# Yield Data Collection BMPs: Minimizing errors and downtime

Joe D. Luck, Precision Agriculture Engineer
University of Nebraska-Lincoln Extension
Department of Biological Systems Engineering


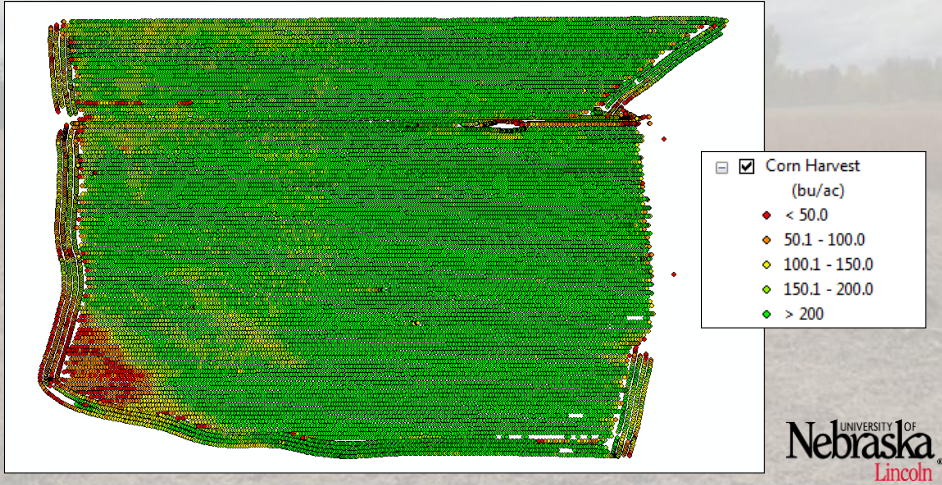commercialmotor.com

Nebraska Lincoln

---

# Discussion Topics

- Examples of Yield Data Error Sources
- How do these errors contribute to incorrect yield
- Tips and solutions to minimize these errors
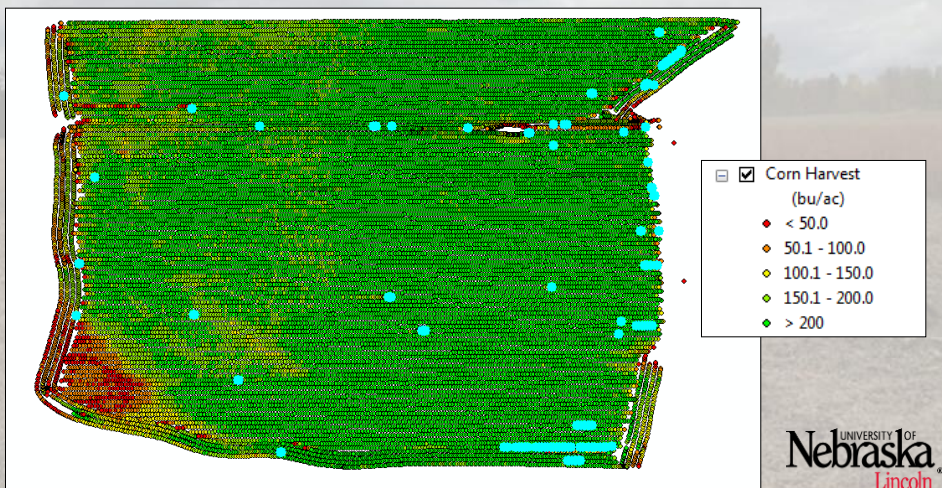- Other time-saving tips in the field and office

