Application Note 78: NIT Spectra of Whole Cookies

Introduction:

The NIT region of the spectrum, i.e., 720 to 1100nm, provides the ability to collect NIT spectra through 10mm thick samples of cheese, meat, 20 mm of grain and 30mm of wine. This means that food products can be measured for protein, moisture, fat and sugars in their natural state. This study is to show that NIT spectra can be collected through whole cookies(biscuits), thereby providing a means of measuring components in cookies on the factory floor, in almost real time.

Description:

5 sets of four cookies were provided by the manufacturer. A single cookie was placed into a Cropscan 2000G grain cell and the NIT spectra collected in a Cropscan 2000B NIT Analyser, (NIR Technology Systems, Sydney, Australia). The spectrum for each cookie was collected using NTAS software. Integration time was set at 40ms per pixel and a single scan mode was used.

Note that the Cropscan 2000G sample cell, figure 1, has a 45mm diameter window. The internal walls of the cell at 55mm by 15mm. Most cookies dropped into this space without any sample preparation, however not al the cookies are perfectly round and some would not drop in. As such, 3mm was cut off one side of the cookie to allow it to be loaded.

The Cropscan 2000B uses an elongated sample cell, figure 1. A special cell can be made with four 45 mm diameter windows to hold up to four cookies. This sample cell would be a door type so that cookies could be loaded and the door closed. The Cropscan 2000B would be set up to scan each cookie separately. Both the individual data for each cookie and the average four all cookies could be provided.

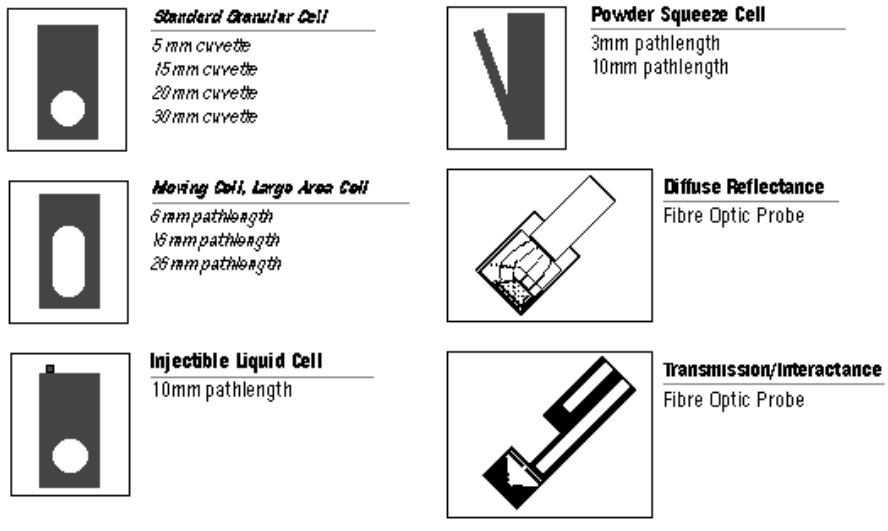

Figure 1, NIR Technology Systems Cropscan Sample Cells and Fibre Optic Probes

Results:

Figure 2 through 6 show the spectra for each cookie type. Figure 7 shows the spectra for all cookies.

