

A-B-Cs OF ROCK RIVER LABORATORY NUTRITIONAL ANALYSIS

Core Techniques

Wet Chemistry

- Rock River Laboratory uses approved physical, chemical, enzymatic, volumetric, and gravimetric techniques to measure core nutrients, vitamins, minerals, or digestion of feed and forage samples.
- A sample is dried and ground down to around a ground-coffee size to ensure sample uniformity.
 - Subsamples are then taken of the original sample, and each nutrient is measured separately using different wet chemistry techniques.
- Wet chemistry is the backbone of laboratory analyses and the gold standard
 - Valuable for research and development programs
 - Useful when troubleshooting
- Cost ranges from \$15 to \$250, depending on analysis requested
- Turnaround time is two days to two weeks

Near-Infrared Reflectance Spectroscopy (NIR)

- A dried and ground sample is placed into a small cup with a glass bottom and a reflectance instrument is used to bounce near-infrared (NIR) light off the sample.
- The reflected light is measured by the machine, creating a graph that looks like a roller coaster, with wavelength on the x-axis and absorbance on the y-axis.

The nutrient and digestion values for the sample are measured (predicted)

- The absorbance measures are related to nutrient and digestion properties for the sample
- The NIR instrument must be calibrated (validated) against wet chemistry nutrient and digestion measures
 - Accuracy can only be as good as the wet chemistry technique
- NIR is an accepted technique useful for everyday nutritional programs
- Costs range from \$16 to \$30
- Turnaround time is a matter of hours

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Core Nutrient Definitions

- **Crude Protein (CP, % of DM):** calculated after measuring nitrogen content. Protein is important for growth and performance.
- **Soluble Protein (% of CP):** determines how much protein is soluble in a water solution. CP solubility helps determine rapidly available protein.
- **Available CP (% of CP):** determines how much of total CP is available for digestion and use by the animal. Calculated by subtracting ADF bound protein.
- **ADICP (Acid Detergent Insoluble CP) (% of DM):** measures damaged and tightly bound protein that is not available for digestion and animal use.
- **ADICP (% of CP):** ADF bound protein expressed as a % of CP.
- **ADF (Acid Detergent Fiber) (% of DM):** fiber measured using an acid detergent rinse.
- **aNDF (Neutral Detergent Fiber) (% of DM):** fiber measured using a neutral detergent rinse with amylase and sodium sulfite. Fiber content is important because it is a lower energy nutrient.
- **aNDFom (% of DM):** aNDF corrected for ash content.
- **NDR (Neutral Detergent Residue) (% of DM):** fiber measured using neutral detergent rinse that may have some protein residing within.
- **Fat (EE, % of DM):** fat-like compounds measured using an ether extraction. Fat is a higher energy nutrient and can be beneficial.
- **Ash (% of DM):** measured by burning the sample. Ash stems from soil contamination and minerals.
- **Lignin (% of DM):** the woody fiber linkages measured using sulfuric acid. Lignin cross links like a zipper between fiber molecules and is not digestible by ruminants.
- **Sugar (Ethanol Soluble Carbohydrate, ESC) (% of DM):** measured by soaking the sample in ethanol and then reacting sugar-like compounds with other compounds. Sugar is highly digestible.
- **Sugar (Water Soluble Carbohydrate, WSC) (% of DM):** measured by soaking the sample in water and then reacting sugar-like compounds with other compounds. This sugar analysis extracts more “sugar” than ESC and has recently been accepted as more accurate, relative to cow digestion and metabolism.
- **NDIC (Neutral Detergent Insoluble CP) (% of DM):** the protein that is bound within the fiber fraction.
- **Starch (% of DM):** measured by cleaving the starch molecules into individual glucose molecules and then reading glucose. Starch is an important nutrient for animal performance.
- **NDFD (% of NDF):** fiber digestibility is important for nutritionists to estimate how much fiber ruminants can digest. The 24, 30, and 48h define the length of time the fiber was digested.
- **Fermentation Products (pH, volatile fatty acids (VFA), ammonia-nitrogen (NH₃ - N), ethanol and other alcohol compounds):** these are unique feed components that are produced during fermentation (or preservation). Consultants assess these compounds to determine how well feed has been preserved.
- **Calculations:** several different equations, calculations, and animal-performance predictions are available through Rock River Laboratory.

Contact us to help choose analyses, customize analyses, or understand digestion and energy calculations:

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