Nebraska Lincoln

## Sources of Yield Data Error

- 2012 Corn Harvest w/ GreenStar System



## Sources of Yield Data Error

- Locations where yield > 350 bu/ac

# Travel Distance Errors

| Obj__Id | Distance_f | Track_deg_ | Crop_Flw | Moistur | Yld_Mass_W | Yld_Vol_We | Yld_Mass_D | Yld_Vol_Dr | Humidity |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.0757 | 270.1797 | 0.3464 | 16.22 | 13283.3473 | 237.2136 | 13092.6922 | 233.8089 | |
| 9 | 0.0772 | 278.2187 | 2.6578 | 16.61 | 100000.4 | 1785.8039 | 98106.2748 | 1751.9786 | |
| 60 | 0.0838 | 224.9028 | 1.6976 | 19.4 | 58800.6429 | 1050.06 | 55756.8449 | 995.7039 | |
| 61 | 0.0864 | 224.9062 | 5.1783 | 19.4 | 174137.9241 | 3109.7494 | 165123.7256 | 2948.7741 | |
| 221 | 0.0868 | 280.0819 | 2.9903 | 19.08 | 100000.4 | 1785.8039 | 95200.3808 | 1700.0853 | |
| 495 | 0.0868 | 3.6675 | 0.0115 | 14.21 | 383.1031 | 6.8414 | 383.1031 | 6.8414 | |
| 1 | 0.1045 | 89.2969 | 3.5969 | 14.78 | 100000.4 | 1785.8039 | 100000.4 | 1785.8039 | |
| 3 | 0.1085 | 270.1797 | 1.6535 | 16.22 | 44235.8463 | 789.9623 | 43600.9318 | 778.624 | |
| 499 | 0.1197 | 271.2178 | 0.3043 | 15.07 | 7382.8166 | 131.8421 | 7376.7366 | 131.7335 | |
| 6 | 0.1207 | 272.6409 | 2.0751 | 18.49 | 49944.4825 | 891.9069 | 47893.8208 | 855.2863 | |
| 241 | 0.131 | 88.8687 | 0.1168 | 13.21 | 2588.5761 | 46.2267 | 2588.5761 | 46.2267 | |
| 412 | 0.1409 | 94.41 | 0.496 | 9.94 | 10222.263 | 182.5488 | 10222.263 | 182.5488 | |
| 8 | 0.1478 | 278.22 | 0.226 | 17.2 | 4440.5923 | 79.3 | 4325.6593 | 77.2475 | |
| 220 | 0.1525 | 280.0819 | 4.4342 | 19.08 | 84464.6469 | 1508.3669 | 80410.3438 | 1435.9653 | |
| 498 | 0.1525 | 271.2178 | 1.95 | 15.07 | 37135.129 | 663.1579 | 37104.5471 | 662.6118 | |
| 534 | 0.1634 | 267.385 | 1.8167 | 20.26 | 32280.1142 | 576.4572 | 30282.5448 | 540.7847 | |
| 413 | 0.1737 | 94.41 | 1.7417 | 9.94 | 29113.3766 | 519.9057 | 29113.3766 | 519.9057 | |
| 1 | 0.1742 | 270.1797 | 0.3464 | 16.22 | 5776.5469 | 103.1574 | 5693.6365 | 101.6768 | |

---

# Travel Distance Errors

- Some monitors still round off to the nearest inch
- So, for a travel distance of 9.5 to 10.499 inches, we would have a distance of 10 in….or 10% potential error
- We need to clean the data in this case to eliminate any data below 20 in. to ensure that our data will have less than 5% error
- This shouldn't affect much of our data, 34 in./sec is about 1.1 mph

## Header Cut Width Errors

- The cut width you've entered is very important, it feeds directly into the yield equation
- Say you have a 40 ft. header and are only harvesting 36 ft. …that 4 ft. of error equals 10%
- Auto swath has been added to many systems…this will help for cut width, but may also contribute some errors depending on your settings…

Nebraska
University of
Lincoln

## Header Cut Width Errors

- Looking at an 8 row header (30 in. rows)
- Swath width is set for 30 in. but 100% overlap (it won't stop the swath until the entire 30 in. is cut
- This could create a short period of cut width error of 12.5% (30 in. divided by 240 in.)



agleader.com

Nebraska
University of
Lincoln
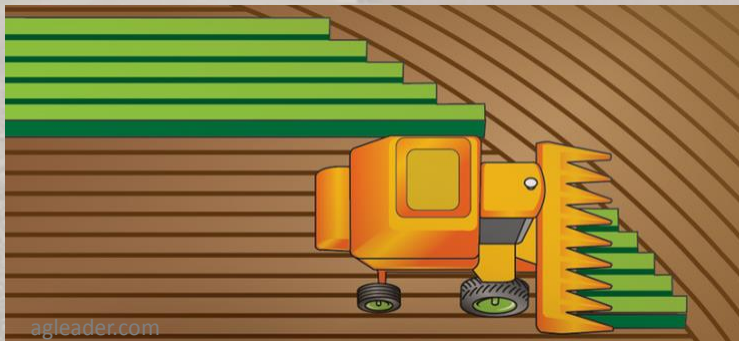
## Travel Distance Errors

