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Onboard analysis

April 5, 2019



The Farmer

BY PAULA MOHR

Onboard analysis

Tony Brateng, Roseau, checks his cab monitor, while others calibrate a CropScan 3000H protein analyzer installed on his combine last summer. The analyzer reads and records protein data every 10 seconds or so to create a geo-reference map of wheat protein while harvesting. Brateng is participating in a project set up by the Minnesota Wheat On-Farm Research Network. The goal is to identify factors that influence protein variability within a field and learn how to manage nitrogen to maximize wheat yield and protein. For more on this research, see Pages 4-5.

Mapping protein variability in wheat

PROTEIN CONTENT IN wheat and other crops varies across the field depending on fertility, moisture, organic matter and soils. If you could pinpoint those low-protein areas in your field, how would you manage them?



CALIBRATING THE ANALYZER: Tony Brateng helps calibrate the protein analyzer installed on his combine last year.

Scientists involved with the Minnesota Wheat On-Farm Research Network and participating growers will soon begin their third growing season with using an on-combine protein analyzer that scans a crop sample about every 100 feet while harvesting. The long-term research goals are to identify factors that influence protein variability within a field and how to manage nitrogen to maximize wheat yield and protein.

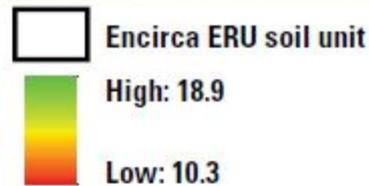
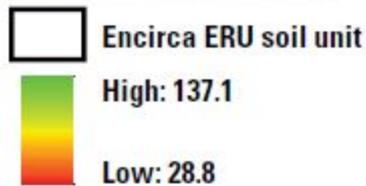
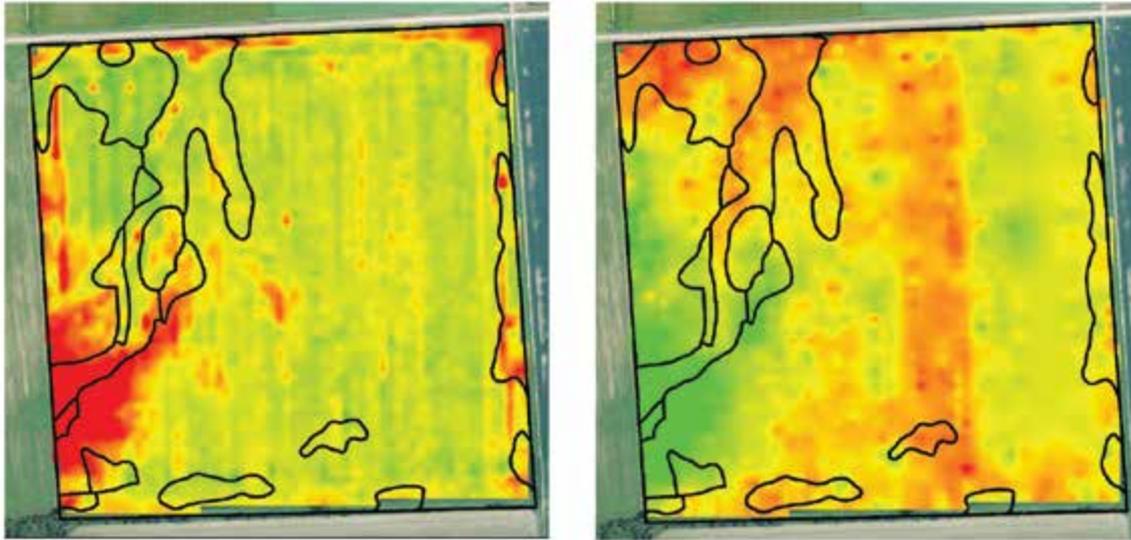
In 2017, crop farmer Tony Brateng, Roseau, worked with the network team, his mechanic and a local John Deere technician to install and calibrate a CropScan 3000H on his John Deere 9660 with RTK guidance. After some adjustments, Brateng was successful in gathering protein data on wheat and oil in canola. However, he was unable to collect oil data on corn and soybeans because grain moisture was too high. Network researcher Rob Proulx says collected data showed some protein patterns in Brateng's fields, such as higher ground having high-protein wheat. However, protein patterns were not consistent across fields. Last year, the research network group had two protein analyzers available for two farmers involved in the project, Brateng and Kyle Mehrkens, Thief River Falls. These farmers are planning to work again this year with the network team on the project. After reviewing yield and protein maps as well as data from the previous growing season, research coordinator Melissa Geiszler says they saw what was expected: that protein would be inversely related to yield, and that protein varied with different soil types in the field. Some calibration challenges showed up, too, on one map. "The machine wasn't calibrated well enough to read high-moisture wheat very well, so it tended to read artificially low proteins when the wheat was wet," Geiszler says. She is working with the analyzer manufacturer to improve the calibrations for this year.



