Monitoring for Manure Management

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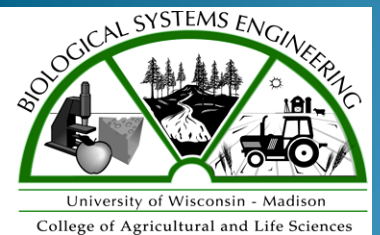
Wisconsin Crop Management Conference

January 16, 2014



Focus Topics for Today

- Methods for monitoring liquid dairy manure dry matter content.

- What does dairy manure dry matter say about total phosphorus content for WI manures ?

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So why do you want to know manure dry matter content?

- Better manage injected manure / nutrient loss risk through sub-surface tile drains

  Field observations suggest reduced tile loss risk for dry matter content greater than 5%, Gibbs (2013).

- Some studies suggest you can estimate manure total phosphorus content from dry matter content.

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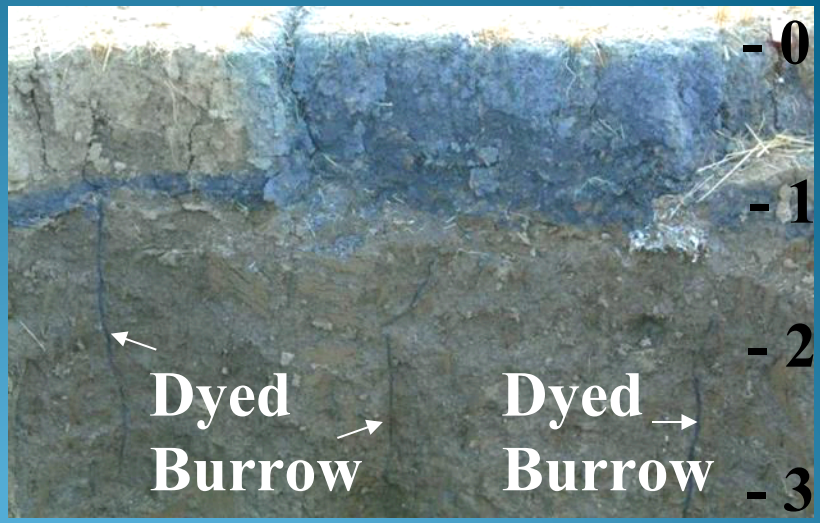
How manure gets into tiles . .

Pressurized flow via preferential pathways

- Biopores
- Structural cracks



Source: M. Shipitalo, USDA - ARS

Manure flow through tiles

Monitoring Liquid Dairy Manure Dry Matter Content

Laboratory Method – the gold standard, takes time.

Recommended Methods of Manure Analysis UWEX Publication No. A3769, Edited by John Peters . Available at: *learningstore.uwes.edu.*

Essentially weighing, drying and weighing again. High quality control.

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Monitoring Liquid Dairy Manure Dry Matter Content

Quick Methods are simple, quick & inexpensive and may be accurate enough.

Quick methods should be used along with laboratory methods and NOT in place of laboratory methods

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Monitoring Liquid Dairy Manure Dry Matter Content

Quick Methods

Advantages

- Simple, quick and inexpensive
- Equipment is easy to obtain and operate
- Provides reasonably accurate result for the same manure type and source

Disadvantages

- Less accurate and precise than laboratory methods
- Needs calibration for manure type and source
- Can be impacted by local conditions (ex. climate, operator skill level, variations in method)

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Monitoring Liquid Dairy Manure Dry Matter Content

- Hydrometer Method
- UW – BSE In-Field Liquid Dairy Manure Solids Tester

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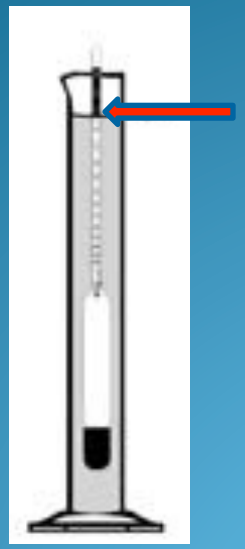
Monitoring Liquid Dairy Manure Dry Matter Content

Hydrometer Method

The hydrometer test method for estimating P content of liquid manure is based on the tendency for manure P to associate with the solids. The method has been used successfully in the Mammoth Cave area of Kentucky.



