Application Note 25: Measurement of Chemical Lean in Raw Beef

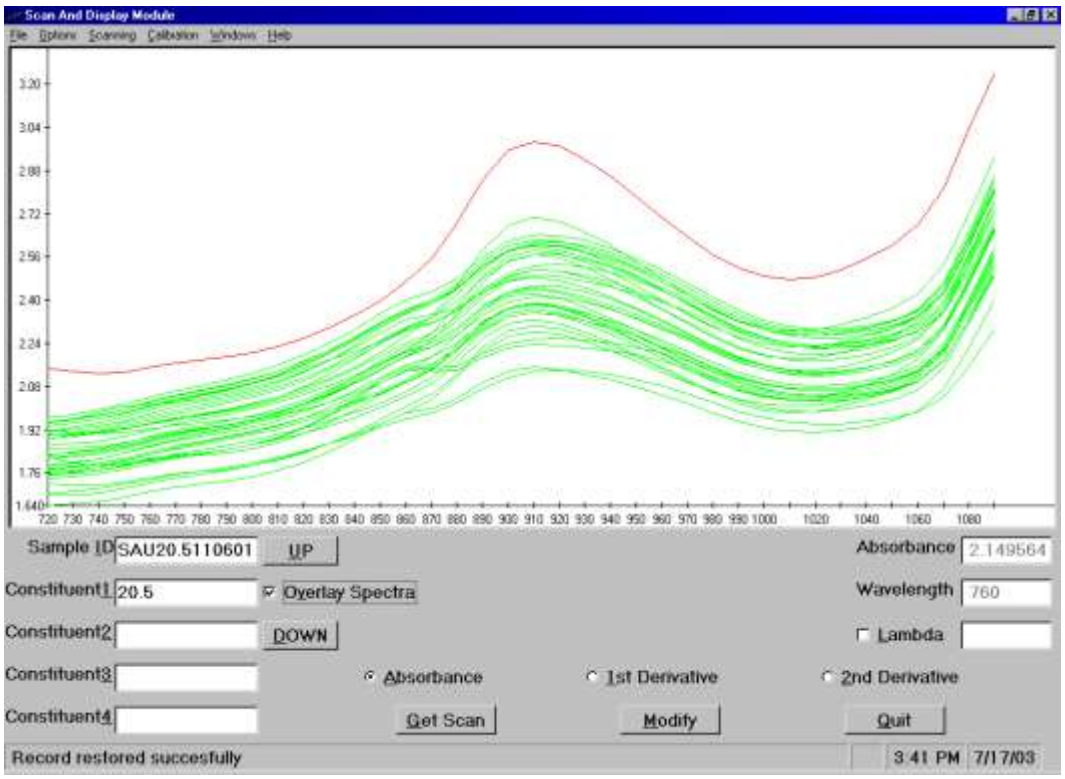
Introduction:

NIR spectroscopy measures fat, moisture and protein in a broad range of grains, foods and fruits. The measurement of Chemical Lean in raw beef and pork is a presently made using a Microwave oven to cook the meat and drive off the fat and moisture. NIR spectroscopy can make a similar measurement to the Microwave technique, offering increased speed and ease of operation.

Description:

35 samples of raw beef and 3 samples of pork were scanned on a NIT-38 Meat Analyser suing a Squeeze Cell. The pathlength for the cell was 10mm and an area of 45mm by 105mm was scanned in up to 9 locations to provide an average scan for the sample. The spectral data was saved and transferred to a PC. NTAS(NIR Technology Australia Software) was used to develop a Partial Least Squares calibration between the Microwave data and the NIR spectra.

Figure 1. shows the spectra of raw beef, pork and sausage mix.

