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Problem Statement: Manure Records

- Application of a smartphone (Manure app)/Ag Leader Integra monitor with Krohne flow meter.
- Using precision tools in the work of applying manure to crop fields could be tedious/satisfying.
- Keeping manure records is tedious.
- Accessibility to data can be difficult.
- Access to manure data and information anywhere with a mobile device.

Background on Manure App

- A manure mobile application through the Android operating system to track data on the farm.
- App was created to ease record keeping in the application of manure and to create autogenic data which can be defined as, "self-generated."
- GPS tracking to see field areas and application of the manure material.
- "Cloudant® database stores all information.
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- Application was created by Matthew Koester, (Koester,2013).
http://docs.lib.purdue.edu/open_access_theses/483

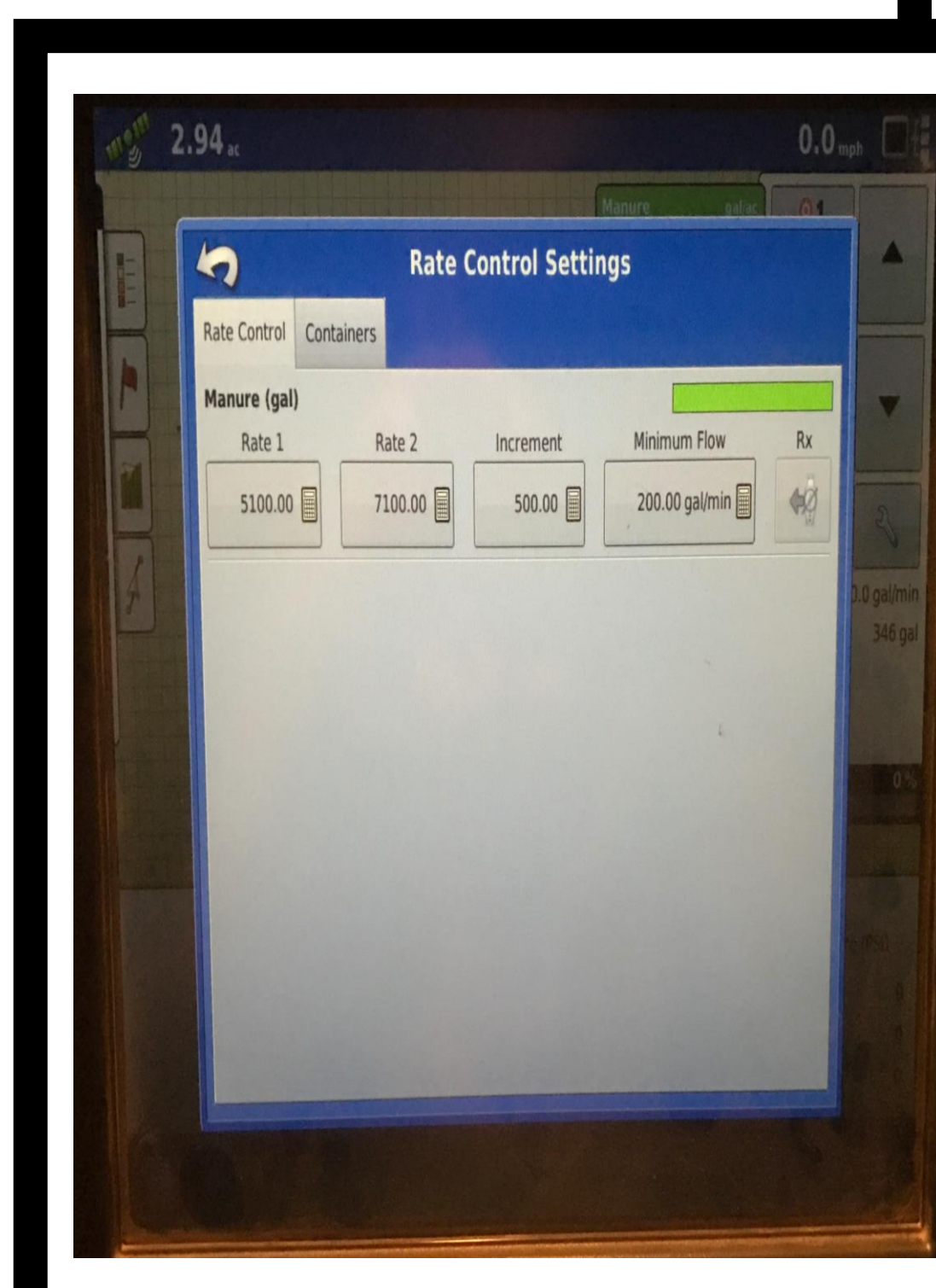
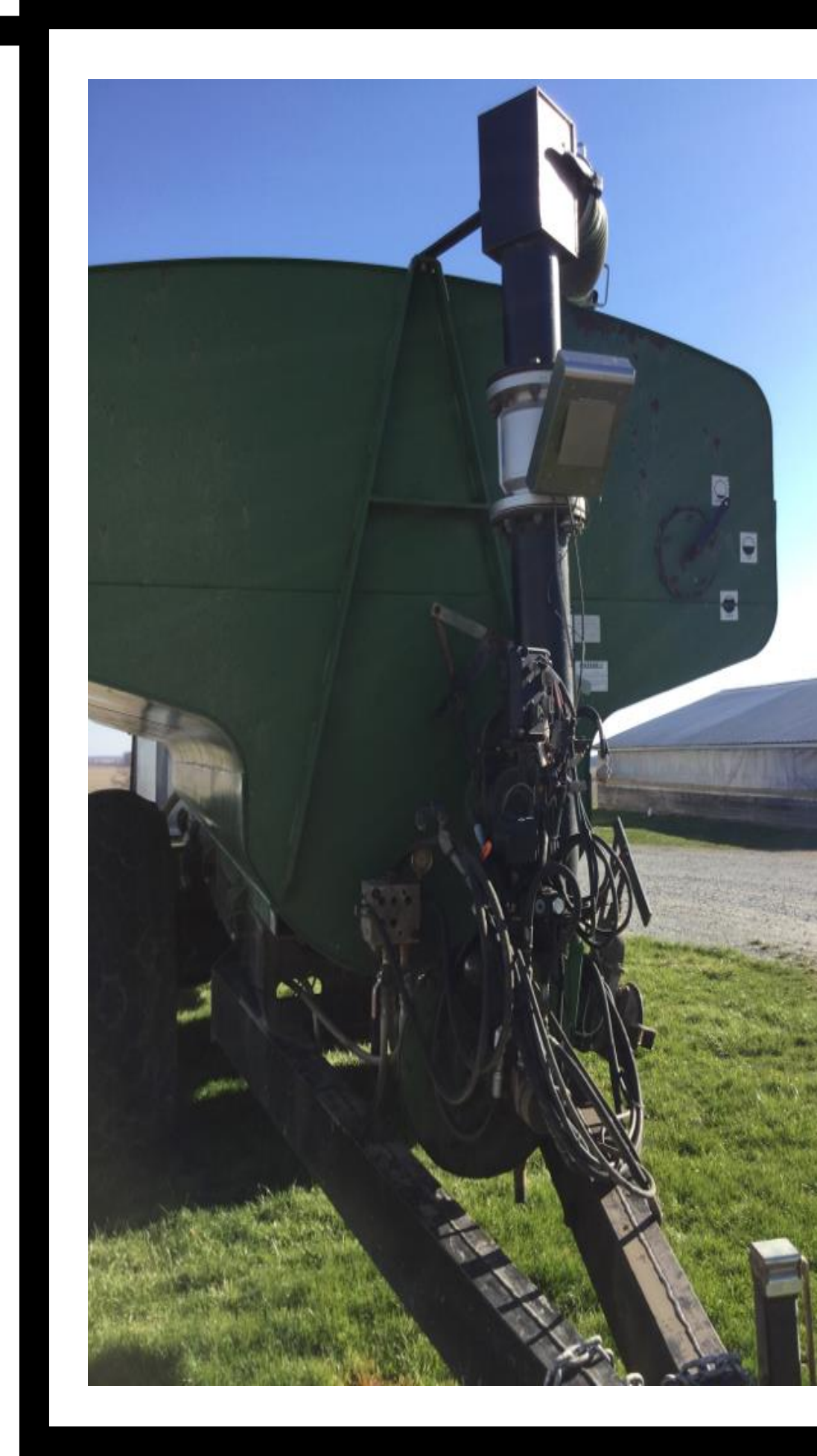
Objectives

- Test approximately 20 loads of manure running 4-7 mph with the manure app/Ag Leader® Integra Monitor and Krohne flow meter.
- No software development, just tests applied on the uses, and understanding of this app/monitor and flow meter.



