Introduction:

There are numerous differences between hard cheese production in Poland and Australia. This is why attempts to use calibrations created in Australia to analyse Polish cheese samples gave incorrect results. Therefore, the need to create a separate calibration for Polish hard cheese was discovered.

The sample preparation for use with the Series 3000 Food Analyser required 160 grams of grated hard cheese to be placed in a petri dish levelled and compressed to a consistent thickness of 10mm. This method proved to be the best and most consistent means of sampling.

This study was undertaken to demonstrate the feasibility of measuring fat and moisture in Polish made hard cheeses. The Series 3000 Food Analyser was used for the purpose of this study.

Procedure:

32 samples of Polish hard cheese were prepared by grating them to a fine consistency. With this done, 160 grams of grated cheese was placed in a glass petrii dish, levelled and compressed to an even pathlength of 10mm. The samples were then scanned over the wavelength range of 720nm to 1100nm collecting 10 scans per sample. The samples were then repacked and the scanning process repeated. The spectra were uploaded into NTAS (NIR Technology Australia Software) and Partial Least Squares Regression (PLS) was used to develop a calibration for Fat and Moisture.

Results:

Figure 1, below, shows the NIT spectra, over the wavelength range of 720nm to 1100nm, for the 32 samples of Hard Cheese.
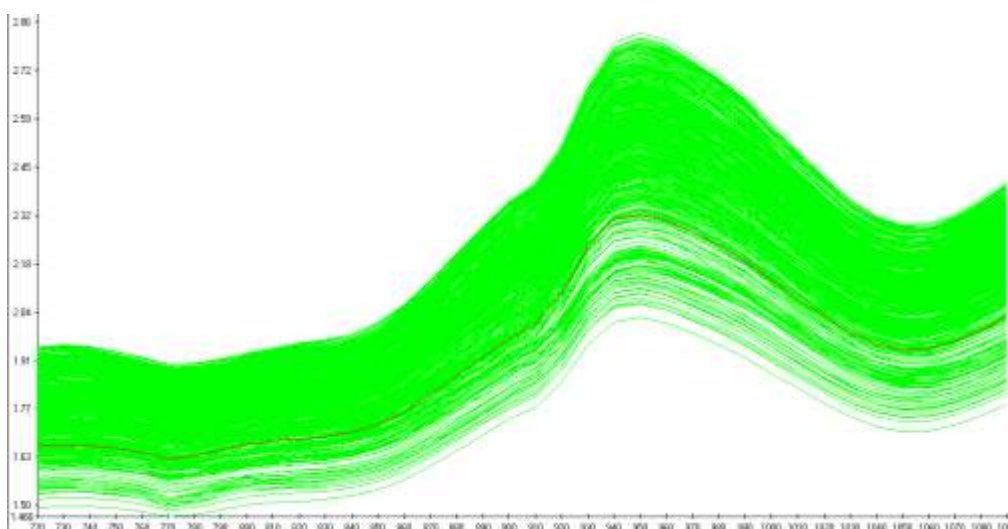

Figure 1: Plot of NIR Spectra for Polish Hard Cheeses.

Figure 2 shows the calibration statistics for the NIR Fat values versus the reference Fat value. The Standard Error of Calibration is 0.80% with a correlation (R^2) of 0.88.
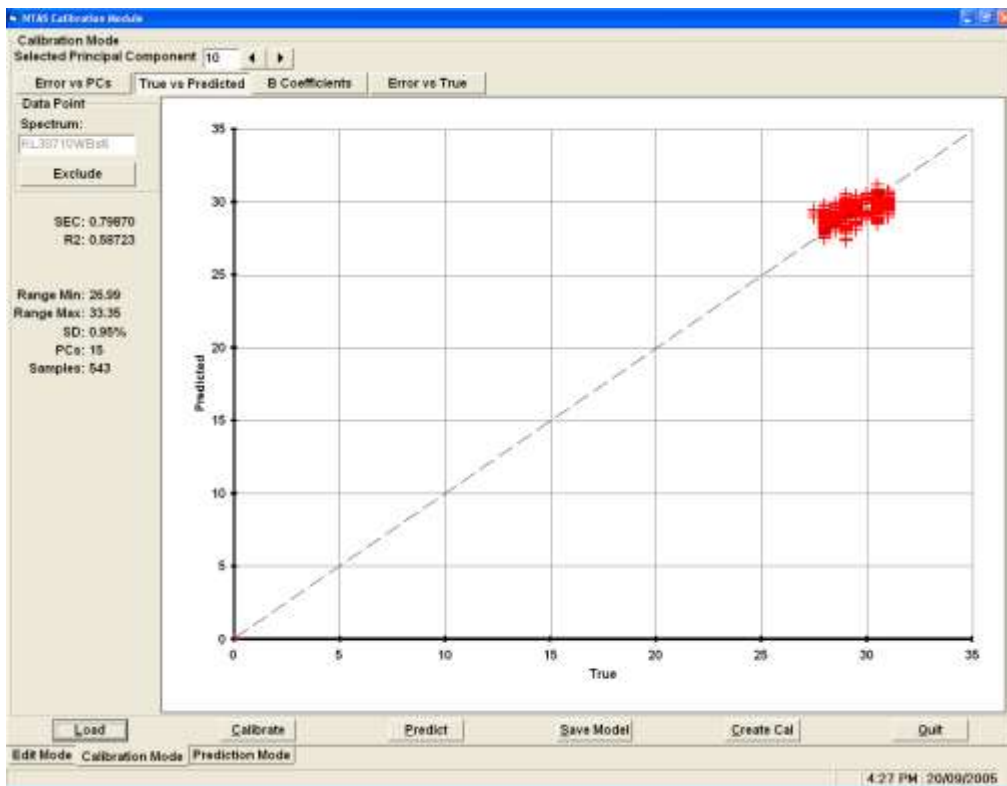