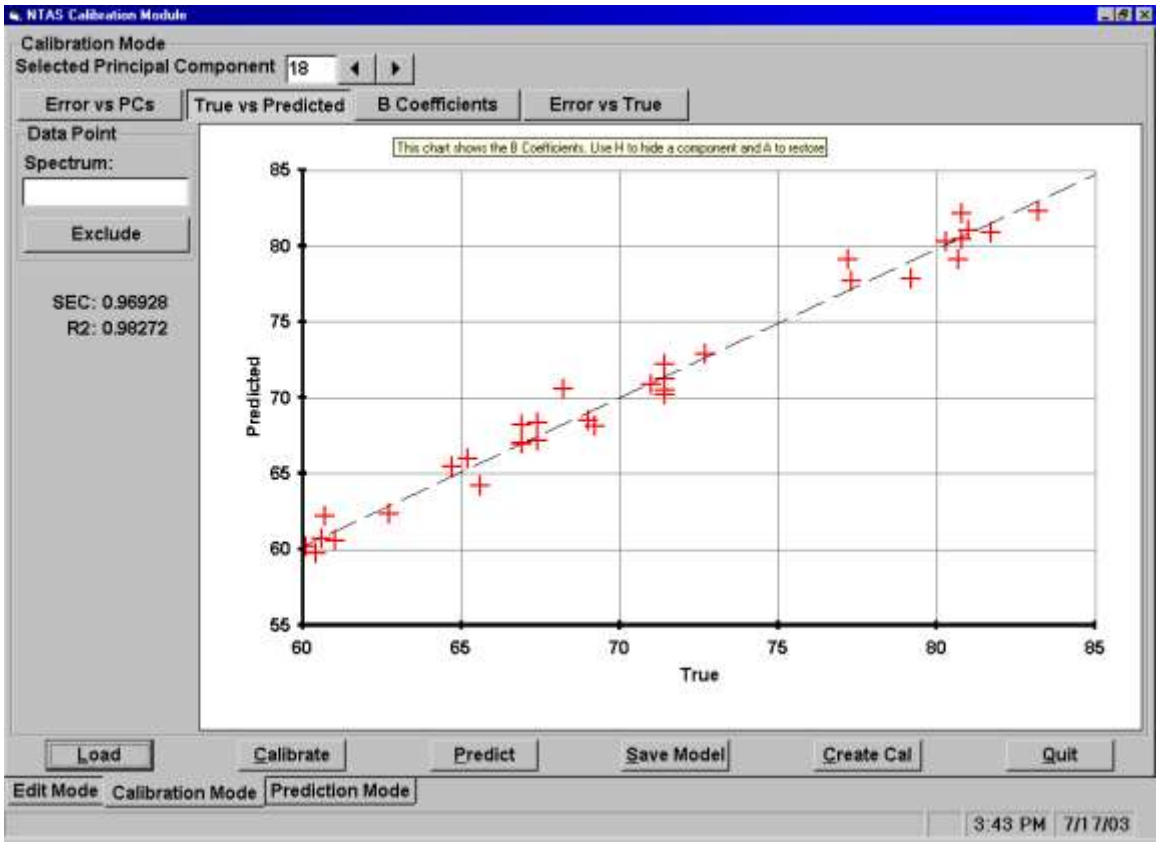


NIR Spectra of Raw Beef, Pork and Sausage

Results:

Figure 2. shows the plot of the NIR Chemical Lean vs the Microwave Chemical Lean.

The Standard Error of Calibration (SEC) was .96 and the Correlation, R2 = .98



Plot of NIR Chemical Lean vs Microwave Chemical Lean

Comment:

The above data only represents calibration between the two techniques. There were no data collected on the basis of prediction of Chemical Lean using the NIR method. As such, it is suggested that the accuracy of the NIR technique is approximately 1 unit.

In discussion with the operator, it was apparent that the longest part of the process was the waiting for the sample to thaw. Since the NIR method required that the sample be placed into a cell, a frozen sample is difficult to handle. As such, it was discussed that a suitable mincer or sample grinder be found which could reduce the frozen sample into a more appropriate consistency. The mincer should have an output shute so that a plastic bag can be filled directly. The bag could then be placed into the sample cell and analysed. The bag would reduce cleaning and thereby reduce the analysis time.

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