Yield Monitor and Planter Studies 2014

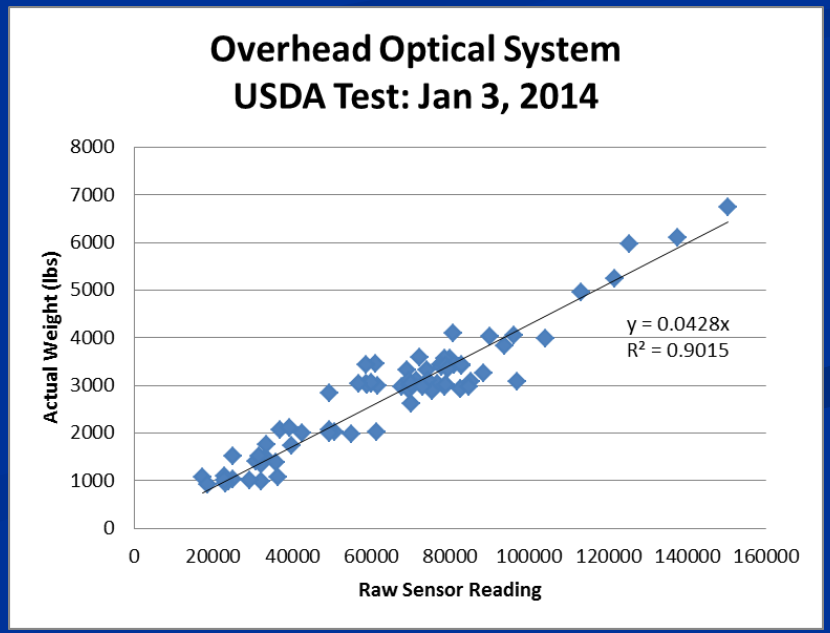
Richard Johnson, Randy Price, Paul White
LSU AgCenter
USDA Houma Sugarcane Research Station

Summary of Presentation:

- Different different yield monitors tested this year:
  - Overhead optical system
  - Weight plate
- John Deere system
- Sensor to indicate amount of cane planted in the furrow

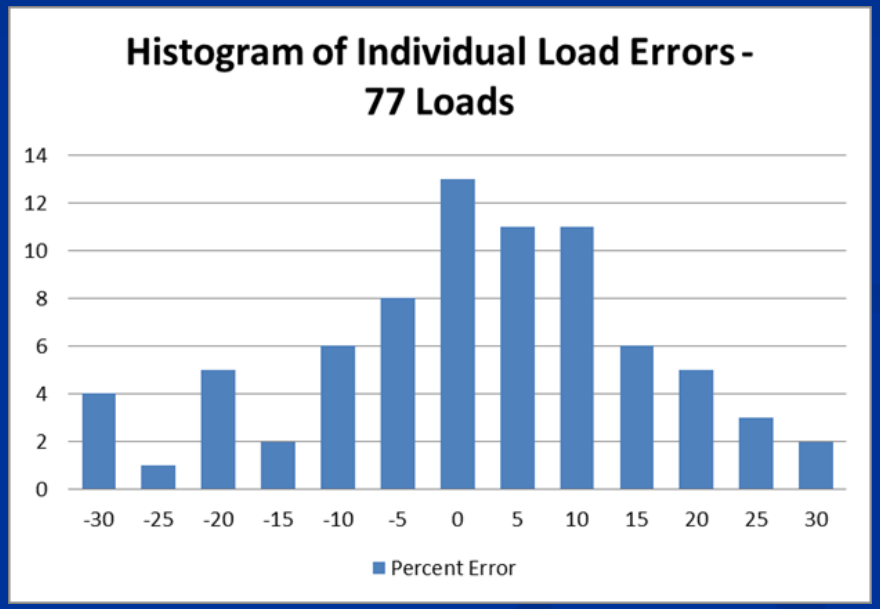
Overhead Yield Monitor:

- System uses multiple lasers to estimate height and depth of billets on slats
- Benefits of system:
  - No clogging
  - Easy to put on combine:
    - System bolts on top of elevator frame
    - Wireless possible
- Good linear calibration line:
  - $R^2 = 0.90$
- Held base calibration well over 2 days of testing



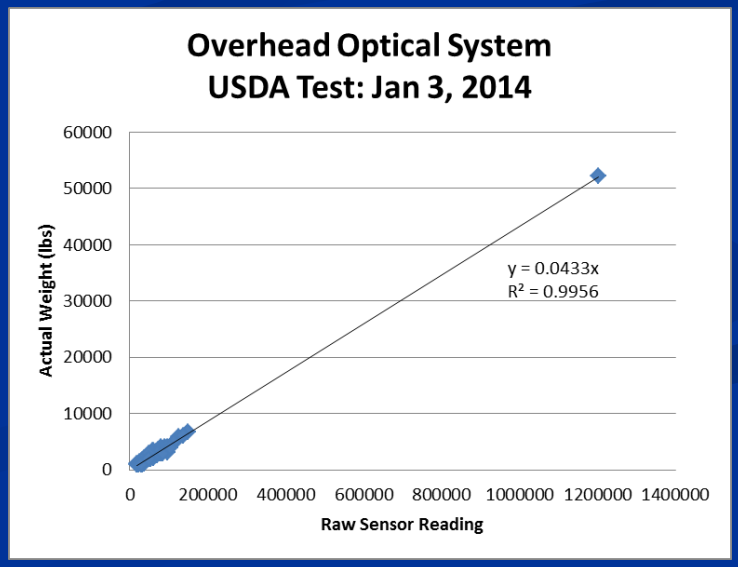
Histogram of Errors:

- Errors still a little high:
  - 60% of readings in the +/- 10% range
  - 90% of readings in the +/- 20% range
- Good News:
  - Errors equally distributed
  - Errors seemed to bounced back and forth equally over a wagon load



Load Out Weight of Trucks:

- One truck weight tested:
  - 1.5% error
  - Monitor indicated 51,443 lbs versus actual weight of 52,220 lbs – 557 lbs difference
- Weight point stayed in-line with calibration curve



Weight Plate:

- Put on two combines
- Direct lb. measurement of weight – 0.2 lbs accuracy
- Method of establishing tare crucial to operation:
  - Static – not good
  - Dynamic – better
  - Skew knob - best

Typical Output:

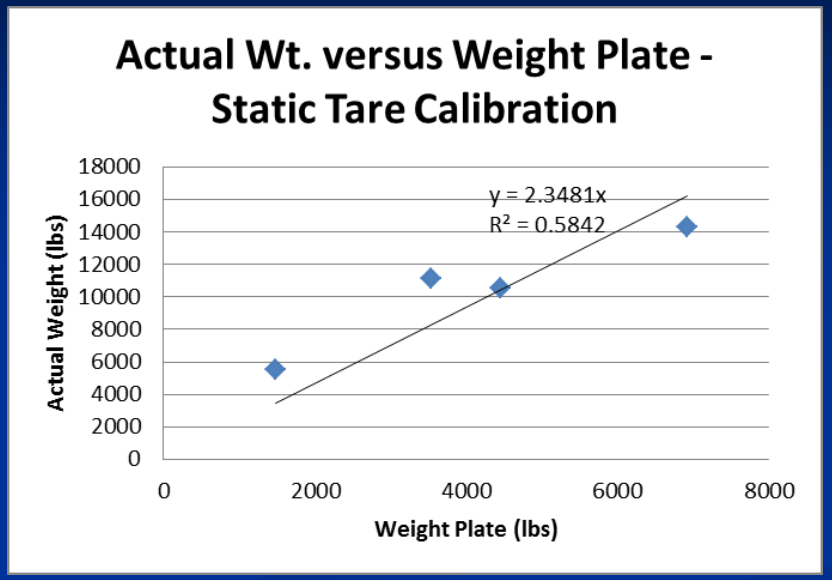
- What is the output of this machine?
  - 150 tons per hour