Coefficient of determination (R^2) for hydrometer quick test for several farms in the Mammoth Cave area, KY.

Parameter	**R^2**
Total Solids	0.76 – 0.81
Total P	0.93

Source: Bicudo, 1991

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Monitoring Liquid Dairy Manure Dry Matter Content

UW – BSE In-Field Liquid Dairy Manure Solids Tester

- Designed and prototype built for a BSE Senior Design Capstone class project.

- The initial prototype was further evaluated using additional farms with digested manure solids bedding.

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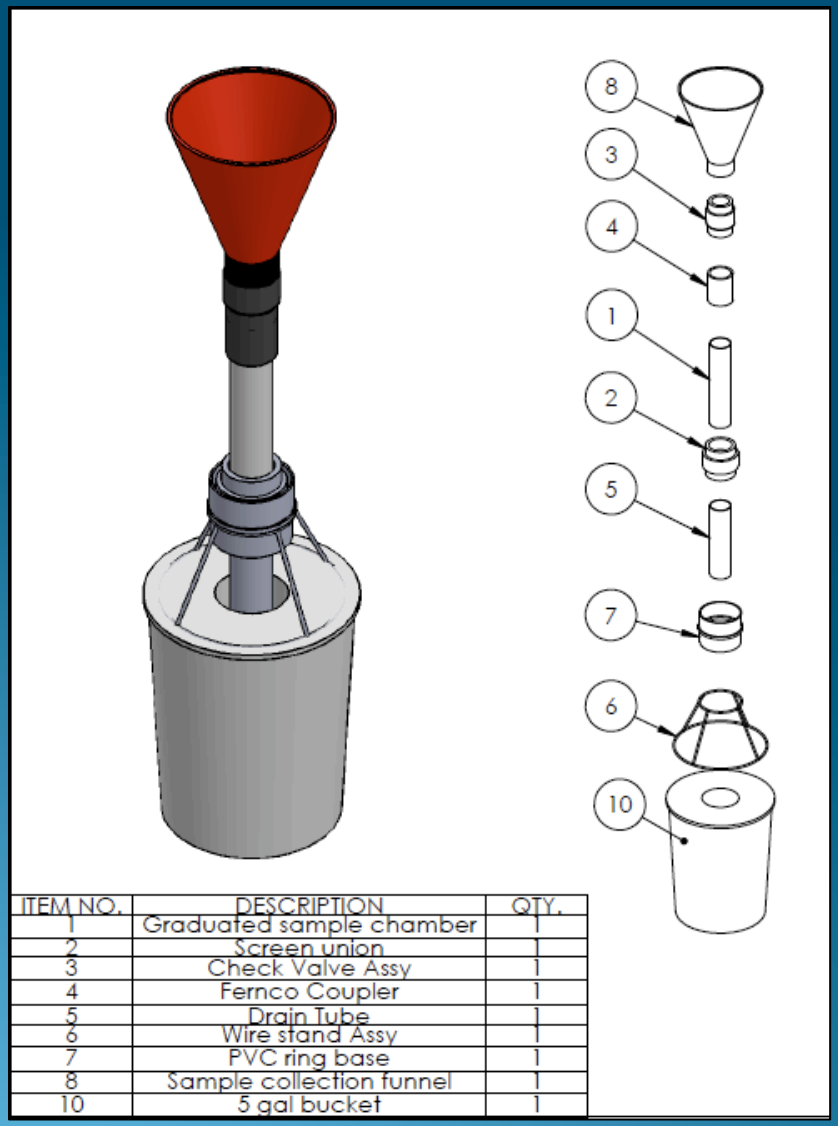
The Tester Explained

The funnel (8) connects to a mesh filter screen (2) and a final collection system (10) captures effluent passing through the screen.



