Yield Monitor Calibration: Garbage In, Garbage Out

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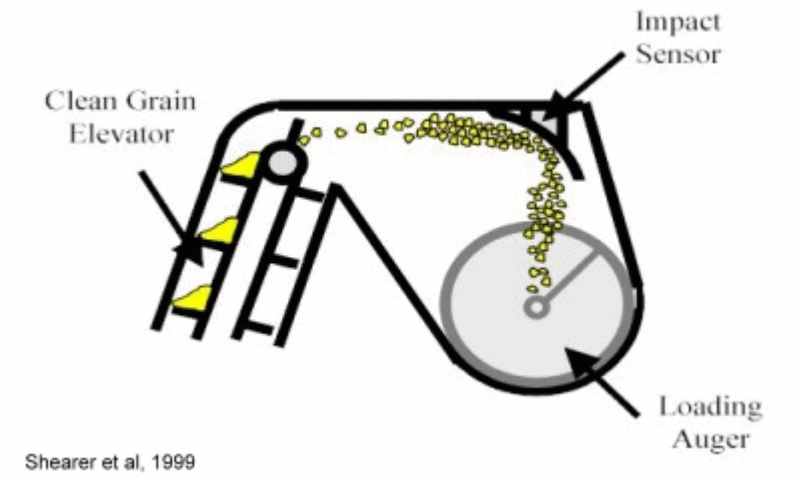
Grain yield monitors have been in vogue for more than 10 years and can provide valuable spatial yield information to growers. Yield monitors offer a visual diversion from the boredom of harvest. They provide a source of historical yield records more detailed than that offered by elevator weigh tickets. They provide a viable alternative to weigh wagons or farm scales for measuring yields in on-farm research trials. When connected to a DGPS receiver, yield monitors generate a source of geo-referenced yield data that can enable growers to document the extent of spatial yield variability within fields.

Most yield monitor systems operate on the same general principles. Typically, a grain flow impact sensor is located at the top of the clean grain elevator. Grain flow hits the impact sensor on its way to the loading auger. The impact of the grain flow is translated to electrical signals by the sensor. The electrical signal data are translated to estimates of grain flow rate by the yield monitor's internal software. If equipped with a DGPS receiver, the yield monitor matches the individual yield estimate data points to geographic locations in the field.

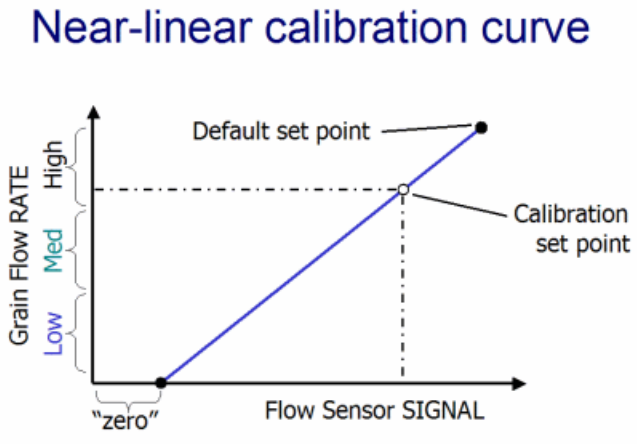


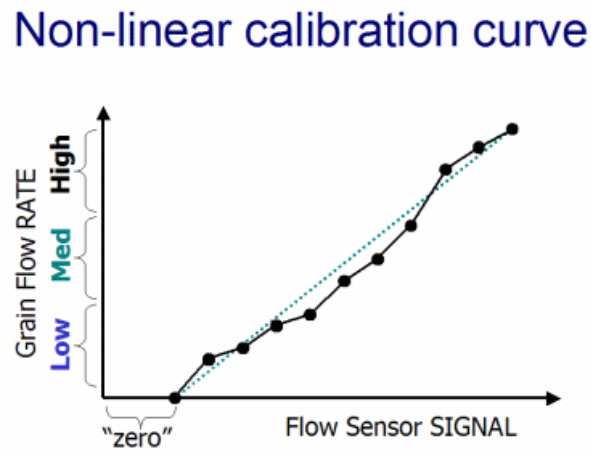
Yield estimates on a whole field or individual load basis made by a well-calibrated yield monitor are accurate in the sense that they often very closely match yield estimates calculated from weigh wagons or commercial weigh scales. However, to achieve a satisfactory level of accuracy, yield monitors must be "trained" to correctly interpret the electrical signals generated by the impact sensor into estimates of grain flow rate. Some background information may help you better understand the nature of and importance of faithfully and regularly calibrating yield monitors.

