Application Note 05:
# Cropscan 2000G Barley Calibration

The Cropscan 2000G On Farm Analyser is portable Near Infrared Transmission Analyser designed for use by farms to measure protein, oil and moisture in whole grains of wheat, barley, oats, sorghum, rice, canola, corn, soybeans, peas and beans. The instrument use a diode array spectrometer to collect the NIR spectrum from 720-1100nm. In this region, N-H(Protein), C-H(Fat) and O-H(Moisture) absorb NIR energy. The NIR spectrum of grains can be analysed to provide rapid analyses of whole grains for protein, oil and moisture in less than 1 minute.

Introduction

The analysis of barley for protein and moisture content is another application suitable for measurement by NIR techniques. The Cropscan 2000G Whole Grain Analyser is provided with a calibration capable of measuring these properties in barley so as to allow a method for growers to separate their crop on the basis of either feed or malting grade (9-12.5% protein).

Description

104 samples of Barley grown in Australia were analysed in the laboratory for protein (Leco) and moisture (Oven) content. The individual samples were scanned five times each on the Cropscan 2000G between 720-1100nm using a 20mm pathlength cell. A calibration model was developed using partial least squares regression (PLS-1 algorithm in the software package Unscrambler®).
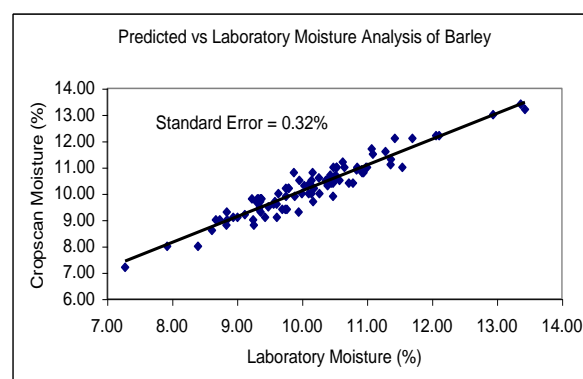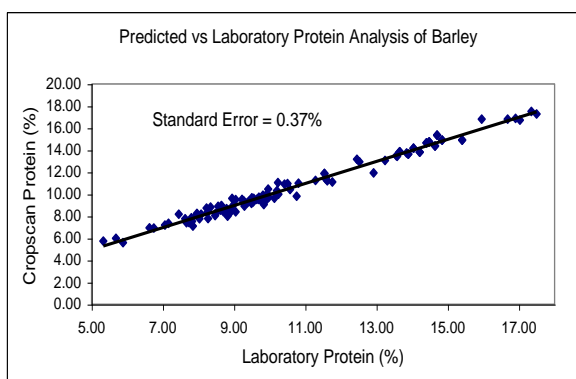

Near Infrared Spectra of Barley
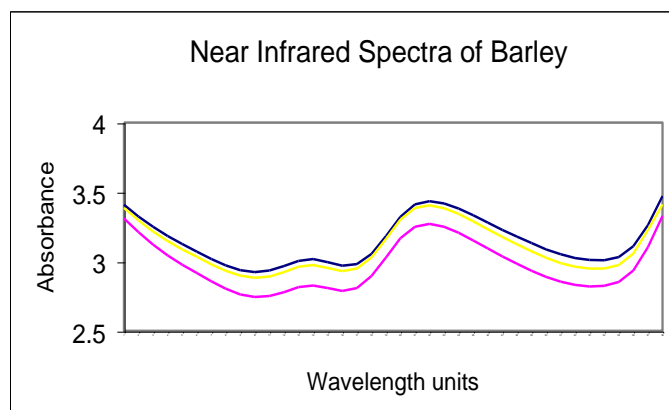
Results

The regression statistics for the calibrations are given below

	Number of elements (n)	Range (%)	Number of Principal Components (PC's)	Correlation (R)	Standard Error of Determination (SED)
Protein	520	5-18	11	0.9831	0.37
Moisture	520	7-14	11	0.9104	0.31

A graphical representation of the calibration data is presented below

Predicted vs Laboratory Protein Analysis of Barley
Standard Error = 0.37%

Predicted vs Laboratory Moisture Analysis of Barley
Standard Error = 0.32%

Conclusion

The Cropscan 2000G can be calibrated to measure the protein and moisture content of barley samples. Variety and colour of barley can effect NIR calibrations. Within the sample set used for this calibration, there were no samples, which exhibited strong absorbances ie. Above 4.5 abs units. Samples, which do absorb above this level generally, have poor agreement with laboratory data. A shorter pathlength cell eg. 16mm can be used to overcome this problem. Alternatively, the Cropscan 2000G can be set up to identify outliers which exceed the 4.5 absorbance unit range.