ITEM NO.	DESCRIPTION	QTY.
1	Graduated sample chamber	1
2	Screen union	1
3	Check Valve Assy	1
4	Fernco Coupler	1
5	Drain Tube	1
6	Wire stand Assy	1
7	PVC ring base	1
8	Sample collection funnel	1
10	5 gal bucket	1

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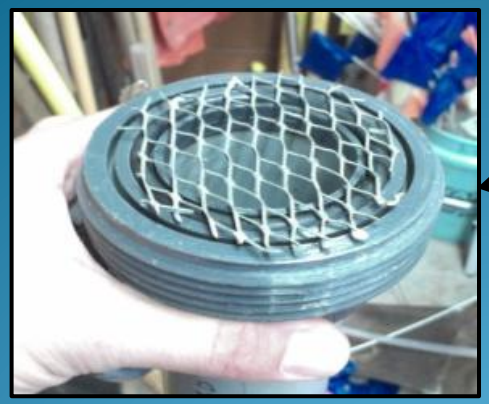
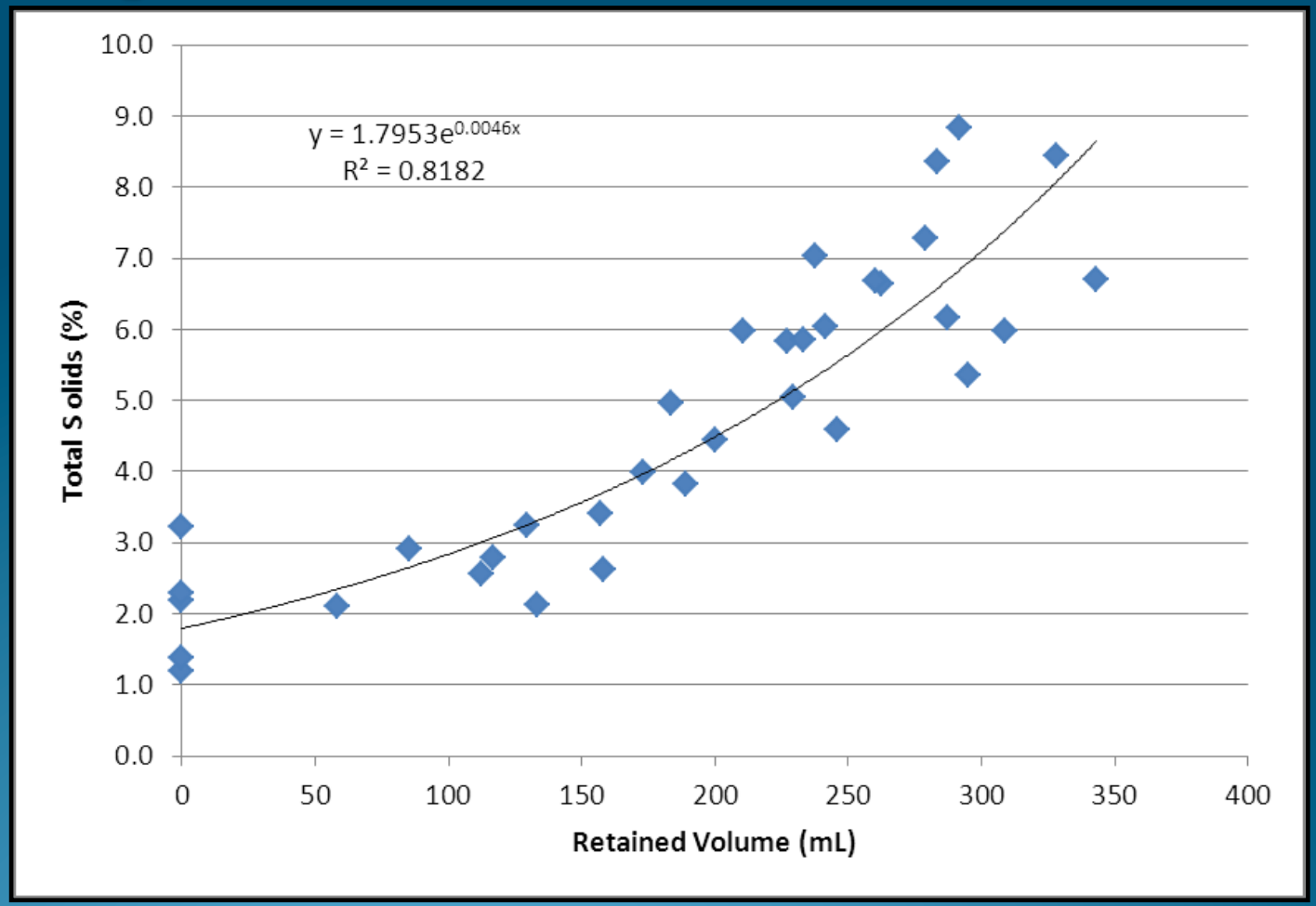
The Tester Explained

The 400 ml (13.5 oz.) sample is held in the funnel by a flap valve that when released drops the sample onto a 2” Dia. - 9/16” long x 3/16” wide diamond shaped screen.



