# Application Note 81: Calibration of Moisture and Free Fatty Acids in Anhydrous Milk Fat using an NIT-38 Dairy Analyser.

## Introduction:

Anhydrous Milk Fat (AMF) is suitable for recombination and reconstitution of milk, and is widely used in the ice cream and chocolate industries. AMF is also increasingly being used for the production of soft spreadable butter and blends. AMF contains over 99.8% milk fat and not more than 0.1% water.

This study was undertaken to demonstrate the feasibility of measuring Free Fatty Acid (FFA) and moisture levels in AMF. The NIT-38 Dairy Analyser was used for the purpose of this study.

## Procedure:

10 samples of AMF were prepared by heating to a temperature of 50 degrees centigrade. The liquid solutions were then placed in a liquid test cell and scanned over the wavelength range of 720nm to 1100nm at a pathlength of 20mm. A total of 10 scans were collected and each sampling was repeated and presented to the instrument twice. The spectra was collected and then uploaded into NTAS (NIR Technology Australia Software) and Partial Least Squares Regression (PLS) was used to develop a calibration for Fat and FFA.

## Results:

Figure 1, below, shows the NIT spectra of the 10 samples of AMF solutions.

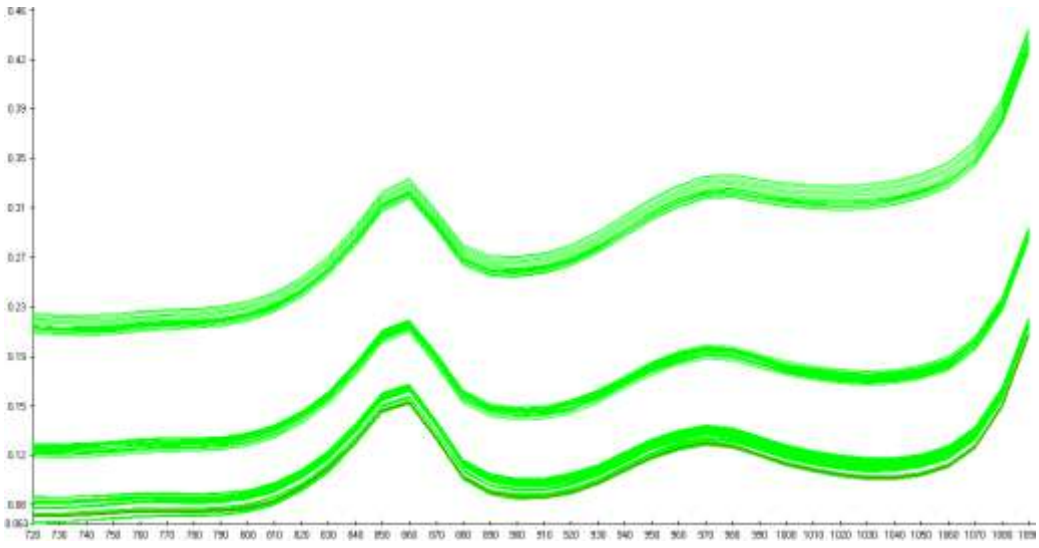

**Figure 1:** Plot of NIR Spectra for scanned Anhydrous Milk Fat solutions.

Figure 2, shows the calibration statistics for the NIR moisture versus reference moisture. The Standard Error of Prediction is 0.03 with a correlation($R^2$) of 0.95.

