

# HarvestLab™

## John Deere Constituent Sensing

### Frequently Asked Questions



#### **Why should I buy a HarvestLab?**

HarvestLab allows for on farm monitoring of the nutrient qualities in feedstuffs. It can be used during the harvest season to monitor silage quality and throughout the year to track changes in the nutrient profiles of forages.

#### **How does HarvestLab work?**

HarvestLab uses Near Infrared Spectroscopy (NIR) to predict the nutrient profile of feedstuffs. NIR recognizes nutrients in the same way that a human eye recognizes colors. Humans see the color green because objects like pine trees reflect light at a specific wavelength that we recognize as green. HarvestLab recognizes nutrients in feedstuffs based on the wavelengths that are reflected in the near infrared spectrum.

#### **How does HarvestLab predict moisture values so accurately?**

Water (H<sub>2</sub>O) reflects near infrared light very strongly across a wide range of wavelengths. This makes its NIR "signal" very strong and its measurement by NIR very accurate.

#### **How accurate are the other nutrient values from HarvestLab?**

For ensiled forages, users should average at least 3 scans of a representative sample. With this procedure, HarvestLab can accurately rank the nutrients profiles of feedstuffs from high to low. This makes HarvestLab a useful tool for detecting changes in the nutrient quality of silages.

#### **NIR is less accurate when samples are not dried and ground prior to scanning. How can I use HarvestLab to obtain reliable nutrient profiles of my feedstuffs?**

There are two major limitations to getting an accurate estimate of the nutrients in a feedstuff; 1) how well the sample represents the lot it was taken from and 2) the accuracy of the analysis method.

Commercial Laboratories typically dry and grind feed samples prior to NIR analysis because moisture and particle size change the way that light is reflected from a sample. By drying and grinding the sample, these laboratories are able to predict, with higher accuracy, the nutrient values of the sample that is submitted.

HarvestLab will not be able to predict nutrients in a single sample as accurately as a commercial lab, but it will allow for more frequent analysis which will reduce the amount of error associated with sampling. By sampling frequently and averaging the results, producers can use HarvestLab for qualitative nutrient ranking of their feedstuffs.

In addition, many commodities arrive on the farm with low moisture content and relatively uniform particle size. On these commodities the difference between HarvestLab and commercial laboratory accuracy will be greatly reduced.

**My nutritionist wants dried and ground NIR values for balancing rations. Why should I purchase a HarvestLab?**

HarvestLab is useful for detecting changes in forage quality. If your nutritionist wants dried and ground NIR values, the HarvestLab will be useful for determining when it's time to send a sample into a commercial laboratory. By monitoring the feed quality more frequently it will be possible to detect changes in feedstuff quality immediately and then the sample can be submitted to a commercial laboratory for more precise analysis.

Additionally, on large farms it is common for commodities to be fed so rapidly that sending a sample for commercial laboratory analysis is not practical. Having a rapid analysis instrument like HarvestLab on the farm would help account for the variation in quality of these commodities. Plus, due to the relatively uniform particle size and low moisture content of many commodities, HarvestLab values are quite accurate. **My nutritionist needs other nutrient values for balancing rations like minerals, NDFD, and Soluble Protein. Can I get these from HarvestLab?**

Inorganic elements like minerals absorb very little near infrared light making the prediction by NIR instruments poor, even in a commercial laboratory setting. It is recommended that mineral analysis be done by wet chemistry in a commercial laboratory.

NDFD is a biological assay in which a sample is digested in rumen fluid for a period of 24-240 hours. The factors that affect NDFD are complex and variable which makes their prediction by NIR difficult. NDFD cannot be accurately predicted without drying and grinding samples prior to analysis.

Similar to NDFD, the factors that make protein soluble versus insoluble are complex and variable and the prediction of soluble protein by NIR is difficult. Soluble protein cannot be accurately predicted without drying and grinding samples prior to analysis.

For precise ration formulation it is recommended that HarvestLab be used to detect changes in feedstuff quality. When change is detected samples should be submitted to a commercial laboratory for analysis of constituents like minerals, NDFD, and soluble protein.

### **How often should I scan samples with HarvestLab?**

HarvestLab will only improve the accuracy and precision of feeding operations if users take samples more frequently than traditional systems. The exact number of samples required will depend on the variability of the feedstuff. At a minimum, samples should be taken every time a new "lot" of feed is started. For commodities, this means at least every truckload. Ensiled forages can have much more variability, especially when stored in vertical silos and bags. These crops should be analyzed at least daily.

