

TECHNOLOGY TOOLS

By Michael Contessa

Calibrating On-Board Yield Monitoring Systems – Best Management Practices

Yield monitoring systems in forage harvesters and combines provide producers and their advisors with powerful information. These systems instantly measure yield, moisture, and other quality parameters that when translated into thematic maps, allow for graphic visualization of in-field variation. The data collected can be used to answer questions about field capabilities/limitations, management practices, and product usage. When good data is collected, post analysis decision-making is enhanced and improved. To accomplish this users must properly operate and maintain their equipment to minimize data collection errors during harvest. This article discusses best practices to help ensure that your next harvest maps are as useful as possible.

Brains of the operation: Both grain and forage harvesters use an onboard computer (Display) that interfaces with installed sensors, while also recording and mapping data. This is the brains of the operation. The Display records information from the harvesters GPS, Moisture Sensor, Mass Flow Sensor and other sensors using the data to calculate a yield value. It is also used to update firmware in the sensors. Having the most recent software version for your model Display is critical. Updating will ensure that you are armed with the latest features, calibration algorithms, and bug fixes before you hit the field. Software updates can typically be downloaded from the manufacturer's website onto a thumb drive or SD card and transferred to the Display. You can also load other farm specific data in this manner such as field names/boundary's, crop type and variety. Be sure to back up last season's data before updating and preparing the Display for the current year's harvest operations.

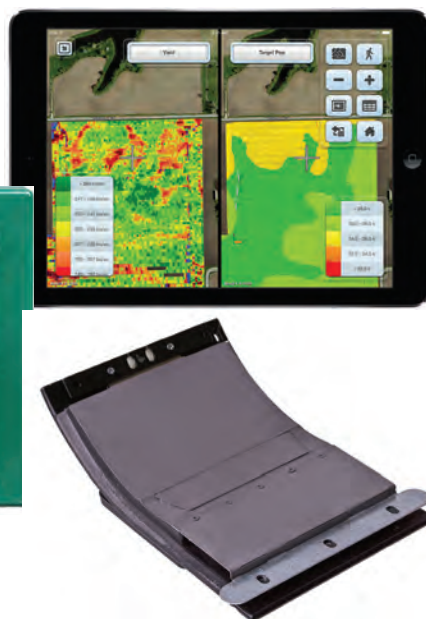
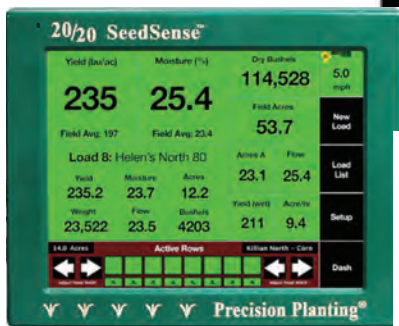
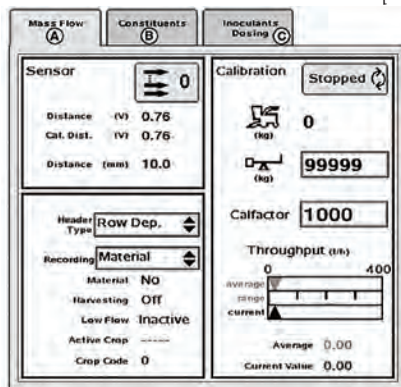
A properly maintained and calibrated yield monitoring system is an asset to any crop farming operation.

Calibrating the Sensors: The calibration process teaches the system that a given voltage from either the force of grain striking a sensor on a combine or the feed roll displacement on a forage chopper are equal to a certain amount of force measured in pounds. Similarly, on some units, the system learns that voltage reported from the moisture sensor is equal to a specified moisture value. Forage harvesters that monitor moisture using NIR or Capacitance sensors do not require field calibration. Calibration files are loaded

into these systems, typically by the dealer. While each yield monitoring system differs in terms of specific calibration procedures, all share the same basic principle. The process boils down to what is measured by the sensors and recorded on the Display and the actual values measured independent of the harvester. The difference in these values is known as the percent error or calibration factor. This is how the system "smartens up."

Most Displays provide a straightforward method for calibrating. They contain setup assistance in the form of step-by-step instruction to guide users through the process. If a calibration step fails, or the percent measured error is significant (>10%), then hardware components must be checked for excessive wear or damage as a mechanical issue is often the culprit.

At a minimum, calibrate the system once a year for each crop harvested because each will



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impact the sensors differently. Recalibration should occur as often as practical, but especially when crop or harvest conditions change significantly (% moisture, test weight, etc.). Always run the calibration procedures in a representative area of the field. Avoid headlands or areas of inconsistent poor crop as this will affect calibration accuracy. For combines, vary harvest speed and crop flow; whereas for forage harvesters, uniform crop harvested at expected operating speed is recommended. Both will provide best results when larger calibration loads are measured. Be sure to have a plan for how to measure loads. Accuracy is essential, so a good practice is to use certified scales or calibrated weigh wagons. Using the same measuring equipment throughout the process will ensure best results.

An important consideration for forage harvesters before beginning the yield calibration process is feed roll adjustment. Since this is where crop mass entering the unit is measured, it is important to ensure that the “zero point” is within the manufacturers specifications. It is not uncommon for this set point to move out of adjustment or become displaced as heads are changed or residual crop material accumulates. Sensors that signal the Display to start and stop data recording will likewise benefit from in spec feed roll

positioning. As previously mentioned, NIR and Capacitance moisture sensors on these machines do not require in-field calibration. Unexpected variability in moisture readings are often the result of soiled or misaligned sensors. The operator’s manual is the best asset to ensure proper sensor alignment.

After the harvester is properly calibrated, do not assume that the recorded data is error-free. GPS signal disruption and improper header height operation will leave data gaps. Harvesting a partial width of the cutter head and/or starting and stopping frequently will result in skewed yield values. While many of the errors can be removed via Post Processing or “Cleaning,” this task can be time consuming and frustrating. It is better to be aware of what causes errors so you can act to minimize them.

A properly maintained and calibrated yield monitoring system is an asset to any crop farming operation. Accurate yield and moisture maps can help drive informed decision-making. Identification of spatial variability within fields opens the door to prescriptive management opportunities. While there’s always something else to do, calibrating yield equipment will undoubtedly provide value whether you intend to leverage the “Power of the Data” now or in the future. □

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Auto Guidance Systems on Farms: Benefits and Costs for Decision Making

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location, are an important feature. Data collection, analysis and management using the GPS based system produces yield maps that support the identification of management zones – those areas of a field that will likely benefit from receiving different rates of an input, for example, lime. Decision making benefits from financial and economic analysis, particularly given the sizeable capital investment requirements associated with variable rate technologies.

Contact a dealer for a demonstration, and to gain a better understanding of the impact of auto steer technology on your bottom line.

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Table 1. Expected Change in Profit by Expected Acres of Corn by Overlap without Auto Steer.

Expected Acres of Corn Affected	Overlap Without Auto Steer (%)		
	5	10	13
	--- Annual change in profit (dollars) ---		
250	-145	1,459	2,421
500	1,459	4,666	6,590
Notes: 1) Expected change in value of production = \$0; 2) expected initial capital cost = \$12,000; 3) expected overlap with auto steer = 0%			

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