

Introduction:

NIR Transmission Spectroscopy provides a means of measuring moisture, protein, sugar and fat in foods and agricultural products. In milk, Fat and Solid Non Fat are measured based on the absorption of light passed through a 5mm pathlength cell filled with milk. Fat absorbs light due to the C-H bonds that appear in the long chain fatty acids. Water absorbs light due to the O-H bonds. SNF are the other solid components of the milk, including protein and sugars.

This study demonstrates the accuracy and precision of the Series 1000 Milk Analyser for measuring Fat and SNF in milk.

Description:

10 samples of milk including low fat, whole milk, goat milk, and mixtures of cream and other milk were scanned using the Series 1000 Milk Analyser. The samples were heated to 30C and mixed with a vortex mixer, then poured into the sample cell. The milk was then pumped through the cell, 5ml at a time and individual scans were collected and saved in memory. Figure 1 shows the NIT spectra of these samples.

The data were imported into NTAS (NIR Technology Analysis Software) and a Partial Least Squares (PLS) Regression Analysis performed.

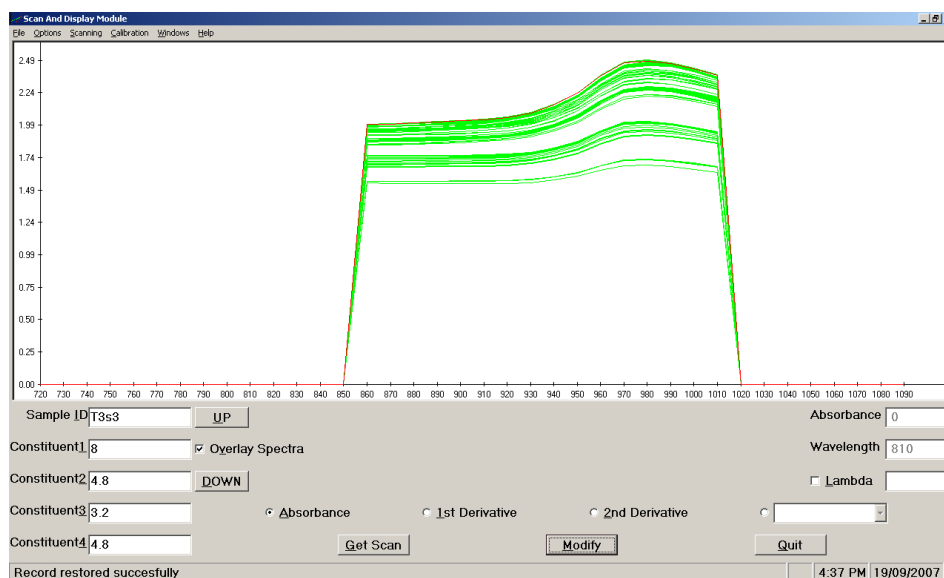


Figure 1. NIT spectra of milk.

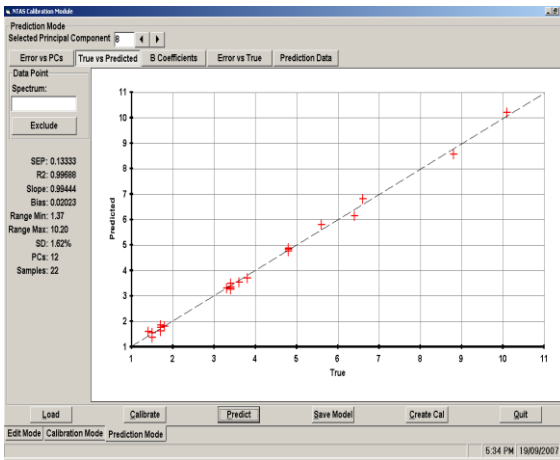


Figure 2. Plot of NIT Fat vs Actual Fat

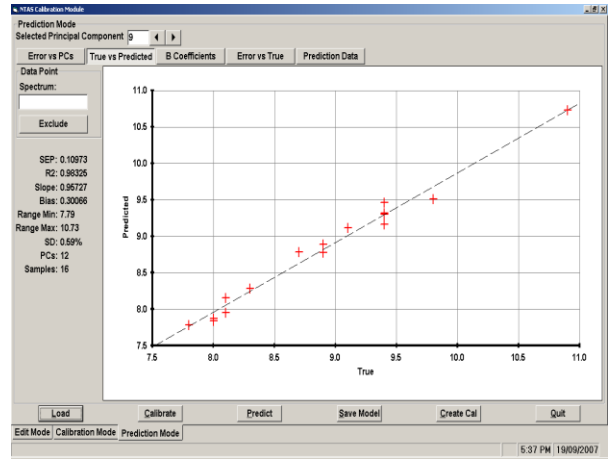


Figure 3. Plot of NIT SNF vs Actual SNF.

Results:

Figure 2. shows the plot of the NIT Fat versus the actual Fat values. The Standard Error of Calibration (SEC) was 0.1% and the linearity 0.99. Figure 3. shows the plot of the NIT calculated SNF versus the actual SNF values. The SEC for SNF was 0.1% and the linearity 0.98.

3 Samples of milk, ie, light, normal and high fat, were analysed 10 times using the above calibration. The precision of the analysis was 0.07% for Fat and 0.08% for SNF.

Repeatability Testing on Milk Analyser.

All sampling done at 30 degrees.

Sampling	Light		Normal		Gold	
	SNF	Fat	SNF	Fat	SNF	Fat
Ref	9.2	0.8	8.0	3.4	7.7	4.8
Start	9.2	0.6	7.8	3.5	7.6	4.2
1	9.2	0.7	7.9	3.4	7.6	4.1
2	9.3	0.7	8	3.5	7.5	4.1
3	9.2	0.7	8	3.5	7.7	4.2
4	9.3	0.7	8	3.5	7.8	4.3
5	9.2	0.8	8	3.6	7.7	4.2
6	9.3	0.8	8	3.5	7.7	4.2
7	9.4	0.9	7.9	3.5	7.6	4.2
8	9.1	0.8	7.9	3.5	7.6	4.3
9	9.1	0.8	8	3.5	7.6	4.3
10	9.1	0.8	8	3.5	7.7	4.4
Average	9.22	0.77	7.97	3.50	7.65	4.23
St Dev	0.10	0.07	0.05	0.05	0.08	0.09

Conclusion:

The Series 1000 has been demonstrated to provide an accurate and repeatable means of analysing milk for Fat and SNF across the range of 1 to 10% fat and 7.5 to 11% SNF.