Figure 2: Plot NIR Predicted Protein value vs. Reference Protein value.

Figure 3 shows the calibration statistics for the NIR Moisture values versus the reference Moisture values. The Standard Error of Calibration is 0.70% with a correlation (R^2) of 0.78.
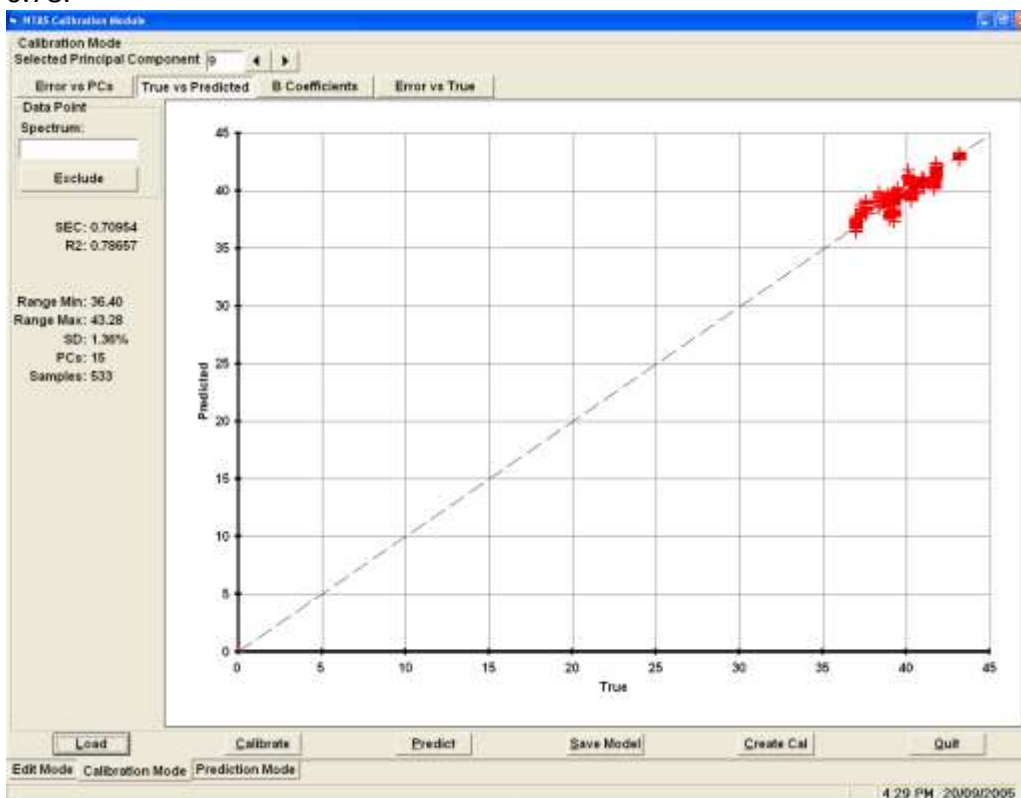

Figure 3: Plot NIR Predicted Moisture value vs. Reference Moisture value.

Conclusion:

It can be seen in figure 2 that the Series 3000 Food Analyser can be calibrated to measure the Fat values of Polish Hard Cheeses. The laboratory reference data for the Fat values in the cheese are reported to only 0.5%. Therefore, an inherent error of 0.5% from the reference method does affect the overall reliability of the calibration. With an improvement in the reference method the calibration will be improved.

The Moisture calibration for the Polish cheese samples is acceptable within the industry. However, improvements in reference testing and addition of samples of higher and lower moisture levels will continue to improve the calibration set.

However, the available samples clearly demonstrate the ability of the Series 3000 Food Analyser to measure Fat and Moisture in Polish Hard Cheese. Whilst the reliability and accuracy of the reference testing methods requires improvement to increase the accuracy and robustness of the calibration, it is still sufficient to demonstrate the feasibility of the technique.