- Quick stops and starts can affect the yield estimation <u>significantly</u>
- Try to minimize acceleration in the field if feasible
- The effects of new technologies (e.g., opti-crop) that try to optimize flow through combine by controlling speed may affect this
- If you're harvesting downed corn, you might calibrate a point for a very slow speed to compensate for low flows
- Imagine moving at 6 mph and you slow quickly to 5.4 mph…that's a potential for 10% error

**Nebraska** UNIVERSITY OF Lincoln®

## Lag Time Errors

- It takes time for the material to travel from the header to the mass flow sensor
- Most systems allow you to enter a "flow delay time" to compensate for this
- Typically around 12 sec
- This time may change slightly based on harvester settings and loading in the cylinder
- Mostly affect our "start of pass" and "end of pass" numbers; but stops in the field are also affected
- Data are shifted by the yield monitor or software program

**Nebraska** UNIVERSITY OF Lincoln®

# Lag Time Errors

- Remember the time from the mass flow sensor until grain enters the tank (1 to 2 sec)
- Too much delay will shift the data too far!
- We can still post process the data to correct, but if you don't, this will cause error
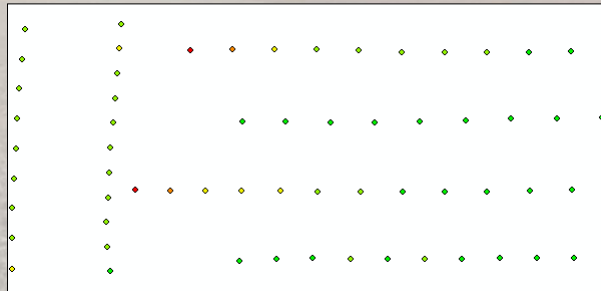


# Yield Monitor Calibration

- Calibration must be conducted properly according to manufacturer specifications
- Beginning of every season (can be adjusted later in software if necessary)
- Different crops need their own calibration
- Different test weight and moisture content may also require their own calibration
- Remember flow ranges!
- Expectations from low to high
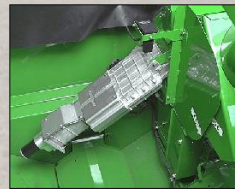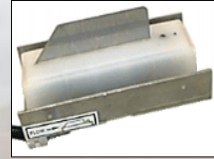- Speed or cut width works
- Must maintain stability

## Moisture Sensing

Moisture sensors have limits:

- Most cannot provide reliable results when moisture exceeds 35%
- Readings below 10% should also be considered as suspect
- Readings below 5% usually indicate an error or failure in the system
- Check the sensor often to ensure that it is kept clean



Nebraska
UNIVERSITY OF
Lincoln

## The Mass Flow Sensor

- This is the most critical component of the yield monitoring system
- Check to ensure that material does not build up on the sensor (high moisture content crops)
- Clean the sensor if necessary
- If physical adjustments are made, you will need to recalibrate
- Worn parts may need to be replaced
- Check cables and connectors for wear



Nebraska
UNIVERSITY OF
Lincoln

7

## More tips:

- Maintain field notes when possible, sometimes we forget what occurred when harvesting
- Use the office software to export your grower/farm/field information directly to the monitor…you won't have to type it in all the time
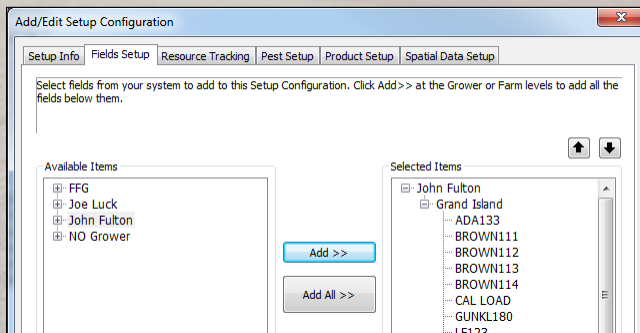


## Summary

- Errors will occur but we can minimize them
- We can improve the quality of the yield data
- Some things can save us a little time in the process