

ABCs of Forage Analyses: Wet Chemistry vs. NIR

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You've sampled your forage and are ready to send it to the lab. You have two choices: wet chemistry or NIR analyses. Looking at the price tag, you're probably asking:

If NIR is faster and cheaper, why bother with wet chemistry?

NIR doesn't work well for all feeds. NIR works well for single source common feedstuffs that are chemically consistent over time. A large data base of wet chemistry values is needed and must be available to calibrate NIR equipment. NIR should not be used for variable and uncommon feedstuffs. For example, bakery waste can contain bread, crackers, donuts, potato chips, etc. The specific ingredients and the corresponding amounts are variable. This will affect the nutrient composition, making calibration of NIR equipment difficult. NIR doesn't work well for TMR samples (because they're mixed) or samples of forages not previously analyzed by wet chemistry. Forages harvested at different stages of maturity may also not lend well to NIR analyses.

Let's step back and define these terms.

Wet chemistry is slang for chemistry-based analytical methods used to measure chemical compounds in plant material. Think lab coat, goggles, and chemical reagents! Methods are published in a reference book (AOAC International – Official Methods of Analysis). A technician follows the book's "recipe." This standardizes the method so all labs performing the same method, in theory, will give similar results. Wet chemistry can be expensive due to labor involved and costs associated with chemicals, safety programs, and waste disposal.

Near Infrared Reflectance Spectroscopy, or NIR, measures light energy that is reflected by the

feed sample to determine the chemical composition of forages. It is a rapid, AOAC-approved method requiring no chemical reagents. The amount of light energy reflected is compared to a known set of values (from that big data base of wet chemistry numbers) to deter-

mine composition. This is why NIR is not appropriate for all feedstuffs. More about that below.

Wet chemistry and NIR are linked.

Wet chemistry data are used to calibrate NIR equipment. The NIR equipment does not know how much NDF is in the sample. That is where wet chemistry plays a critical role. The more wet chemistry values are available for a feedstuff, the better the calibration of NIR methods for that feed will be. The quantity of NDF that was determined by wet chemistry for a given forage sample is linked to the NIR spectral pattern (from the reflected light) for that same forage. To put it simply, wet chemistry values are used to develop the "curve" for NIR. Samples are analyzed with wet chemistry. Then they are evaluated at a specific wavelength with NIR. The light energy reflected is determined and assigned the concentration amount based on wet chemistry.

Take home message

Wet chemistry is an accurate method for forage analysis, and NIR can be an accurate method. Wet chemistry takes longer and is appropriate for forages and other feedstuffs where there are limited data. NIR is quick, and so are the reports. NIR works best for common feedstuffs as long as it can be calibrated with good wet chemistry information.

Previous *ABCs of Forage Analyses* Articles (reading forage reports, fiber and digestibility, carbohydrates) can be found here: <http://ucanr.edu/heguy>

