

Measuring feed moisture content is a useful tool

Value of moisture monitoring feed

Monitoring moisture content of ration ingredients with near-infrared reflectance spectroscopy (NIR) assists dairymen with gaining consistent feeding results.

by Amy Ryan

Donald Meyer, president of Rock River Laboratory, Inc. (RRL) in Watertown, Wisc. helped pioneer the use of NIR for dairy farmers. NIR can be used to measure moisture content, nutrient content, fiber and starch digestibility, and energy potential in feed ingredients. And, it can assist with quality control.

John Goeser, also with RRL in nutrition and technical support, consults on hand-held NIR tools at the on-farm level (see sidebar). He says that while the core technology has been available for quite some time, it has evolved to be utilized in various manners in the field of dairy cattle nutrition.

NIR on-farm – moisture

“NIR is a very robust technology used around the world to predict organic bond based constituents,” says Goeser. “The moisture tool uses

a reflective wavelength of light which is bounced off the forages. Some of the light is reflected back, which in turn relates to the moisture content. Based upon the reflected and absorbed light, a calibration equation is used by the instrument to predict moisture.”

Rock River Lab has developed the calibrations behind some of the industry’s newest tools that can measure moisture content to within one percent. These hand-held units were calibrated by measuring moisture levels for many feeds and then comparing moisture values to light reflectance data.

Goeser says that NIR is helping dairymen do a better job of controlling the accuracy of feed delivery. When used on-farm, this technology offers the ability to detect what is being mixed in the mixer and what is delivered to the cow daily. It allows dairy managers the opportunity to focus on

the true dry matter content (by better accounting for water content) of the feed, whereas, when a feed sample is dried with an oven type technique to determine moisture, accuracy comes into question. Accuracy is questionable with oven-based techniques because non-water compounds (such as fermentation acids) become volatilized, in some cases accounting for up to six units or more of feed dry matter.

In the future, NIR also may provide a more realistic means to provide a consistent nutritional profile to cows on a daily basis. “Let’s say that your goal is to give your cows a 16 percent protein diet every day,” states Goeser. “Future generations of NIR hand-held devices may analyze the feed and real time adjustments can be made so cows are getting that 16 percent protein every day.”

These new tools are driven by dairy producers and their management teams recognizing the importance of measuring moisture to nutrition. “Cows’ nutritional requirements are met with dry matter intake, not water,” says Goeser. “Monitoring moisture daily is critical as we strive for consistent and precise nutrition programs. Moisture content changes caused by rain events or variability in silos have



John Goeser: “Monitoring moisture daily is critical as we strive for consistent rations”

been clearly documented to impact cow performance.”

NIR in lab – speed and accuracy

When looking more specifically at NIR technology, Goeser cites three main advantages when compared with wet chemistry and X-Ray technology. First, NIR technology is very good to pinpoint organic measures such as fiber, fat and protein content of feed.

Secondly, it can measure energy levels by predicting how fiber and starch will be digested in the rumen. Finally, it is much faster and more economical than true chemistry, where there can be 6-10 feed observations done at a considerable less cost than chemistry. More specifically, NIR takes a matter of seconds and chemistry takes days.

Goeser continues to say that NIR measurements are very precise and repeatable. However, he adds that environmental factors such as temperature fluctuations and humidity, and electrical supply quality can all affect NIR hand-held instruments. For this reason, he recommends that the machines be calibrated and standardized often to ensure they are measuring feed content correctly.

Because of the speed and lower cost, Goeser recommends nutrient analysis of any feedstuff that is being offered at more than three pounds in the ration. This includes home grown and

purchased feeds. Based on his nutrition experience, Goeser feels this is where quality control and inventory control (on a smaller scale) come into play.

It is widely known that cattle crave consistency. Reducing variability of the diet they receive is key to that consistency.

More consistent diet

“Delivering a more consistent ration day in and day out means that cows are eating what is being offered,” says Goeser. “While there are only currently less than five percent of dairy operations utilizing NIR on-farm, nutritional consultants are using it to manage diets and home grown forage content along with pinpointing the nutritional profile of purchased commodities. Ultimately, the more consistent diet coupled with understanding feed nutritive content (and not using book values) will lead to optimized feed intake which can in turn improve performance and profitability.”

The hand-held moisture tracking unit – results at your fingertips

Rock River Laboratory, LLC and John Goeser have helped develop and are currently consulting on the hand-held moisture tracking unit described below.

Digi-Star Moisture Tracker™

- Made by Digi-Star in Wisconsin
- Released in October of 2013
- The Moisture Tracker hand held device
- The Moisture Tracker PC Utility software package
- The Moisture Tracker uses a USB Stick

to upload the feeds and forages that are to be measured and to download recordings of the measurements that have been made

- A growing range of calibrations for most common livestock forages with additional calibrations provided as they are created
- Program the device with only the feedstuffs used on-farm
- New feeds can be added, or old feeds removed, at any time

- Calibrations provided by Rock River Labs ensure the accuracy of the Moisture Tracker
- Access to updated feedstuffs and calibrations available 24/7 via the Web
- License renewals available 24/7 via the Web
- Free 24/7 Tech and Help Support
- Moisture Tracker software to produce a file which can be imported by most feed management packages
- Accurate dry matter readings within approximately 1-2%
- Requires annual License & Calibration Renewal (the first year is provided with purchase)
- Time efficient – results in seconds
- Ease of use – just pull the trigger
- Bring the tool to the pile, not the pile to the tool
- Rechargeable
- Spreadsheet reporting



ChemWatch by Valley Agricultural Software in California is a private label distributor for the Moisture Tracker.