Laboratory Test Results

Replicated sample testing gives a coefficient of variation in TS content of about 1-2% at the 5% TS level



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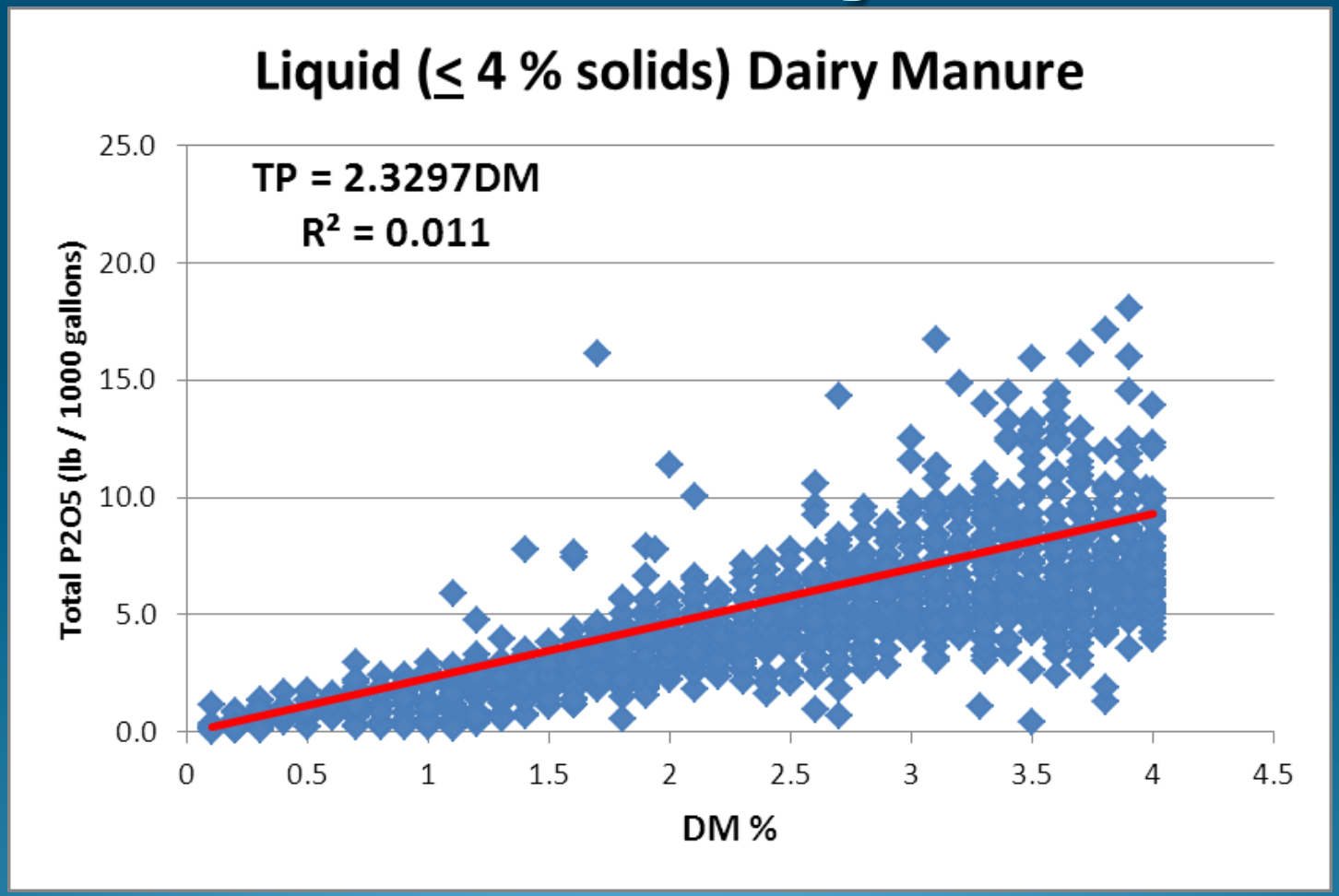
All WI Farms over 12 years, n=6,100



