

# Application Note 24: Measurement of Whey Powder using the NIT-38 Dairy Analyser

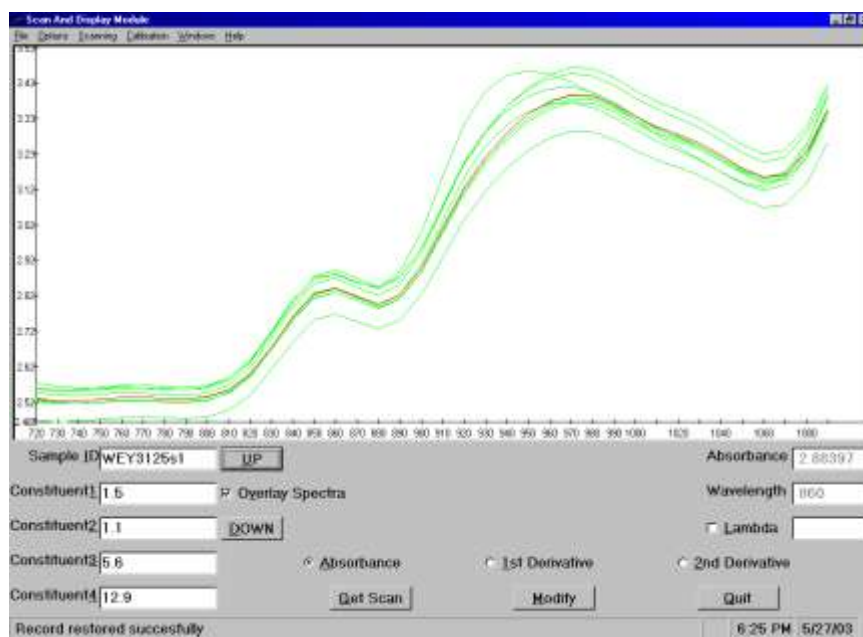


## Introduction:

The NIT-38 Dairy Analyser provides a means of analyzing a broad range of dairy products for components, such as, protein, fat and moisture. The NIT-38 is a NIR transmission spectrophotometer based on diode array technology. The analyzer scans the NIR spectrum from 720 to 1100nm. Within this region, C-H (fat), N-H (protein) and O-H (water), absorb NIR energy. The analyzer measures the amount of light absorbed by a sample as the light passes through it. The transmitted light is separated into its frequency domain using a concave holographic grating and a silicon photo diode array detector. Partial Least Squares (PLS) regression techniques are used to correlate the NIR spectra with the concentration of protein, fat and moisture in the samples. Calibration models are then downloaded into the NIT-38 Analyser. Analysis of routine samples is as easy as loading the sample cell, selecting the product type and following the instructions on the screen. Analyses of up to 4 constituents are provided within 60 seconds.

## Description:

10 samples of whey powder were scanned in duplicate on the NIT-38 Dairy Analyser using a Powder Cell with a 4mm pathlength. 5 spectra were collected for each sample scan. The spectra were stored in the analyser's memory and later transferred to a PC. The spectra of several samples of whey powder are shown below.



Laboratory analyses for Moisture, Fat, Ash and Protein were combined with the spectra data in Microsoft Excel. The file was loaded into NTAS(NIR Technology Australia Software) suite and a PLS calibration performed on each constituent.

Every second sample scan was then averaged in Microsoft Excel to form a prediction set. This set was used to test the agreement between the laboratory analyses and the NIR analyses.

## Results:

The attached four figures shows the prediction data for each constituent.

