

## **Pre-Conference Session: Introduction to NIR Moisture Testers**

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## **Overview**

- **History of NIR**
- **What is NIR?**
- **Why you should care**
- **Pros and Cons**
- **Types commercially available**



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## History of NIR

- **NIR: Near Infrared Reflectance**
- **Discovered by William Herschel in the 19<sup>th</sup> century**
- **First industrial applications were in 1950s**
- **In the 1980s, a single, stand-alone NIR system was available, focusing on chemical analysis**
- **Nowadays, NIR can be used for agriculture, physics, physiology, or medicine (possibilities limitless)**

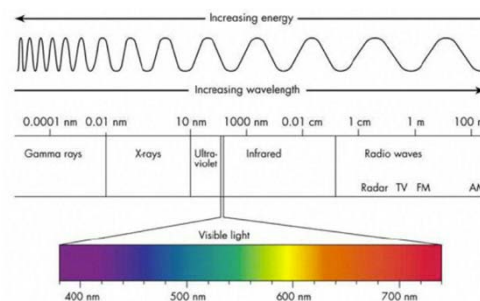


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## What is NIR: What is light?

- **Light is made of rays of energy**
- **Each ray travels straight, and has its own particular wavelength**

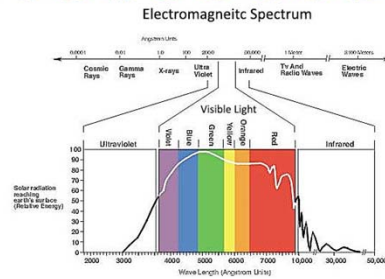


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## What is NIR?

- White light is not one single wavelength

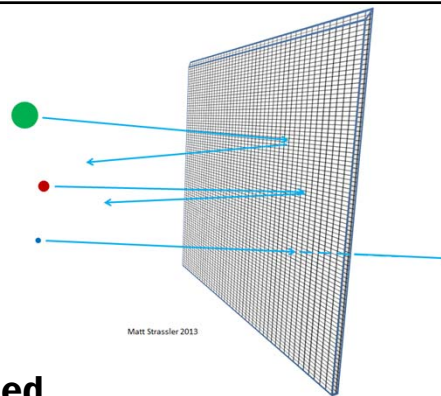


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## How NIR Works

- Light is shone onto a sample
  - Some is absorbed
  - Some bounces back
- Different parts of the feed (protein, moisture, etc.) absorb different wavelengths of light



Matt Strassler 2013



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## How NIR Works

- **Light can be used to measure the amount of a nutrient in a feed:**
  - The amount of light that was shone out is known
  - The amount of light that bounces back is measured
  - The difference is the amount absorbed

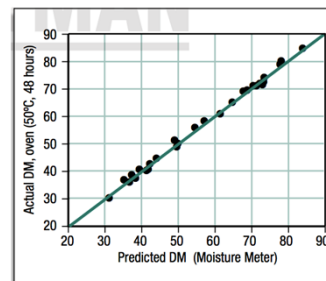


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## What is NIR?

- **Correlations made between the amount of light absorbed and wet chemistry results, resulting in NIR equations**
- **Each laboratory has their own equations, and they can sell them to other laboratories**



(Goesser, *Progressive Dairyman*, Feb. 2014)



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## How is NIR used?

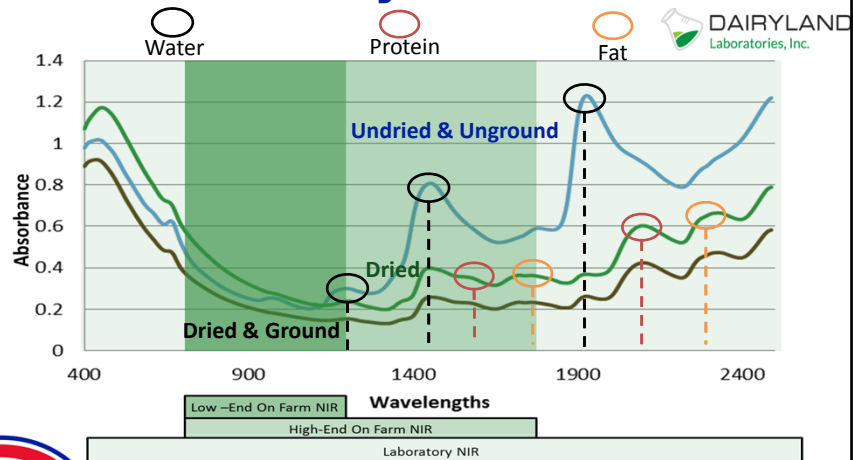
- Moisture
- Nutrients
- Quality control
- Digestibility
- Energy potential



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## In wet samples, NIR measures moisture accurately



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## Why do I care about NIR moisture testing?

- **At harvest:**

- Harvesting based on moisture produces the best quality feed, with the least DM losses
- 4-unit moisture error can cost 45 days of feed (Goeser, Hoard's Dairyman, Sept 2014)

- **At feeding: Moisture changes, such as rainfall, can cost 2-3 lb per cow** (Boyd and Mertens, 2013)



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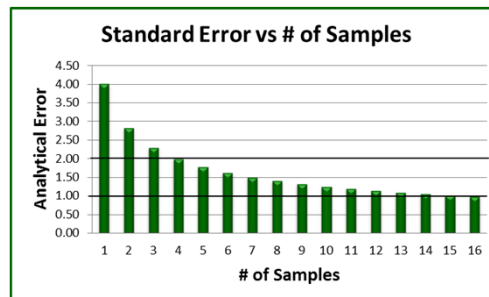
## Pros and Cons of NIR

- **Pros**

- Fast
- Easy
- Cheap

- **Cons**

- NIR cannot be more accurate than wet chemistry, as the equations are based on wet chemistry
- You need a large number of samples to create the mathematical equations



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## Types of NIR Digi-Star



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## Types of NIR AgriNIR



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## Types of NIR HarvestLab



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## Types of NIR Laboratory Scale NIR



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## Bottom Line

- NIR results are only as good as the sample!



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# Thank you



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