Data source: UW Soil Plant Analysis Lab

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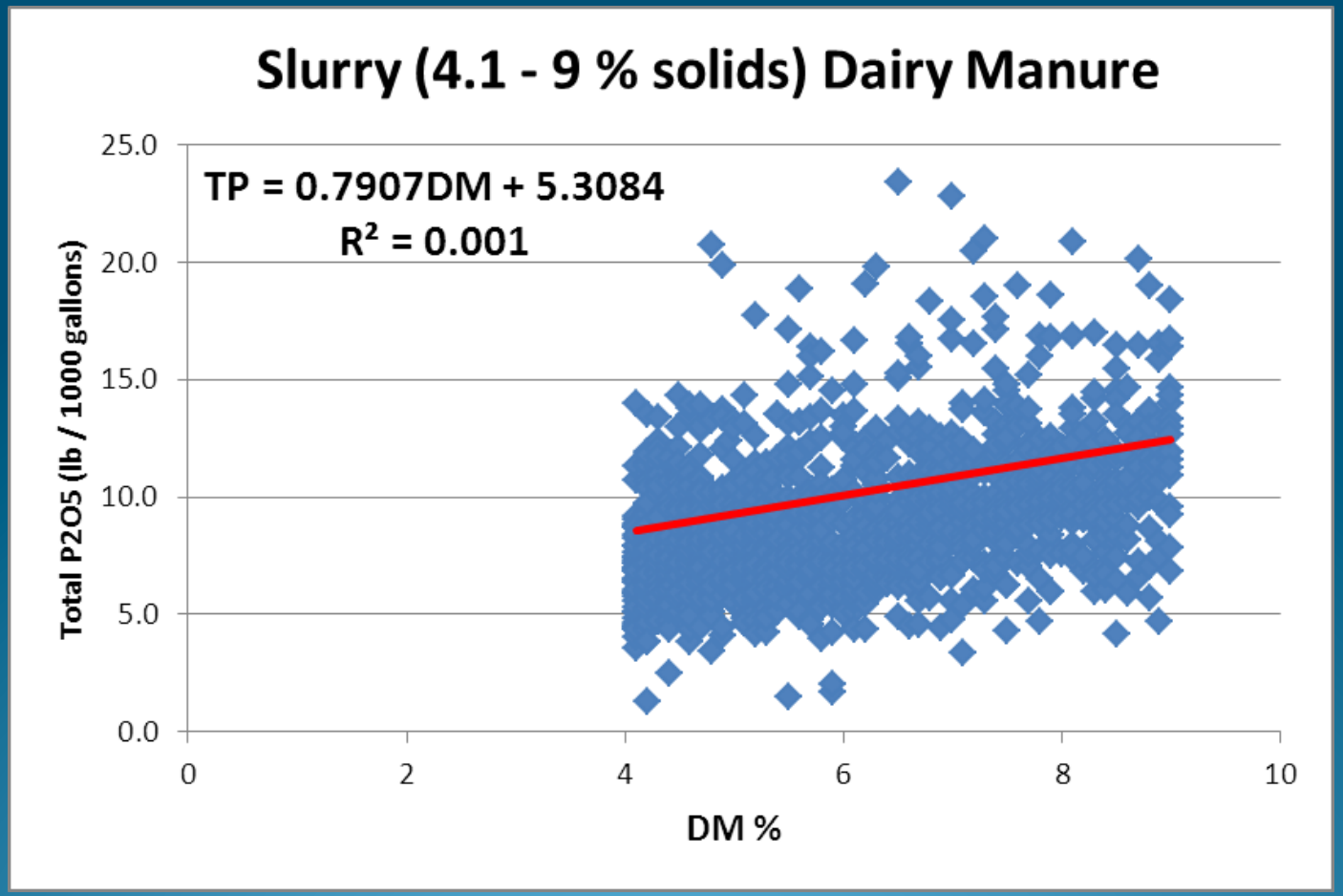
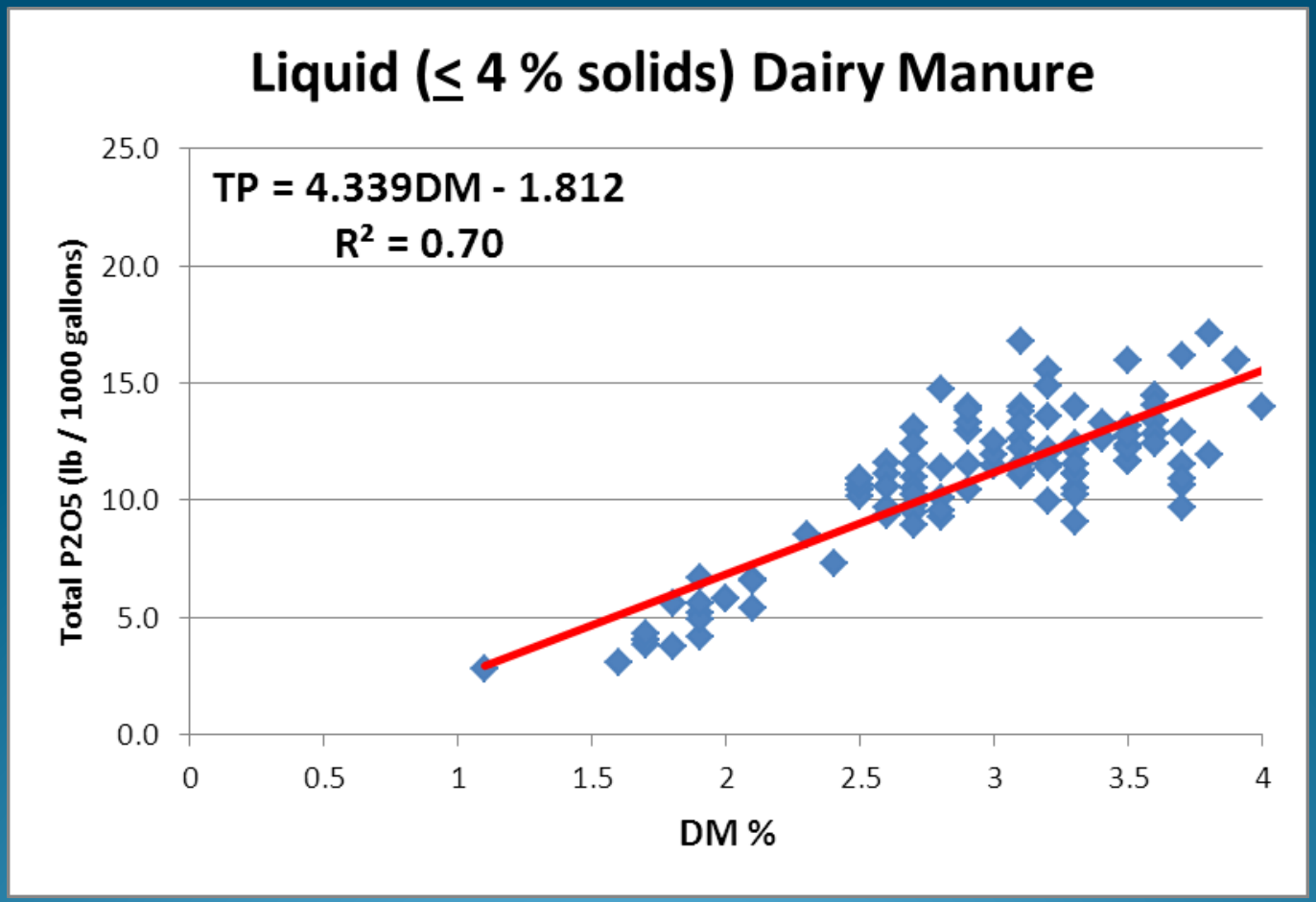
All WI Farms over 12 years, n=6,100