Tool Comparisons

	Manure App	Ag Leader® Integra/ Krohne Flow Meter
Usability	Knowledge of a smartphone, simple operation	Training required, knowledge of precision monitors
Components	Smartphone, Bluetooth (optional tag)	Ag Leader® Integra monitor, Krohne flow meter
Data access	Cloudant® database (CSV export)	SMS software, USB drive, (shape files)
Accuracy	GPS of a smartphone	RTK, GPS
Precision	By the load, speed, mapping	By the load, flow of manure, speed, mapping
Cost	+/- \$20 + smartphone cost	+/- \$9,000



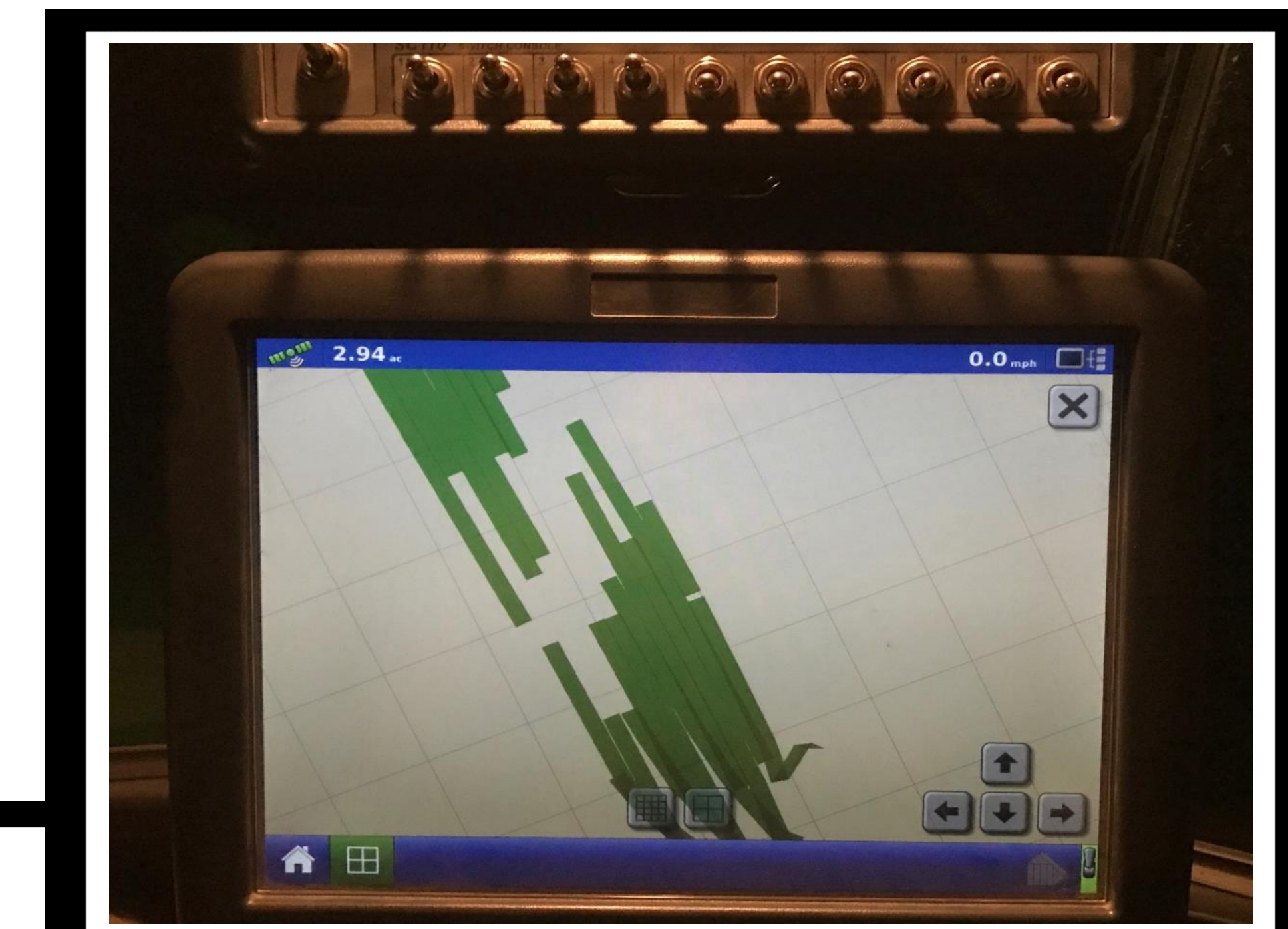
Tool Evaluations

Manure App

- Little to no cost, must have a phone or tablet.
- Option of a Bluetooth attachment.
- Only available on Android operating systems.
- Less precision but provides information per load.
- GPS tracker was reasonable.
- Easy to use, not much reading/training.
- No calibration needed.
- Easy transfer of data through a CSV file download, with an easily readable spreadsheet.
- Map displays coverage.

