Application Note 40: Analysis of Protein in Feed Mix

Introduction:

The objective of this preliminary study was to evaluate the potential use of the NIT-38 Near Infrared Transmission analyser for measuring protein in stock feed mix. The mix was provided as a ground powder and was made from grain and soy bean meal.

Description:

13 samples of mixtures of the feed mix with other known wheat, rye, rice, buckwheat and soy flours were scanned using a 4 mm pathlength powder cell. Each sample was scanned 5 times as the powder cell moved past the light beam. Each sample was repacked and scanned again.

The spectral data was stored in the NIT-38 and uploaded to a PC. NTAS (NIR Technology Australia Software) was used to develop a PLS calibration for protein. The spectral data was converted into the second derivative of the absorbance spectra because there were significant differenced between many of the feed/flour mixes. For example, rice flour has a very low absorbance where as the buckwheat flour has a very high absorbance.

Results:

Figure 1. shows the absorbance spectra of the 130 sample scans. Figure 2 shows the second derivative of the absorbance spectra. It can be seen that the second derivative spectra help to reduce the baseline shift in the absorbance spectra and to isolate the moisture, protein and fat bands.

The calibration plots for the absorbance and second derivative spectral data are shown in figures 3 and 4. It can be seen that the second derivative spectra provides a better SEC (Standard Error of Calibration) than does the absorbance spectra.

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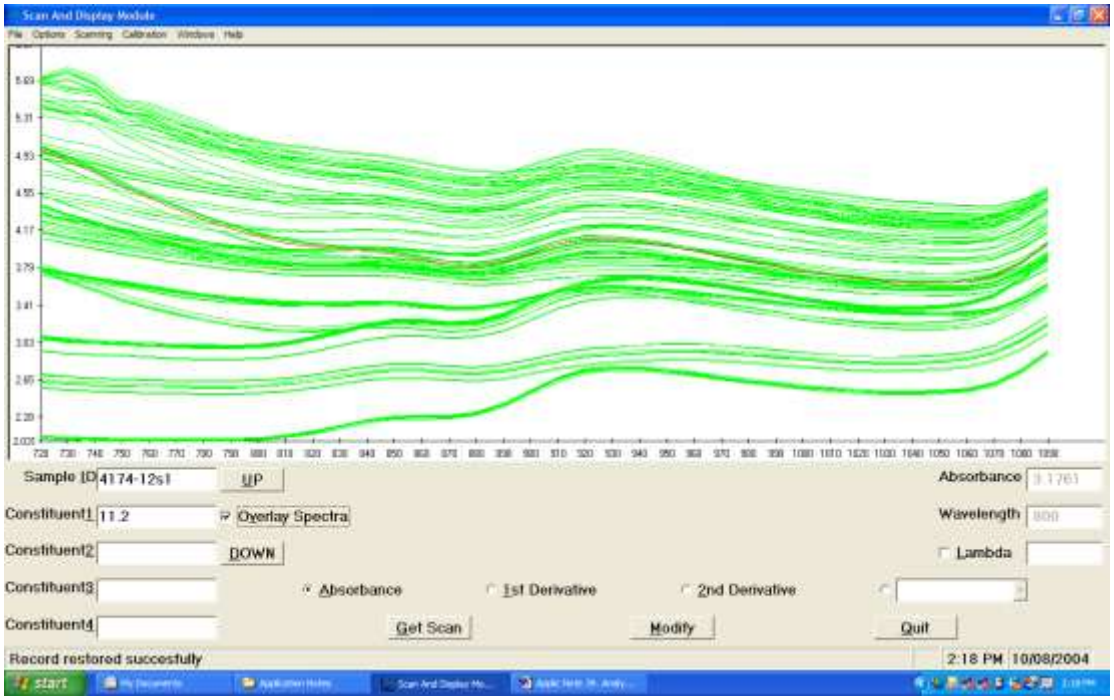