Calibrating a yield monitor simply requires the harvest of individual “loads” of grain that represent a range of grain flow rates (i.e., a range of yield levels) expected in the field(s) to be harvested. The amount of grain required for each calibration “load” ranges from 3,000 to 6,000 lbs (50 to 100 bu grain) depending on the manufacturer's recommendations for the specific model/make of yield monitor. The grain weight of each “load” is estimated by the yield monitor as the grain is harvested. The grain for that specific "load" is then offloaded from the combine hopper and weighed on weigh wagon or commercial scales. The actual weight is then entered into the yield monitor console and the yield monitor firmware makes adjustments to curve.

Conceptually, the calibration process is about fitting a response curve between grain flow rate and flow sensor signal strength in order to estimate low, medium, and high yields. Makes of monitors appear to differ in the nature of the calibration curve that is determined.

Some manufacturers suggest that only one grain load is necessary to perform an accurate calibration. The need for only one grain load implies that the calibration response curve is a straight-line or near-linear relationship between grain flow rates and flow sensor signals. While the standard recommendation is for only one grain load, the "fine print" in the owners' manual suggests that additional calibration loads may be added to fine-tune the accuracy when necessary.





Other manufacturers recommend between 3 and 6 grain loads to perform a satisfactory calibration of the yield monitor. This suggests that the calibration response curve for these yield monitors is not a straight-line, but is rather some sort of non-linear response curve that requires a number of calibration points to best "train" the yield monitor how to interpret the flow sensor signals.

The goal here is to "capture" the full range of grain flow rates (aka yield levels) you expect to encounter during the harvest of your fields. Capturing a range of grain flow rates can be a nuisance because it typically requires harvesting individual full header width "loads" at different speeds or partial header width "loads" at a constant speed. This headache plus the time it takes to off-load and weigh the individual grain loads are among the most common reasons why growers do not faithfully calibrate their yield monitors.

Yield monitor accuracy can be excellent if well-calibrated. Yield estimates by calibrated yield monitors that I use in my field-scale research trials are typically within 1% of the actual grain weight measured with a weigh wagon or farm scales. Conversely, yield estimates can be very poor if yield monitors are not well-calibrated. The error in accuracy can be as much as 100% if the yield monitor is taken “off the shelf” and put into service without any calibration. Errors in accuracy can easily range as high as 7% to 10% late in harvest season if the yield monitor was calibrated only at the beginning of the harvest season. Errors in yield estimates are especially likely if the full, anticipated range of harvested grain flow rates are not included in the calibration of the yield monitor.

Well, you may ask...who cares whether or not your yield monitor is providing you with accurate yield estimates. After all, growers are typically paid at the point of sale according to the weights printed on the scale ticket and not according to a yield map. Quite honestly, it also may not matter for simple farm record-keeping purposes.

However, if you want to USE the information that an accurate yield dataset provides, then you should strive to ensure accuracy in the yield estimates made by your yield monitor. Common uses for yield monitor data include comparisons of one field to another, one specific spot in a field to another, one hybrid's performance to another, early versus late harvest season, and experimental treatments in on-farm field trials.

Yield monitor calibration accuracy can be influenced by yield levels outside the range of grain flow rates used for the yield monitor calibration, by seasonal changes in temperature, by grain moisture content early in the season versus late in the season, by hybrids in terms of their differences for grain weight, grain shape, and grain moisture, and by field topography. Calibrating your yield monitor once a season will typically not be satisfactory. Check the accuracy of the yield monitor calibration occasionally by harvesting and weighing additional calibration loads. Recalibrate the yield monitor when necessary to maintain an acceptable accuracy.

Don't forget to...

- Also calibrate the combine's grain moisture sensor.

- Also calibrate for the zero-flow combine vibration.
- Also calibrate the temperature sensor at the beginning of the season.
- Re-read the yield monitor operations manual prior to the harvest season.
- Create a pre-season and in-season yield monitor checklist of all adjustments and settings.
- Go through the yield monitor checklist every morning before beginning the day's harvest.

Bottom Line

Yield data can be very useful for identifying and diagnosing yield-influencing factors in corn or soybean. Yield monitors can also be useful for harvesting on-farm research trials. Yield monitor calibration, yield data processing, and yield data "cleaning" are necessary to ensure accurate yield data. Remember the old adage: "Garbage in….Garbage out."

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