Application Note 51: Analysis of Free Fatty Acids in Tallow

Introduction:
Tallow is the fat extracted from animals. It is used in cosmetics and for producing soap and detergents. The level of free fatty acids(FFA) in the tallow is significant because it reflects the quality of the tallow. The lower the FFA level the higher the quality and the more stable the product, ie, less likely to go rancid.

This study shows that Near Infrared Transmission spectroscopy can be used to measure FFA in tallow.

Description:
5 samples of tallow were scanned 10 times in duplicate to produce 50 NIT spectra from 720-1100nm using a NIT-38 Near Infrared Trnasmission Analyser. Figure 1. shows the spectra of the tallow samples. The FFA level ranged from 2.7% to 8.3%. The spectra were collected in a 10mm pathlength squeeze cell. The tallow was relatively solid and was spooned out of the sample container and spread into the squeeze cell. The cell was closed to squeeze the tallow between the glass windows and form a 10mm thick slab of tallow.

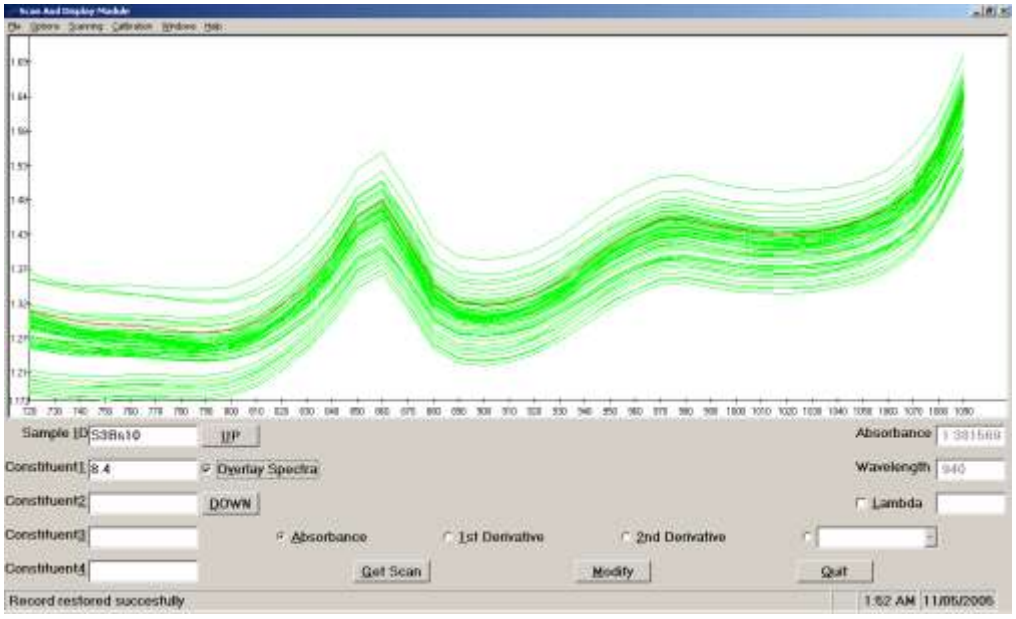

Figure 1. NIT Spectra of Tallow
The spectra were uploaded into a PC using NTAS, NIR Technology Australia Software. The FFA levels were added to the spectra files in Microsoft Excel. The spectral file ws then imported into NTAS where the spectra was checked. A PLS, Partial Least Squares Regression, calibration was developed using NTAS. Figure 2 shows the plot of number of NIR vs Ref FFA levels.

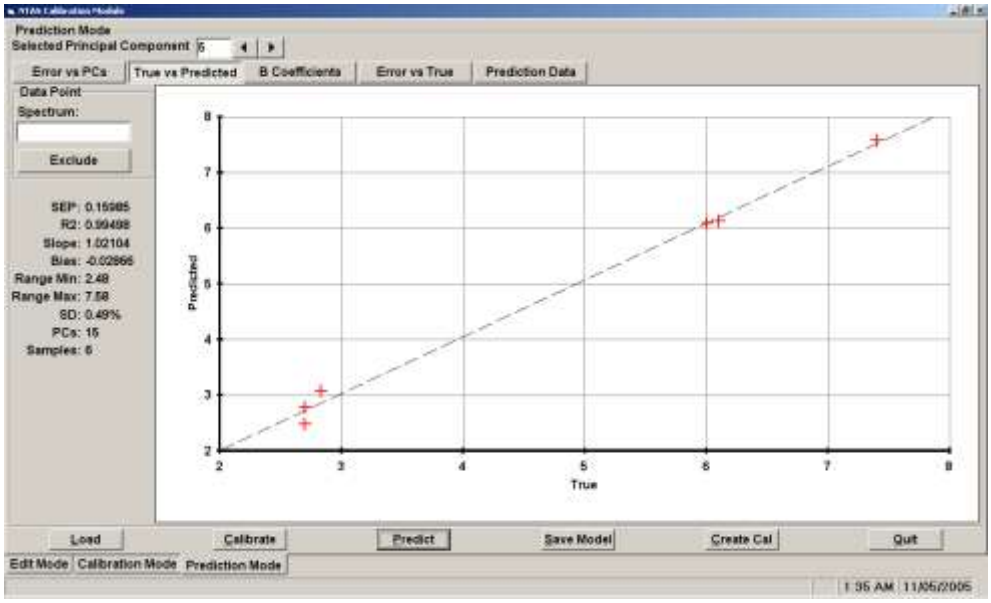

Figure 2. NIT vs Ref FFA

Discussion:

The regression statistics, ie, SEC = 0.15 and R2 = .99, suggest that FFA is measureable by NIT spectroscopy. Since FFA would be expected to exhibit slightly different spectral features to triglycerides, then NIT spectroscopy should detect these differences.

The fact that this study is based on only 5 samples, makes the results preliminary. However there is strong evidence to suggest that results are not coincidental but demonstrate a solid relationship between the NIT spectra and FFA.

NIR Technology Systems
366 Edgar Street, Condell Park, NSW, 2200, Australia
Tel: 612 9708 5068, Fax: 612 9708 5537
Email: nirtech@nirtech.net, Web: www.nirtech.net