Figure 1. NIT Absorbance Spectra of Feed Mixes

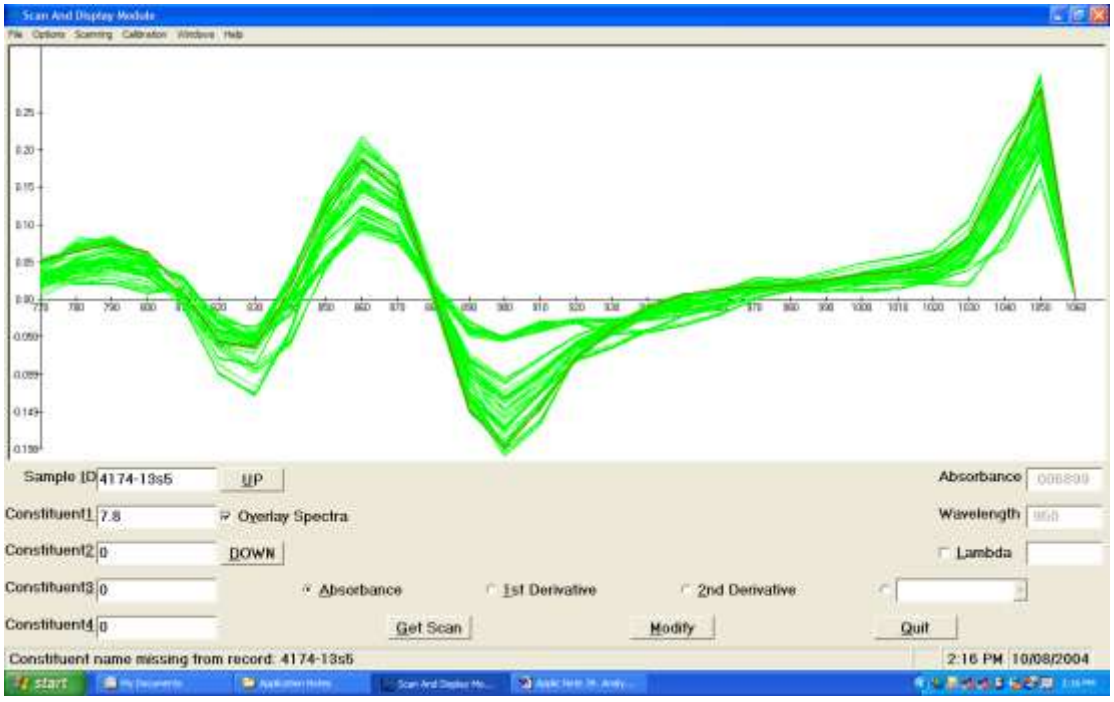

Figure 2, NIT Second Derivative Spectra of Feed Mixes

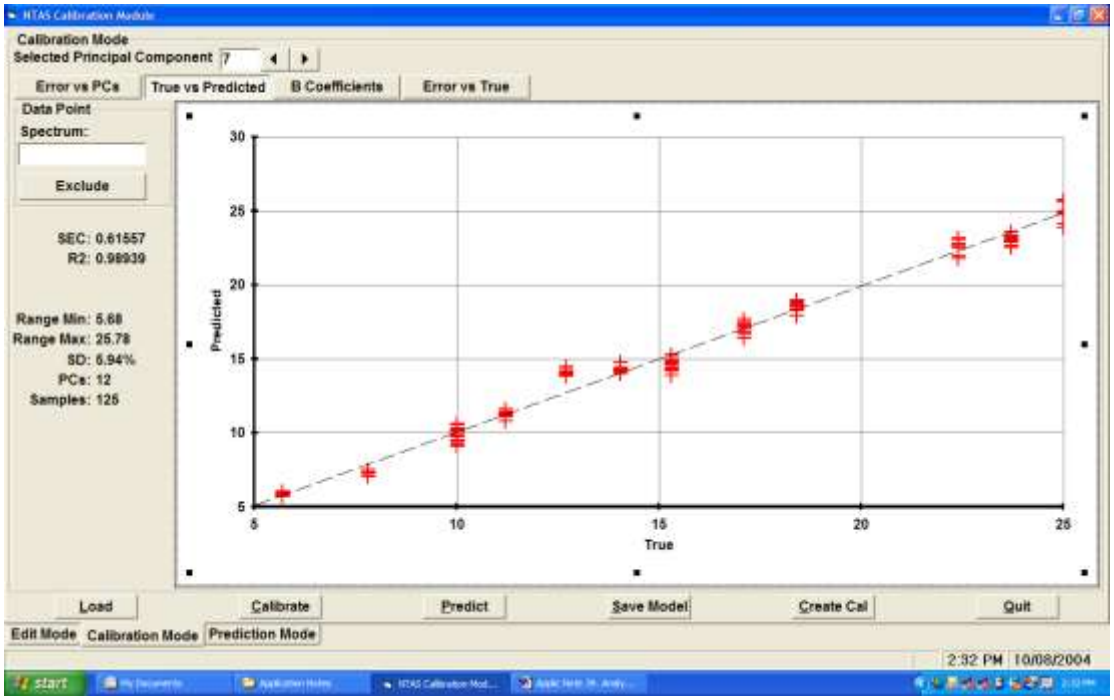

Figure 3. Calibration Plot for Absorbance Spectra

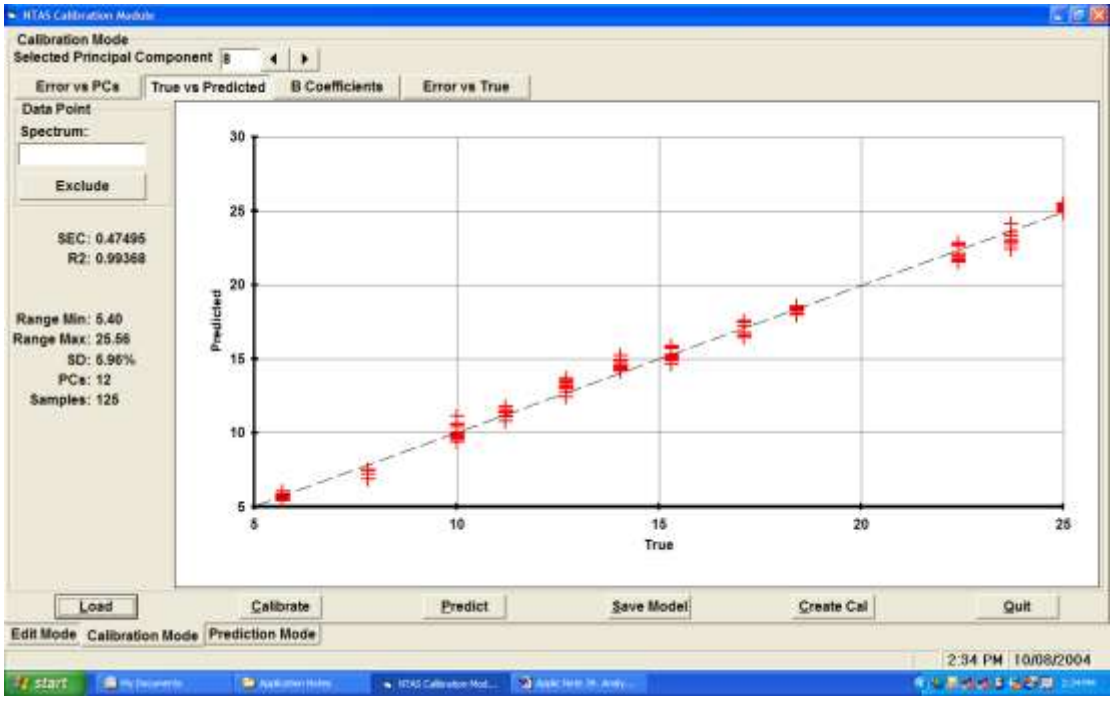

Figure 4. Calibration Plot for Second Derivative Spectra.

Comment:

This is only a preliminary study. The data shows that it is possible to develop NIT calibrations for protein in feed mixes. The Standard Error of Calibration(SEC) is intended as an indicator of the errors that might be expected using this technique.

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