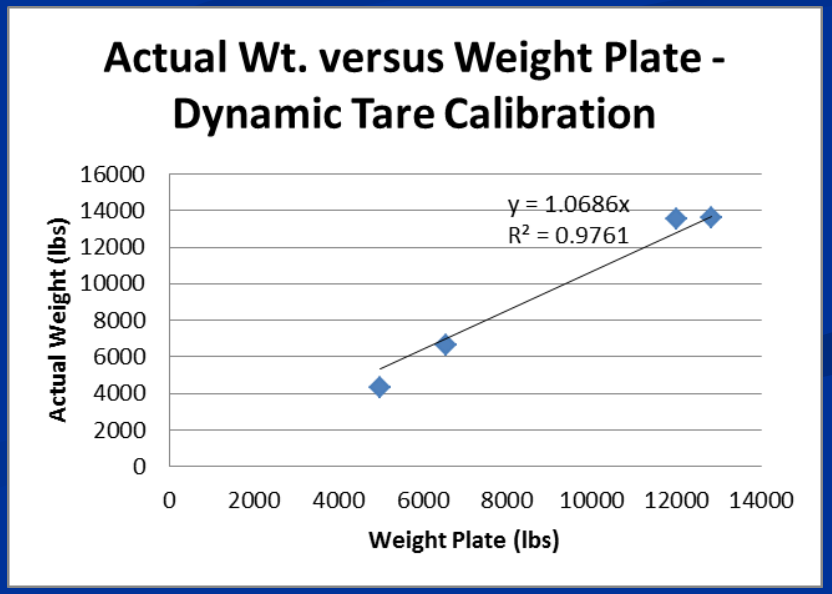
What 150 tons/hr Cane Looks Like:



Cheveyville Calibration:

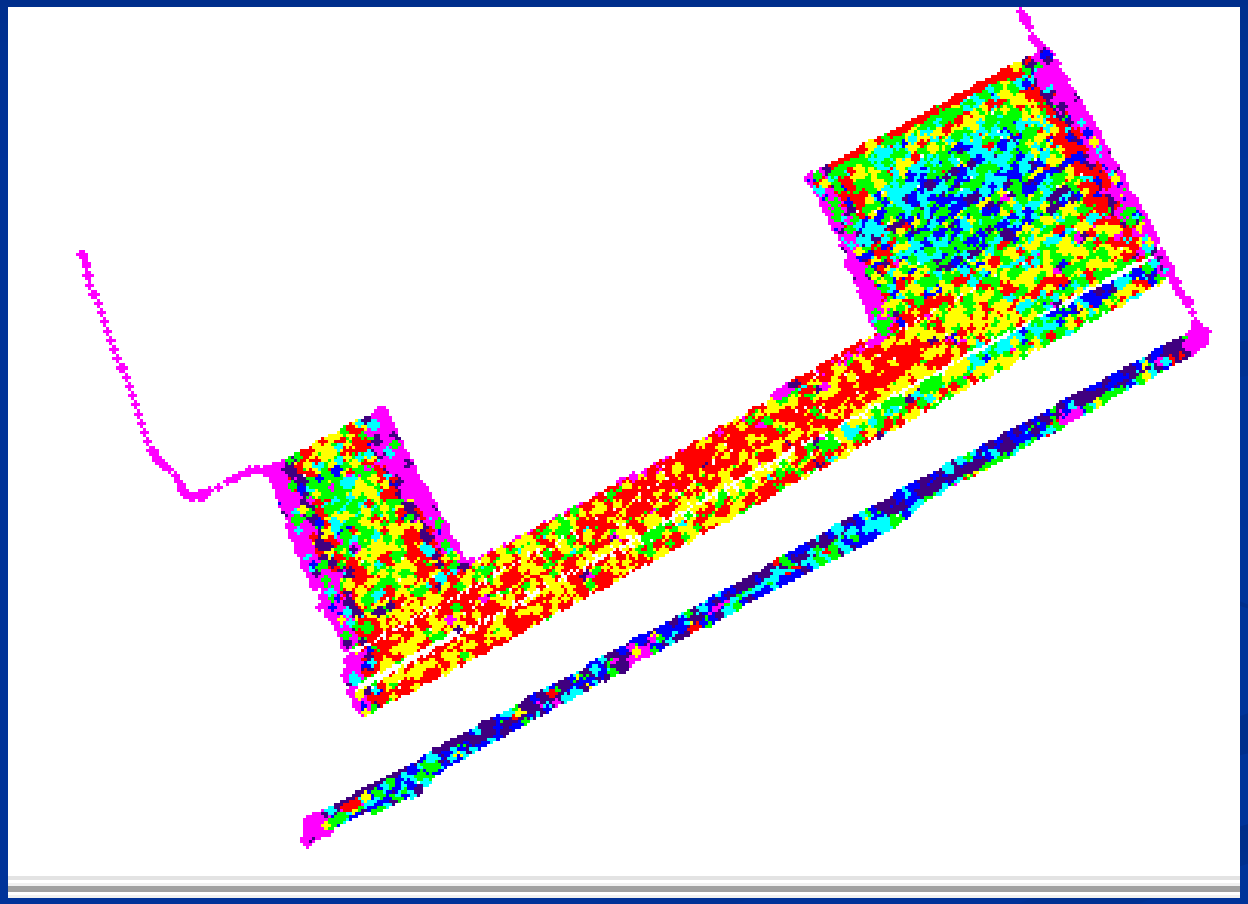
- Performed calibration with truck scales at local co-op
- Percent Errors
- Graph 1: Average 8%
  - -12, 59, 0.8, 34
- Graph 2: Average 5.9%
  - (-5, -0.7, -23, 5)
- Unit needed dynamic zeroing (tare) to create an accurate calibration curve
  - $R^2 = 0.97$
- Unit seemed to vary somewhat