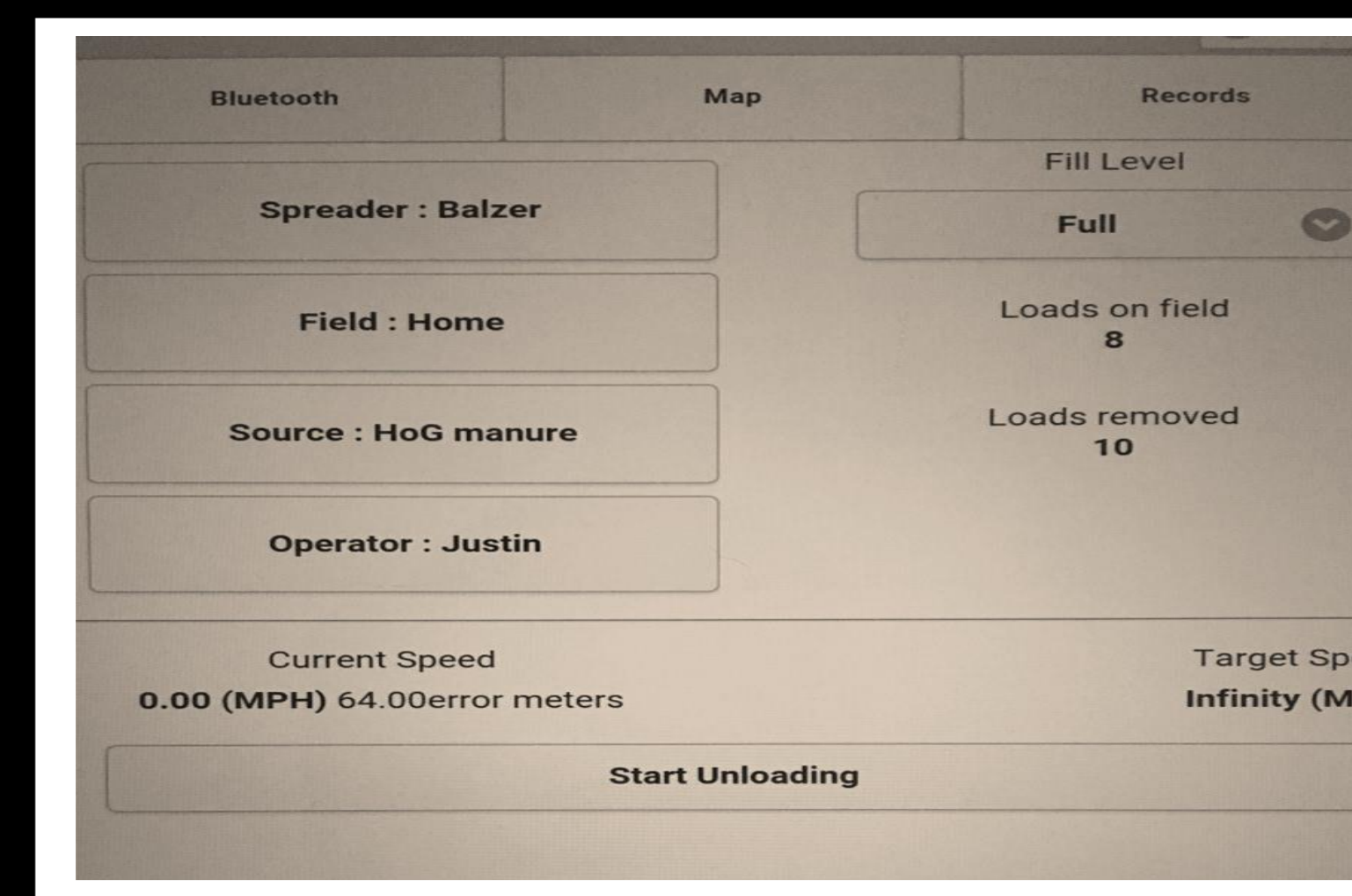
Ag Leader®/ Krohne Flow Meter

- High cost of equipment.
- Intensive knowledge of operations/training.
- Flow meter and monitor needed, which could be an added cost.
- Calibration needed (could be labor intensive and several hours to calibrate).
- Map shows variable rate within load of manure applied to what location/field.
- Special Software needed.



Impact & Sustainability

- Allows creation of records that are essential to farm management practices and manure management.
- Manure app is a no/low cost investment for the farm.
- Allows owner to generate records simply and easily.
- The manure app could be a potential start/ low cost way into the precision area of agriculture.
- Both the manure app, and Ag Leader® system have value, it is the cost and resolution that are the main differences.



Date	Time	Operator	Field	Source	Spreader	Amount	Rate	Load Fill Level
2016/11/27	16:33	Justin	Home	Cattle manure	New Idea (Gallons)	NaN	NaN gal/ac	100%
2016/11/27	16:35	Justin	Home	Cattle manure	New Idea (Gallons)	NaN	NaN gal/ac	100%
2017/02/13	14:33	DB	Home	Cattle manure	New Idea ()	NaN	NaN gal/ac	25%
2017/02/13	14:35	DB	Home	Cattle manure	New Idea ()	NaN	NaN gal/ac	50%
2017/02/26	16:47	Alec	Alec Home	HoG manure	Yamaha Ytz (1500Gallons)	Infinity	Infinity gal/ac	100%
2017/02/26	16:56	Alec	Alec Home	HoG manure	Yamaha Ytz (1500Gallons)	5336.92	gal/ac	100%
2017/02/26	17:03	Alec	Alec Home	HoG manure	Yamaha Ytz (1500Gallons)	2600.72	gal/ac	100%
2017/02/26	17:57	Alec	Alec Home	HoG manure	Yamaha Ytz (1500Gallons)	1085.77	gal/ac	100%



Final Analysis

- The Manure App was an easier way to do manure application tracking and records without much reading/training.
- Ag Leader® Integra monitor with the Krohne flow meter generates applied maps which made points within 100ft of each other per load (which involved more knowledge and training) as compared to the created Manure App, which was a constant rate per load.