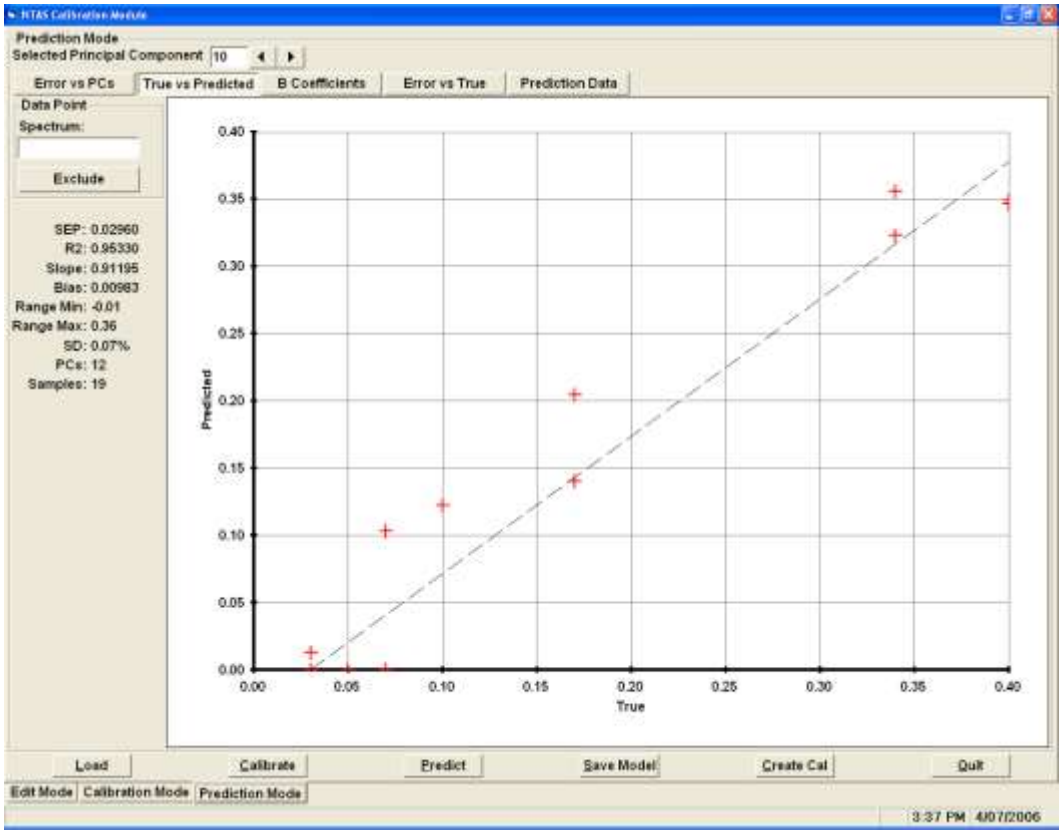


**Figure 2:** Plot NIR moisture value vs. Reference moisture value.

A number of samples are showing with a predicted value of zero. This is mostly due to the detection limits of the analysis, which appears to be at 0.05%.

Figure 3 shows the calibration statistics for the NIR FFA values versus the reference FFA values. The Standard Error of Prediction is 0.005 with a correlation ($R^2$) of 0.99.

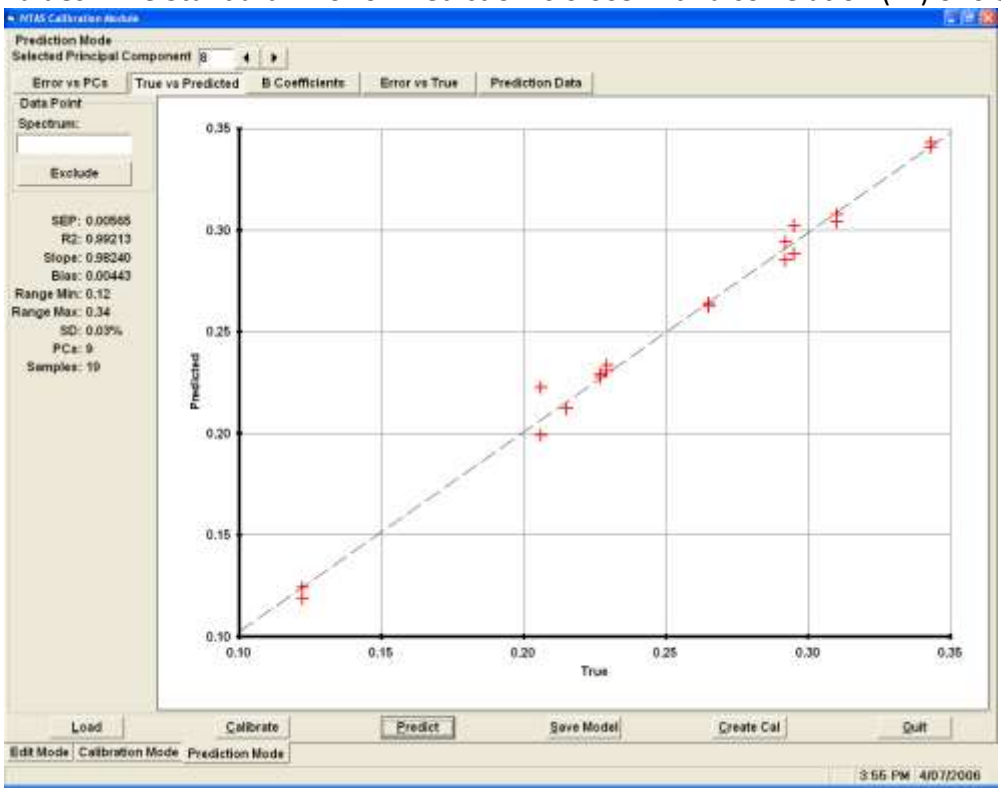


**Figure 3:** Plot NIR Predicted FFA value vs. Reference FFA value.

## Conclusion:

It can be seen in figure 2 that the NIT-38 Dairy Analyser can be calibrated to measure the moisture levels in AMF. However, as the moisture levels decrease they approach the detection limits of the analysis. This results in a zero value of prediction and does marginally affect the results.

Figure 3. shows clearly that the NIT-38 Dairy Analyser can be calibrated to measure the FFA levels in AMF.

Whilst the sample set is to small for a robust calibration the inclusion of additional samples will improve this. The ranges for the available samples are also too small to be considered as truly reliable for an ongoing calibration. Additional samples are required to increase the range of the sample set.

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