Data source: UW Soil Plant Analysis Lab

One Farm Over 15 Months; n=150



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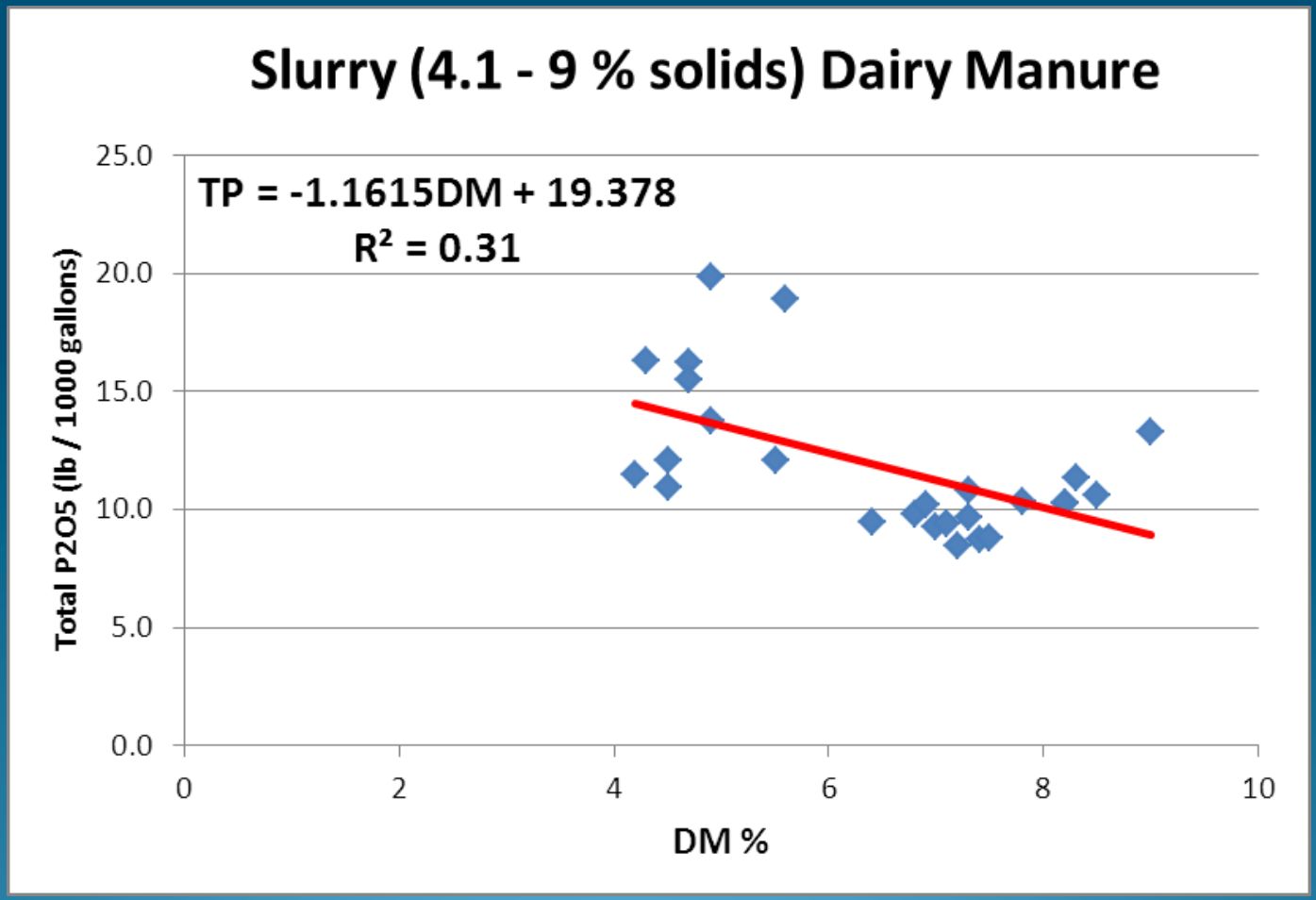

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Conclusions

1. Wisconsin data from multiple farms do not indicate a meaningful relationship between percent TS and pounds TP per 1000 gallons of manure liquid or slurry.

2. Wisconsin data from a single farm do not indicate a meaningful relationship between percent TS and pounds TP per 1000 gallons of manure liquid or slurry.

3. The manure quick test device developed by BSE students appears to be able to adequately distinguish between dairy manure with < 4% and > 6% dry matter solids content when tested with digested solids bedding.

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REFERENCES

Bicudo, J. R. 1991. Managing liquid dairy manure. University of Kentucky Cooperative Extension Service, Publ. No. AEN-91. 4 p.

Gibbs, F. Email dated January 10, 2014.