

E-Learning Course: Implementing NIRS Fecal Sampling Technology

Course Overview:

This e-Learning course will teach students how to implement NIRS (Near Infrared Reflectance Spectroscopy) fecal sampling technology, which provides a specific point in time analysis of the chemical makeup of a manure sample. Once the chemistry of the diet and spectra of manure is identified, the amount of crude protein (CP) and digestible organic matter (DOM) can be determined. Students will learn how to set up and maintain equipment, collect and process samples, and predict diet quality using the GRAMS software.

This course is divided into two parts, with a total of five learning modules. The course has been designed in a sequential manner so that multiple audiences can participate in the course based on their role within a project, organization, or on an individual basis using commercial lab services.

Audience:

Part 1 (modules 1-2): Any person interested in NIRS technology, it's implications to livestock health, and collecting fecal samples to be processed by a lab.

Part 2 (modules 3-5): Lab managers, workers, and project personnel responsible for processing fecal samples using NIRS technology with validated pre-existing equations.

Modules and Objectives:

- Module 1: Introduction to NIRS
 - Terms and Definitions
 - ✓ Understand common words and phrases
 - ✓ Review technical terms and uses
 - History
 - ✓ Review evolution and timeline of NIRS technology
 - ✓ History of applying NIRS to fecal samples
 - Technical Overview
 - ✓ Understand light sources and wavelengths
 - ✓ Review basic principles of NIRS
- Module 2: Collecting Fecal Samples
 - Supplies
 - ✓ Identify supplies needed for collection.
 - ✓ Identify supplies needed to transport sample to lab.
 - Labeling protocol
 - ✓ Understand importance of following labeling protocol.
 - ✓ Complete labels correctly.
 - Collection Procedure

- ✓ Maintain integrity of sample.
 - ✓ Follow appropriate sampling protocol according to purpose.
 - ✓ Labeling, storing and securing sample for transportation to lab.
- Module 3: NIRS Equipment and Maintenance
 - Sample Mill
 - ✓ Identify parts of sample mill.
 - ✓ Operate and clean the sample mill.
 - ✓ Replace worn parts in the sample mill.
 - Oven
 - ✓ Identify parts of the oven.
 - ✓ Operate and clean the oven.
 - Spectrometer
 - ✓ Setup NIR equipment.
 - ✓ Install SpectraSuite and GRAMS software.
 - Maintaining Equipment
 - ✓ Review checklist for powering off and storage.
 - ✓ Create and maintain a free and dust free work environment.
- Module 4: Processing Samples
 - Supplies
 - ✓ Identify supplies needed in the lab to process samples.
 - Logging Samples
 - ✓ Create logging procedure for samples received.
 - ✓ Determine naming and numbering convention for samples.
 - ✓ Create a sample log.
 - Drying fresh or wet fecal samples
 - ✓ Record and retain logged sample number with fecal material.
 - ✓ Determine when sample is dry enough for grinding.
 - Grinding
 - ✓ Place dried sample in sample mill correctly.
 - ✓ Perform grinding procedure.
 - ✓ Clean sample mill.
 - Drying ground fecal samples
 - ✓ Set oven to appropriate temperature.
 - ✓ Determine appropriate length of time to dry sample.
 - ✓ Place ground fecal sample in oven to dry.
 - Collecting Spectra
 - ✓ Initialize and launch SpectraSuite.
 - ✓ Scan samples to a file.
 - ✓ Master troubleshooting techniques.
 - Storing the Processed Samples
 - ✓ Label and store processed samples.

- Module 5: Predicting Diet Quality
 - GRAMS
 - ✓ Apply calibration equation to unknown spectra.
 - ✓ Record results in lab log
 - ✓ Record results on field sample sheet
 - ✓ Save results