READING ON THE RUN: The CropScan 3000H works by taking a small sample of grain off the clean grain elevator every 10 seconds or so, dropping it into a remote sampling head where light passes through it. A fiber optic cable collects the transmitted light and sends it to the NIR spectrometer in the combine cab. The combine operator can then see the real-time grain quality data on the cab's monitor. The real-time data is geo-tagged, time-stamped, recorded and saved.

YIELD

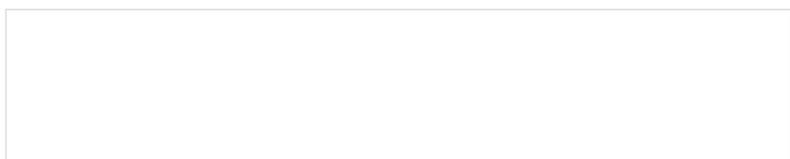
PROTEIN



SEE FOR YOURSELF: Maps from one of Brateng's wheat fields show the yield-protein relationship. The yield map is on the left, and the protein map on the right. This field had some sandy soil. Note lower yields on the left side of the yield map yet higher-protein wheat in that same area.

Brateng says he used the analyzer on all his wheat and confirmed that protein was usually lower where yields were good. He notes, too, that in one field, protein ranged from 11.5% to 17%. While crop characteristics are the end goal, each season everyone learns a bit more about the sensor technology, too. It takes an investment in time to get up to speed on how to install and calibrate the equipment and then collect the data. "The instrument and the installation are pretty in-depth," Brateng says. "You can't pop it off your combine and move it easily." And if there are questions about the scanner, those are directed to the Australia-based company Next Instruments. "We harvested about half a day [last year] and the scanner didn't seem to work," Brateng says. "It turns out it needed a product update that hadn't taken place yet. Our days are [Next Instruments'] nights. We contacted them and then they sent it." Everyone involved in this project realizes that more research needs to be done. Mehrkens says he appreciates efforts by the on-farm network team and the opportunity to have research done on his farm. "Wheat Growers is very good in working with farmers and not making it too time consuming," he says.

Depending on research results and soils, Mehrkens says he may end up



tweaking N rates on wheat. For example, on clay versus loam soils, heavier clays typically have lower-protein wheat and sandy loams, higher protein wheat. Knowing where those areas are in his fields, Mehrkens can make N adjustments if necessary.

“The more information you have, the better your decisions can be,” Mehrkens says. “Also, if you have applied in-season nitrogen, with the protein analyzer you’ll find out if it pays or not.”



SAMPLE CHECK: *Melissa Geiszler, Minnesota Wheat Research and Promotion Council research coordinator, and Brateng double-check bags of wheat seed used to calibrate the protein analyzer installed on his combine.*



ANALYZER INSTALLATION: *Brad Naplin from Evergreen Implement, Thief River Falls, installed the CropScan 3000H on Brateng’s John Deere combine last summer. The analyzer, which comes from Australia, is not cheap. It retails for around \$23,000, and only one dealership in Montana offers the technology in the U.S.*





FIRST TO KNOW: Kyle Mehrkens, a Thief River Falls crop farmer, is one of the cooperators involved with Minnesota Wheat's on-farm research. He also does his own on-farm research and likes learning firsthand what practices help improve wheat yields and protein.



MORE DATA: Rob Proulx is one of the principal investigators working with farmers and the on-combine protein analyzer. Getting equipment installed and calibrated on combines over the last couple years has had its challenges. Researchers hope additional data will help identify which factors influence protein content and what can be done to make improvements, such as adding nitrogen-rich strips.



PROTEIN RANGE: After reviewing wheat protein maps generated from data collected by an on-combine protein analyzer, Tony Brateng could

see where high and low protein zones were in his fields. One field had protein levels ranging from 11.5% to 17%.

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