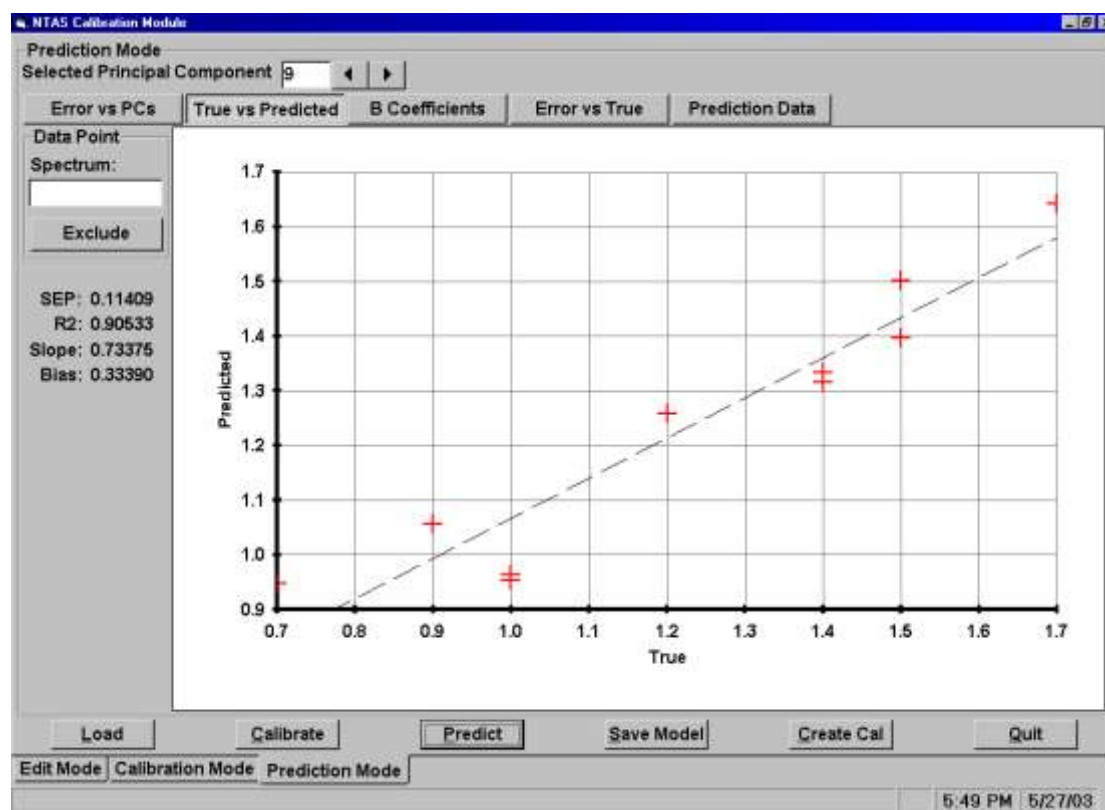
The following table summarises the prediction set data.

Constituent	Moisture	Fat	Protein	Ash
SEP	0.11	0.31	0.14	0.07
R <sup>2</sup>	0.90	0.94	0.56	0.96