Map from Unit:

- Cheneyville LA:

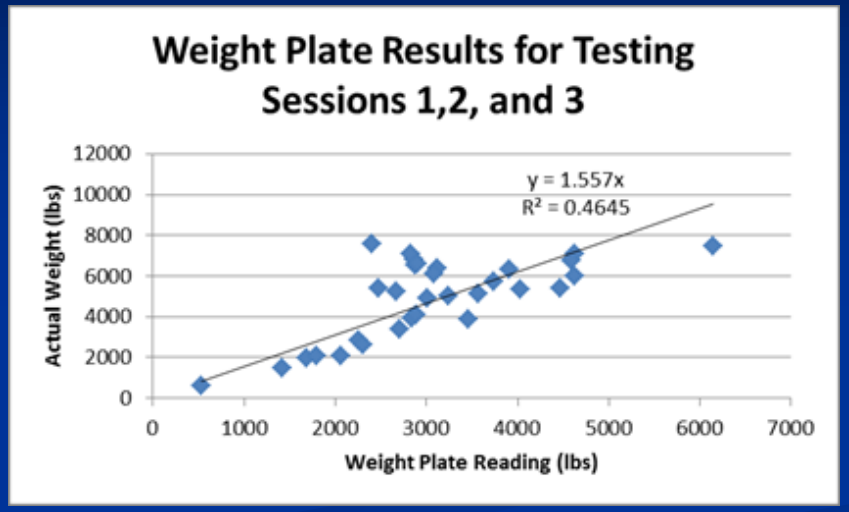


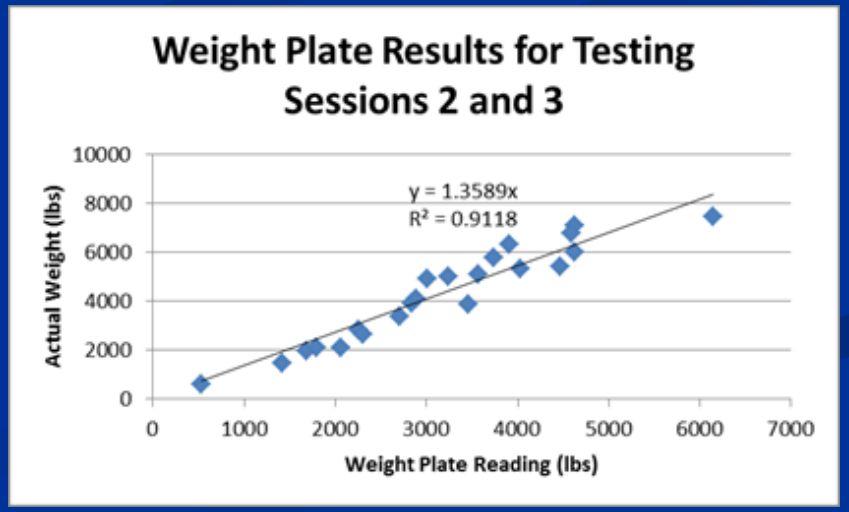
Tons per acre:

67.500 - 37073.300
58.900 - 67.499
51.100 - 58.899
43.000 - 51.099
35.600 - 42.999
0.100 - 35.599
0.000 - 0.099

Results from New Iberia Unit:

- One group of data that caused problems in Session 1
  - Perhaps billet stuck in plate on session 1?
- When that data taken out:
  - $R^2 = 0.91$
  - Average Error:
    - 5.4% over 22 weight wagon loads
- Unit seemed to wonder somewhat





Mud and Billet Fouling:

- Serpentine groove:
  - Mud - not bad
  - Billet – every so often a billet (or piece of billet) would get in stuck in groove
    - Observed mainly on side
- Weight plate support bracket:
  - Mud buildup on support bar mainly on north machine (Cheneyville)
  - Tare could changed up 80 lbs over several days and went back to zero when cleaned (this was measured)
- Solution?
  - Cover sides and all open areas
  - Design support rails that don't catch mud
  - Design straight grooves on sides

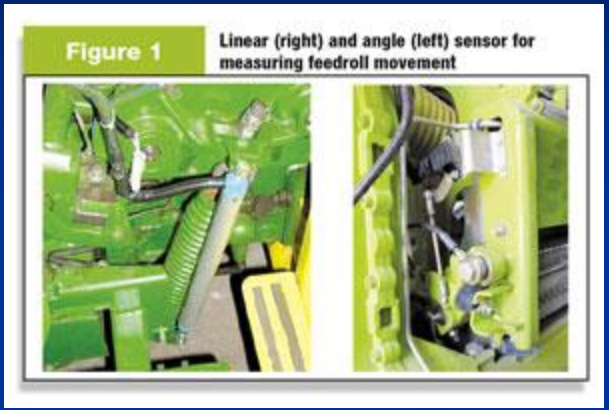
Hydraulic/Pressure System Tested:

- Laboratory results good:
  - 50 lb. error per load cell
  - 1 to 3% error, even in a dynamic situation
- Field test – Not as Good
  - 16 to 30% errors
- Problems:
  - Mud on frame rails
  - Tractor and tilt wagon hydraulic float system
  - Will try again this year with different placement and maybe different seniors

Figure 3: Hydraulic load cells mounted in trailer frame.

