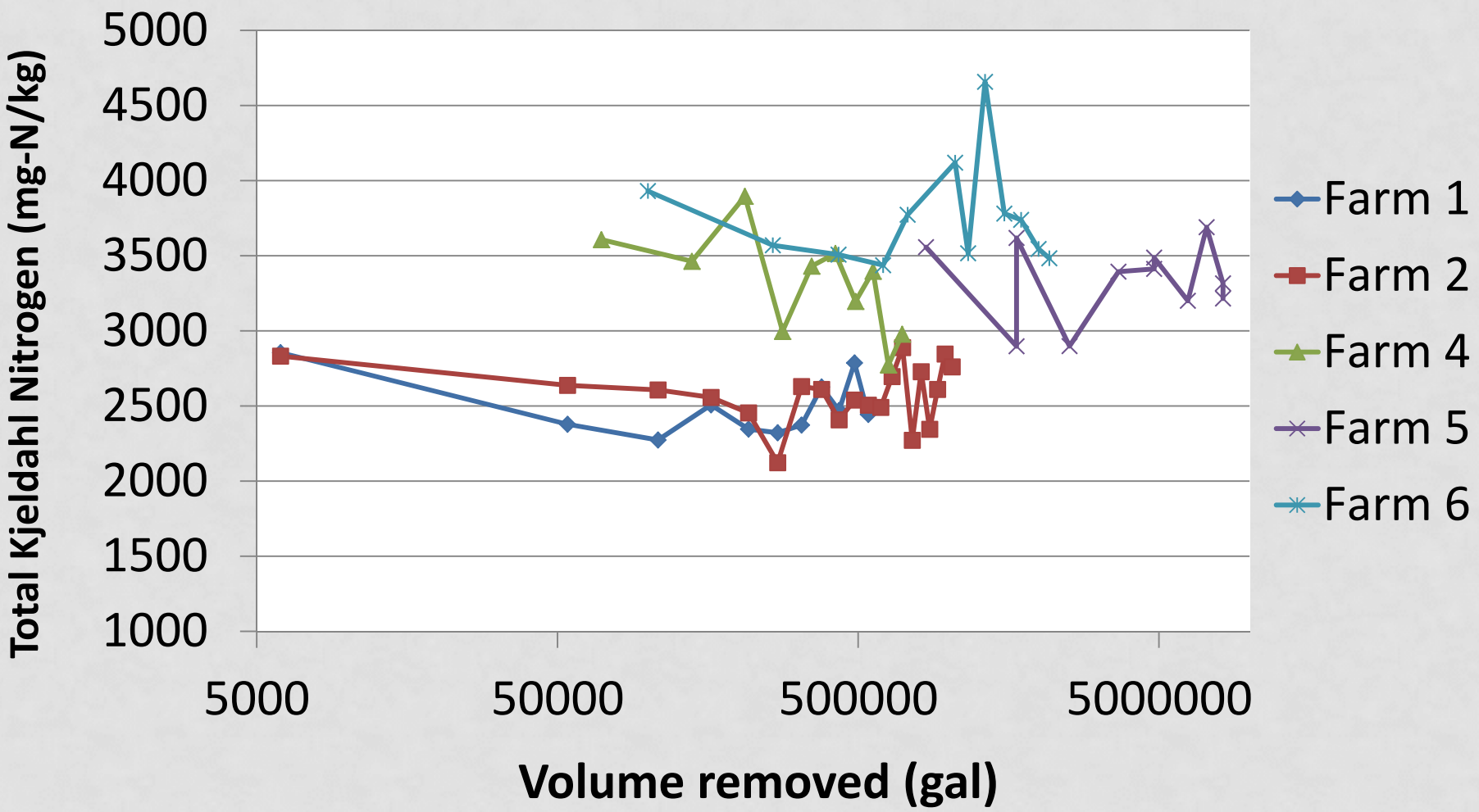
TOTAL SOLIDS



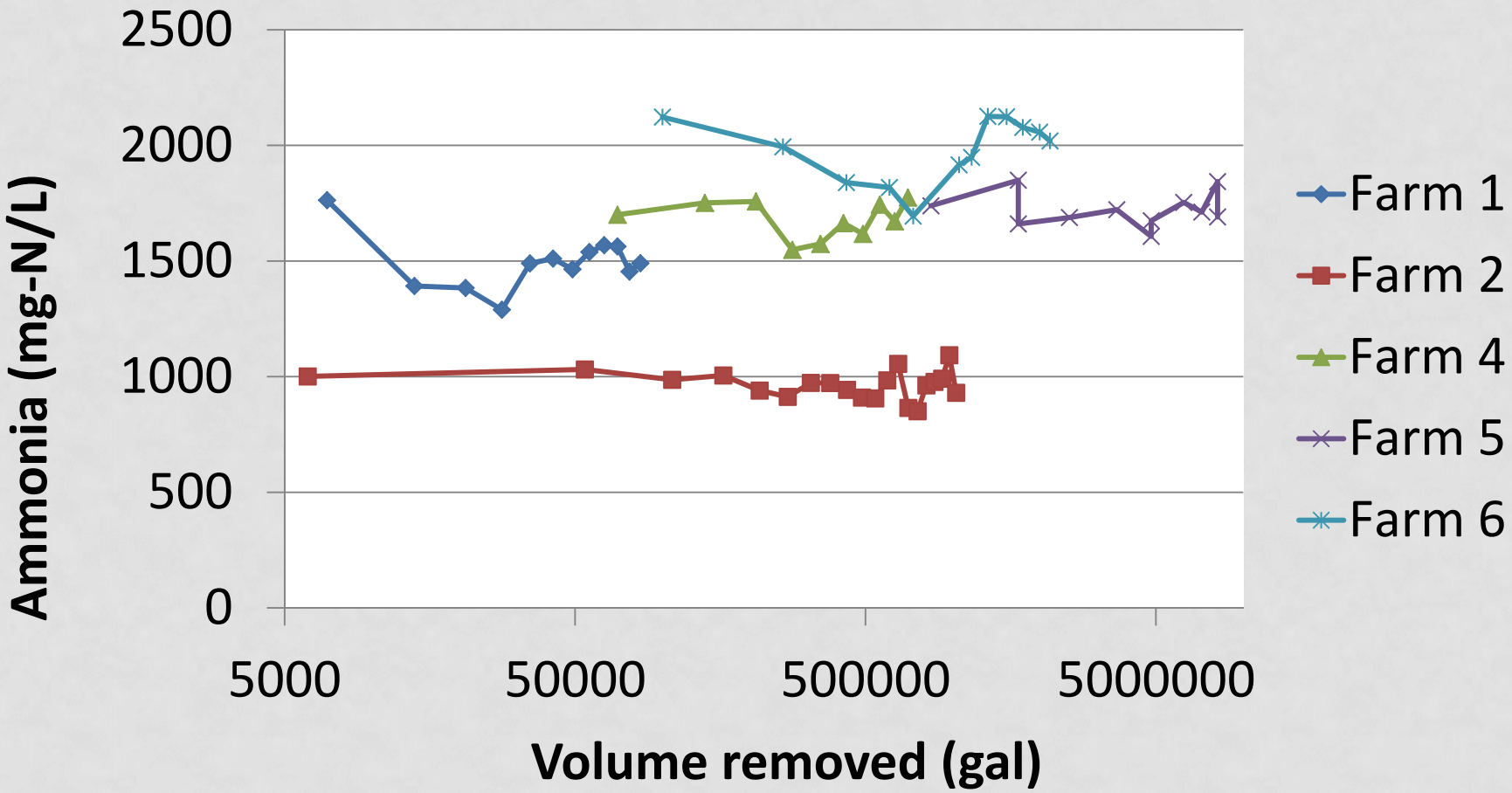
TOTAL PHOSPHORUS



TOTAL KJELDAHL NITROGEN



AMMONIA


2500
2000
1500
1000
500
0
Ammonia (mg-N/L)
5000
50000
500000
5000000
Volume removed (gal)
Farm 1
Farm 2
Farm 4
Farm 5
Farm 6

DATA VARIATION

Parameter	Min	Max	Avg
Ammonia	4%	10%	6%
TS	7%	21%	16%
TKN	8%	15%	9%
TP	5%	12%	8%

AGITATION MANAGEMENT

- Equipment selection
- Constant agitation
- Regular movement of equipment
- Break crust
- Solid suspension
- Sand re-suspension

SAMPLING

- Obtain a representative sample
- Agitate while sampling
- Composite
  - 5 samples required with agitation
  - 40+ samples required without agitation
- Individual or composite samples?
  - Do you agitate?
  - Composite samples may be adequate
  - Multiple composite samples may be needed
  - Evaluate other limitations in your system
  - Cost is an important factor

LAND APPLICATION - TANKERS

- May incur some settling
- Do not allow tankers to sit full
- Load while agitating

LAND APPLICATION – PUMP

- Location of pump inlet is critical
- Determine solids content – necessary for operational requirements
- If pumping only the top of the storage may want to take multiple composites samples

THANK YOU!

Becky Larson
ralarson2@wisc.edu
(608) 890-3171