- The app was a quick, easy tool vs. the more complex precision monitor and flow meter.
- Cloudant® database held the records from the Manure App.
- The Ag Leader® system stores information on a USB drive to be put into the SMS software.
- The manure app is not yet available to general public.

Economic Analysis & Potential Alternatives

- Little/no cost by using the Manure App even if with Bluetooth device being used.
- Ag Leader® monitor cost's around \$4,500.
- Ag Leader® software has additional cost or the cost of labor of a representative pulling the software.
- A flow meter will be needed also of a cost of about \$4,500.

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Technical Advisor:
Dr. Robert Stwalley

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Dr. Robert Stwalley

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- Objective:
- The Agricultural and Biological Engineering Department offers a Senior Capstone Project poster competition concurrent with the ABE Outstanding Alumni and Outstanding Service Awards. As a service of the department, I am available to print your poster presentations on our poster printer. If you will be using a program other than PowerPoint, please check with me prior to the deadline so that printing problems can be avoided. Please “Save as a PDF” and submit the pdf. You are not required to submit your project through me if you do not want it printed on the poster printer. A template can be downloaded at:
<https://engineering.purdue.edu/ABE/Undergrad/> (*Note* - It is near the bottom of the page). Projects may be submitted via email (cmweaver@purdue.edu) or jump drive. The deadline is Friday, April 14, 2017, at 5 pm. Check with your professor for other instructions.
- Carol Weaver ABE 201, 494-1174