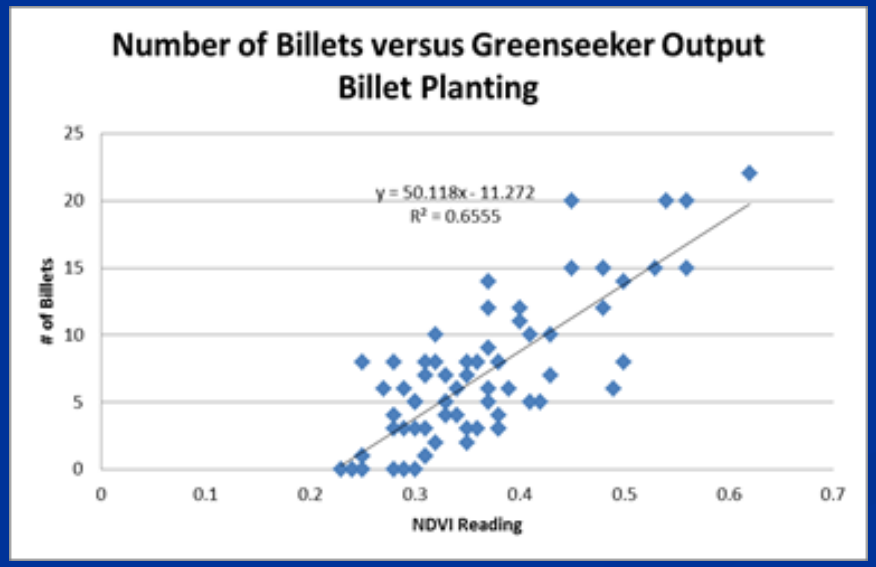
John Deere Yield Monitor:

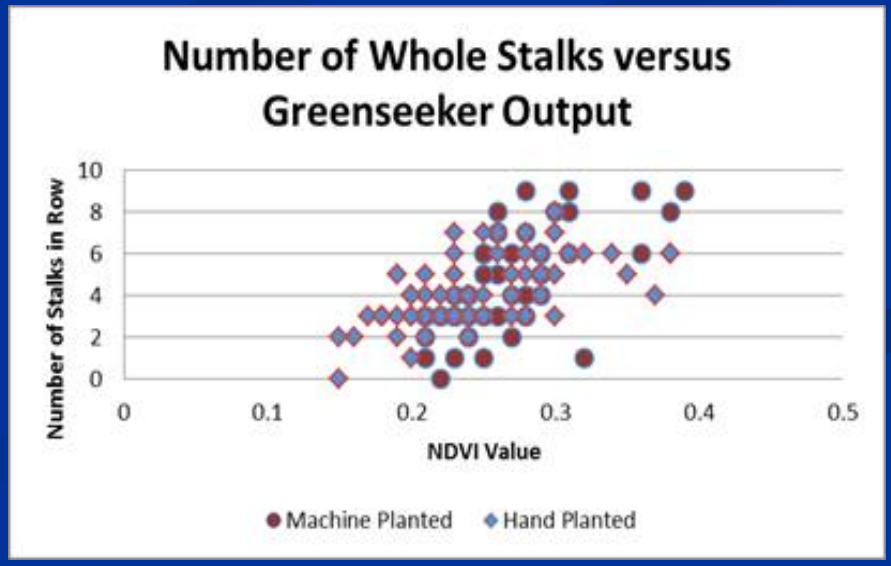
- They have two units they are testing
- One system maybe based on forage monitor:
  - Two components: Roller spreader measurement (Figure 1) and moisture (NIR or capacitance - Figure 2)
- Not sure what other system is?



Sensor to Indicate the Amount of Plant Cane in Furrow:

- Tested Greenseeker
- Variance pretty high (see graphs) but relationship was formed
- System worked better in billets
- System looks promising but will need some more work





Conclusion:

- Several yield monitors tested:
  - Overhead optical looks promising
  - Weight plate - Getting better, but still need some work
- John Deere building something and rumors support that it looks pretty good
- Plant cane quantity sensor:
  - Greenseeker system tested
  - High variance in individual readings, but system may be able to detect amount of planted cane over larger runs
  - Sensor worked better on billet than whole stalk

Acknowledgements:

- USDA and Personnel
- American Sugarcane League
- Danny Naquin – Houma
- Keith Dugas - Donaldsonville
- Sonny Viator – LSU Iberia Station
- Blanchard Brothers - New Iberia
- Wynn Allen – Cheneyville
- Mike and Ross Harper – Cheneyville
- Erath Farms – New Iberia
- Tom Landry – New Iberia
- David Louviere – New Iberia

The End

Questions?