# Application Note 115: Analysis of fat and moisture in Butter using the Series 3000 Food Analyser.

## Introduction:

Butter is used worldwide as a spread for bread and cakes as well as in cooking. The mechanism of producing butter is the same throughout the world. Chilled buttermilk is churned with and without the addition of salt, until the mixture forms a solid mass. The result is a yellow smooth mixture with approximately 81% fat and 18% water and 1% other solids. The % of fat in butter can be accurately measured using Near Infrared Transmission (NIT) spectroscopy. This application note provides data on the analysis of fat and moisture in butter using the Series 3000 Food Analyser.

## Procedure:

11 samples of commercially available butter were sourced from a local super market. The samples were allowed to reach room temperature, i.e., 22C. A 70gram sample of butter was placed into a 10mm deep dish so that the dish was filled completely and that a minimum of bubbles were in the sample. A flat rod was used to scrape the surface of the butter so that a smooth and flat surface was presented to the S3000 Food Analyser.

10 NIT spectra were collected for each sample as the dish was rotated around its axis. Each sample was scanned twice with repacking between scans. As such a total of 20 scans were collected for each sample. The spectra for all 11 samples were stored in the S3000 memory and then uploaded to a PC using NTAS (NIR Technology Australia Software) where Partial Least Squares Regression (PLS) was used to develop a trial calibration for fat and moisture.

## Results:

Figure 1, below, shows the NIT spectra, over the wavelength range of 720nm to 1100nm, for the eleven samples of butter.

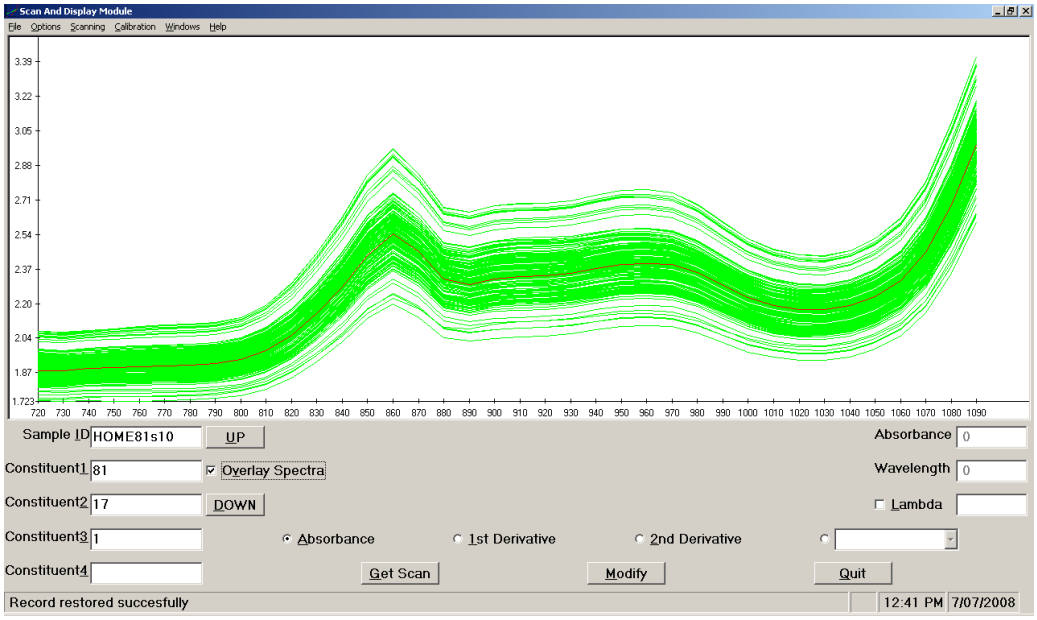


**Figure 1:** Plot of NIR Spectra for rubber plant sap.

Figure 2 shows the calibration statistics for the NIT fat values versus the reference fat values. The Standard Error of Calibration is 0.20% with a correlation ($R^2$) of 0.99.