### **Which feeds will HarvestLab have calibrations for?**

Beginning in 2012 HarvestLab calibrations will be available for fresh and ensiled corn silage. In 2013, calibrations will be available for the other major forage silages including alfalfa, grass, and small grains silages. Calibrations for other commodities including dry hay, distiller's grains, beet pulp, and corn gluten feed will follow.

### **Which nutrients will HarvestLab predict?**

HarvestLab calibrations will predict the moisture content of all feedstuffs as this is the largest source of variation on the farm and the constituent that is easiest to predict by NIR. The other constituents will be selected based on how well they can be predicted by NIR and how well they can be used as a marker for quality in an individual feedstuff. For example, all forages will include ADF, NDF, and crude protein. Distillers' grain calibrations will include NDF, CP and Fat, while high moisture corn calibrations will include ammonia because it is a good marker of starch digestibility.

### **My commercial laboratory uses different procedures for their reference values. How can I use HarvestLab?**

The most effective use of HarvestLab on the farm is to detect changes in feed quality. While laboratories may have different methods for measuring a constituent like NDF, samples that are high in NDF will be high in all laboratories. HarvestLab

should be used to detect when the NDF content of a feedstuff changes and then a sample can be sent to a commercial lab to obtain the precise NDF value based on their preferred method.

**I have a plastic bowl that will fit in the HarvestLab's bench top mode. Can I use this instead of the glass bowl provided?**

No. The quality and clarity of the bowl will change the way that near infrared light is reflected from the sample. Since HarvestLab relies on this reflected light to predict the nutrient contents of the sample, it is critical that the glass bowl that is supplied with the instrument is used. If the bowl breaks or cracks, please contact your HarvestLab dealer for a replacement.

**Why do I need to use the weight that is supplied with HarvestLab in bench top mode?**

HarvestLab relies on the light reflected from a sample to predict its nutrient contents. If feed particles are placed loosely in the bowl, light will be deflected within the open spaces of the feedstuff and not be reflected directly back into the instrument. Using the weight that is supplied with the HarvestLab instrument will ensure that the feedstuff density is great enough to receive accurate nutrient predictions.

**I want to purchase the corn silage calibrations this year, but Dairyland Labs will be adding more corn silage constituents in the future. Do I need to purchase new calibrations when the new constituents are available?**

No. Calibrations are sold by crop types so as new constituents are available for a specific crop they will be included with the yearly calibration updates.

**What do I do if I think that HarvestLab is not predicting correctly?**

The first step is to contact John Deere to ensure that the sample is being scanned properly and that the instrument is functioning as expected. If the instrument is functioning properly then John Deere will direct you to a representative at Dairyland Laboratories who will help you through the process of sample submittal and value verification.

**I sent a sample to my dairy lab and the values came back different than HarvestLab. Why?**

There are many methods for measuring any nutrient in a feedstuff. For example, moisture can be measured by the Carl Fisher method, microwaving, oven drying at 60 C for 24 hours, or oven drying at 105 C for 3 hours. The calibrations for

HarvestLab are all created at Dairyland Laboratories and will only to agree with Dairyland's reference methods. Also, HarvestLab is only able to detect changes in feed quality using multiple scans. The absolute value of any nutrient may vary between HarvestLab instruments and between an instrument and Dairyland Labs, but all instruments will be able to detect high and low nutrient values.

### **How much change should I see before I call my nutritionist?**

Nutritionists build safety factors into their rations to protect against changes in feed quality. The size of these safety factors will depend on the variability of the feedstuffs, the producer's ability to detect changes within a feedstuff, and the relative importance of the nutrient. It is important to discuss with your nutritionist how much change is significant to your ration.

### **The HarvestLab is scanning a sample "As Is", how does it produce a "dry basis" value on the prediction screen?**

In commercial testing laboratories samples are routinely dried before scanning by NIR and the calibrations are developed on a dry matter basis because the samples are presented to the instrument dry. With HarvestLab, samples are presented to the instrument with moisture included. Therefore calibrations are developed on an "as is" basis (the spectra of a sample with 30% NDF and 50% moisture is different than a sample with 30% NDF and 80% moisture). After predicting the "as is" values of each constituent and predicting the dry matter content, HarvestLab calculates the dry basis values by dividing the predicted constituent value by the predicted dry matter value.

$$\text{Predicted NDF (as is)} = 9\%$$

$$\text{Predicted Dry Matter \%} = 50\%$$

$$\text{Calculated NDF (dry basis)} = (9\%/50\%) = 18\% \text{NDF}$$