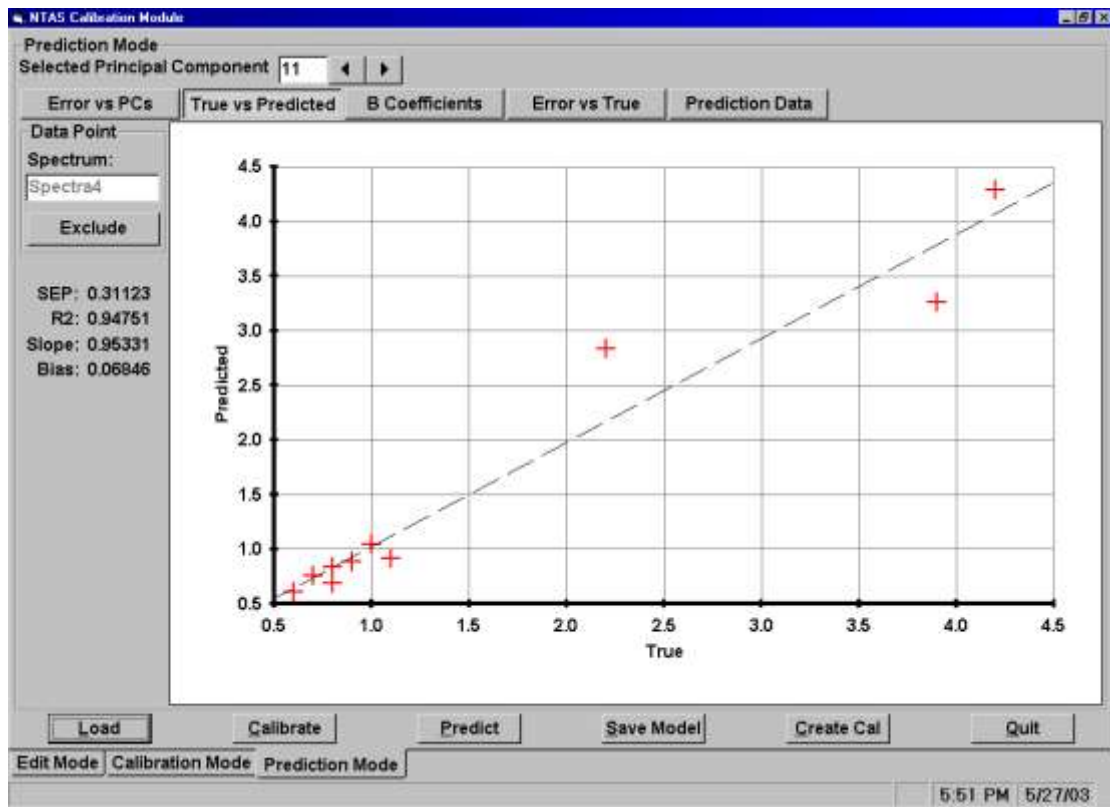
## Discussion:

It must be stated that the prediction set is not a valid test of the accuracy of these calibrations, since the set contains half the samples used for calibration. Unfortunately there were insufficient samples provided to make a separate prediction set.

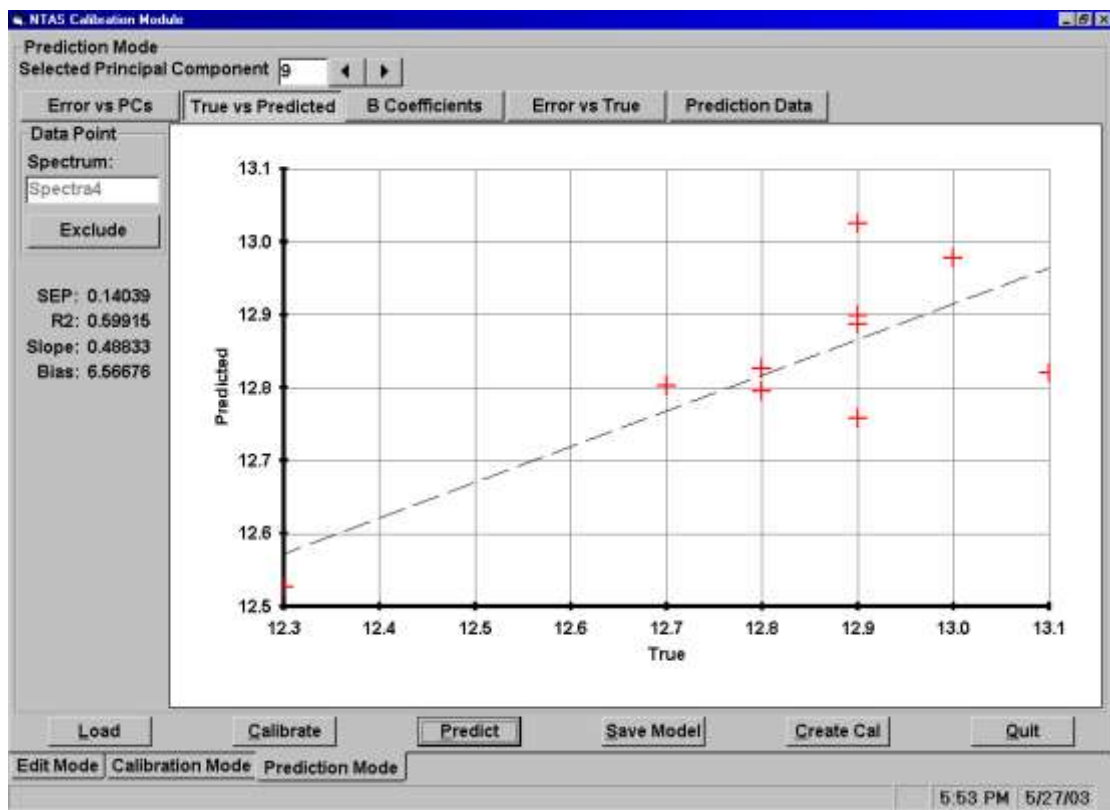
The Moisture, Fat and Ash show excellent agreement with the laboratory data. The protein data also shows a very low error, however the correlation is poor. This is due to the very narrow range of protein data, ie, 12.3 – 13.1%. All four constituents could be improved if there was a wider range of samples. Nonetheless, the data demonstrates that the NIT-38 Dairy Analyser can measure these four constituents.