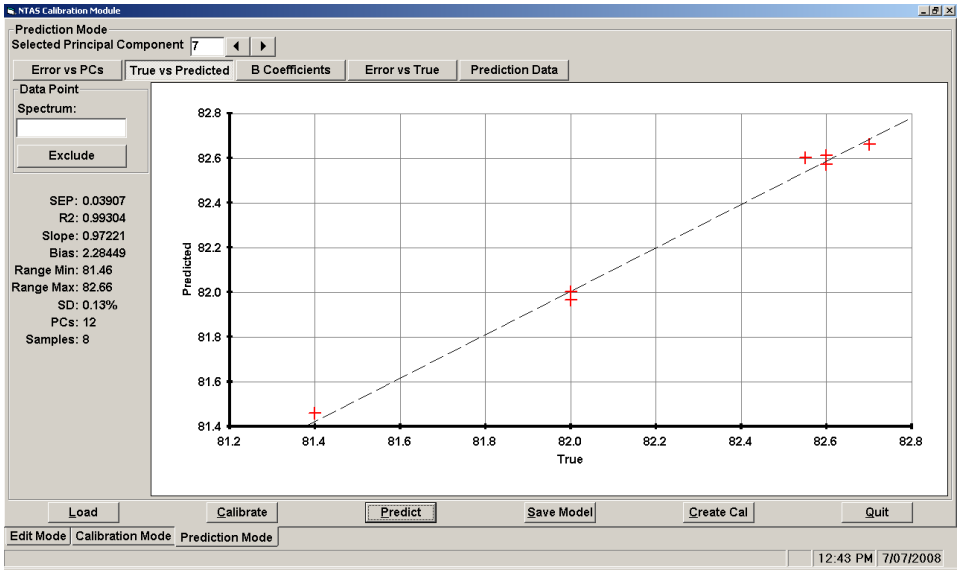


**Figure 2:** Plot NIR Predicted latex value vs. Reference latex value.

Figure 3. shows the calibration plot for NIT moisture versus the reference moisture.

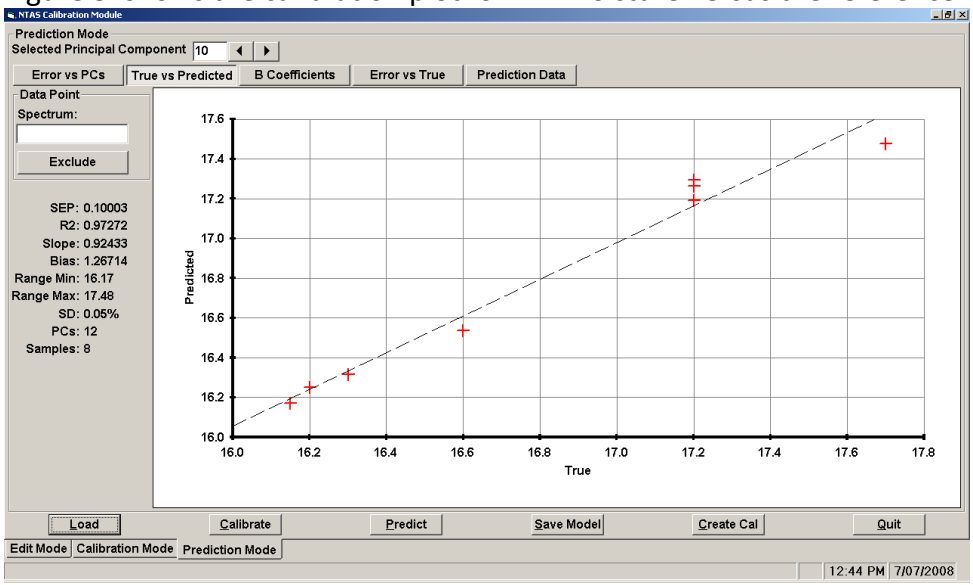


Figure 3. Calibration plot for moisture in butter

## Conclusion:

This study is intended as a demonstration of how NIT spectroscopy can be used to measure moisture and fat in butter. It is recognised that the number of samples used in the calibration is far too few to develop a robust calibration. Nonetheless, it is considered that the ease at which these calibrations were developed and the accuracy demonstrated are indicative of what could be expected using samples from one butter manufacturing plant.

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