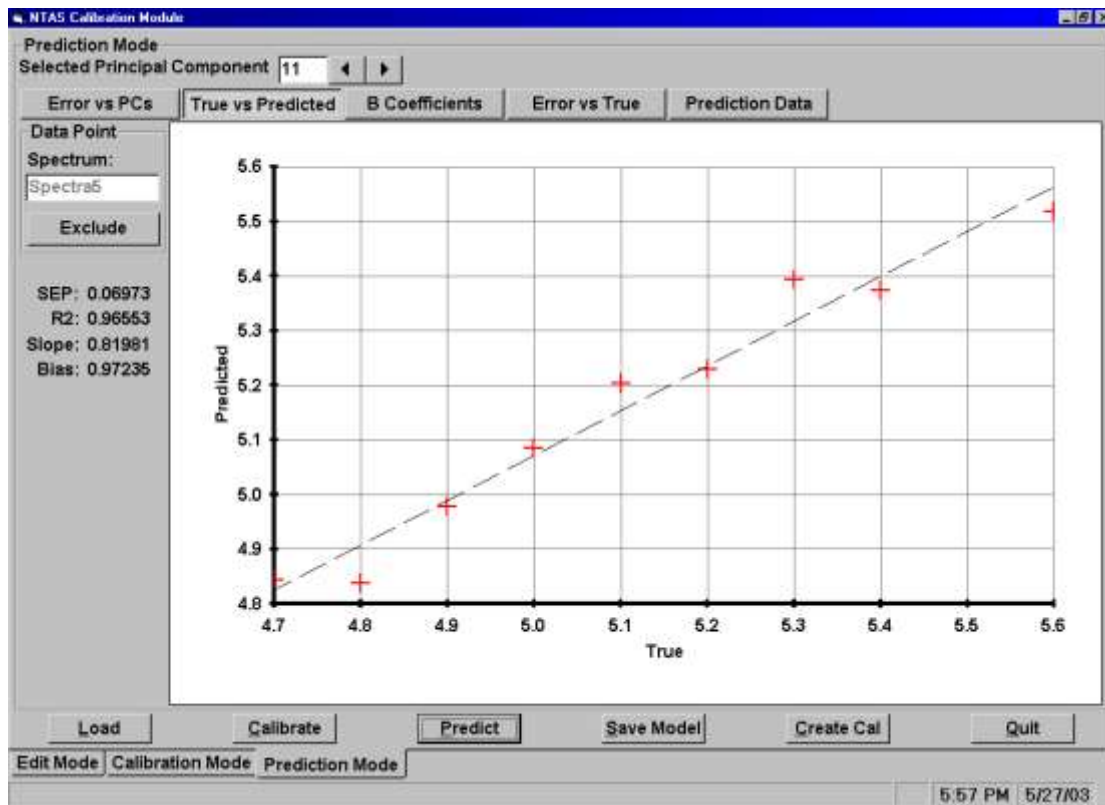
Whey Powder, Moisture Prediction



Why Powder, Fat Prediction



Why Powder, Protein Prediction



Whey Powder, Ash Prediction