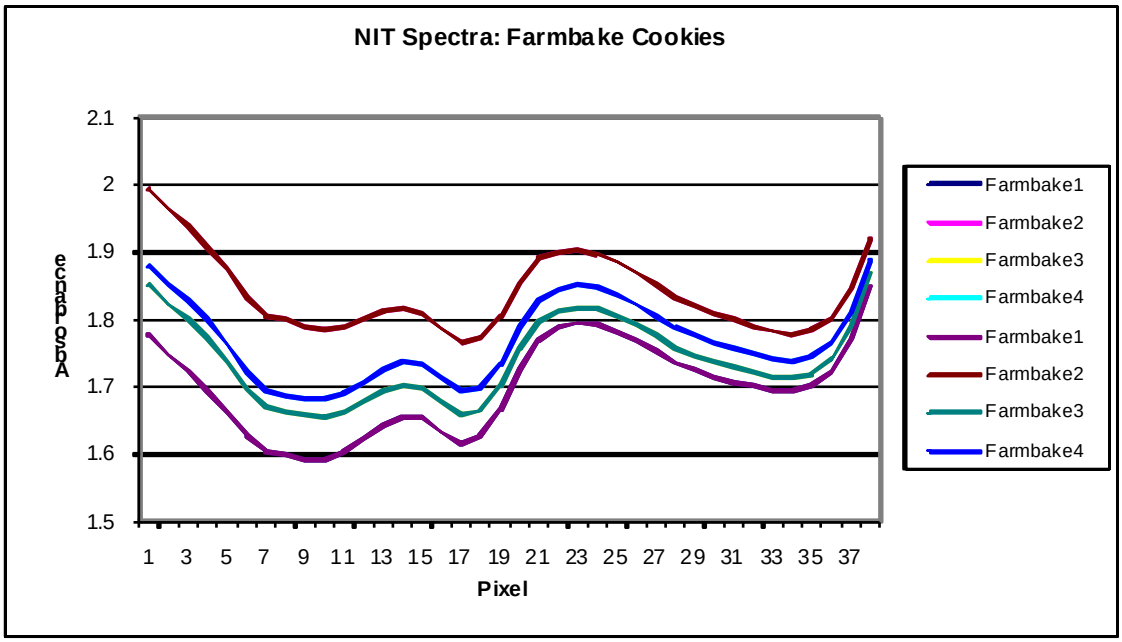

Figure 2. Farmbake Cookies

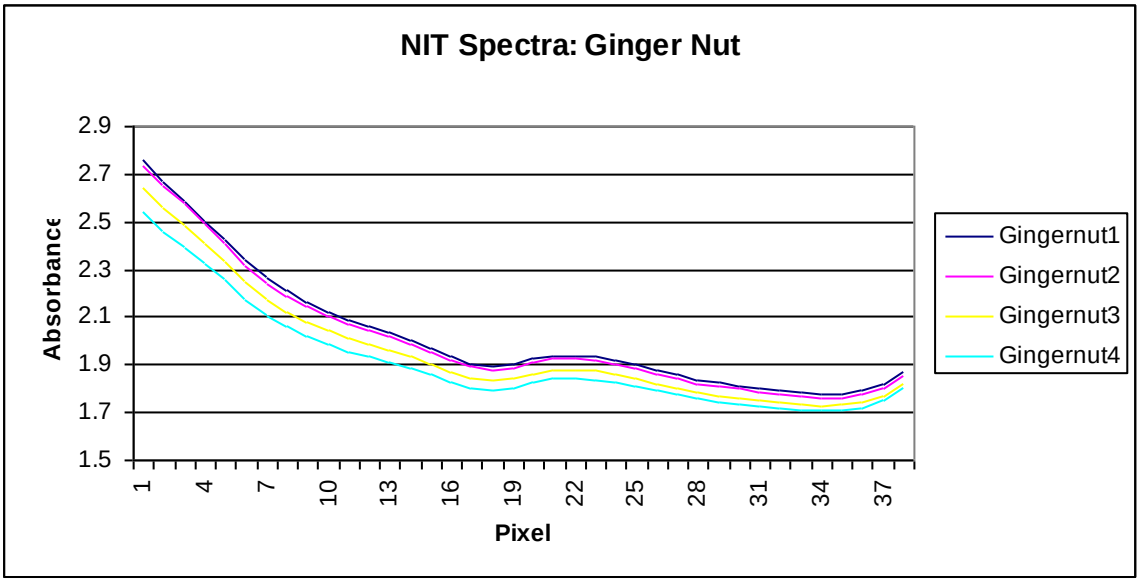

Figure 3. Ginger Nut Cookies

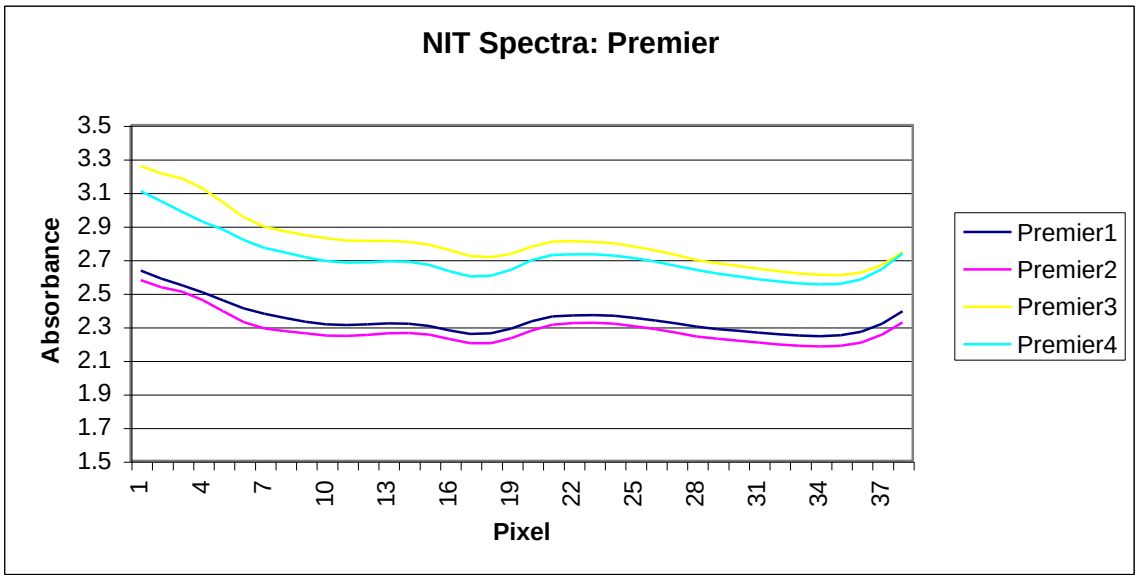

Figure 4. Premier Chocolate Chip Cookies

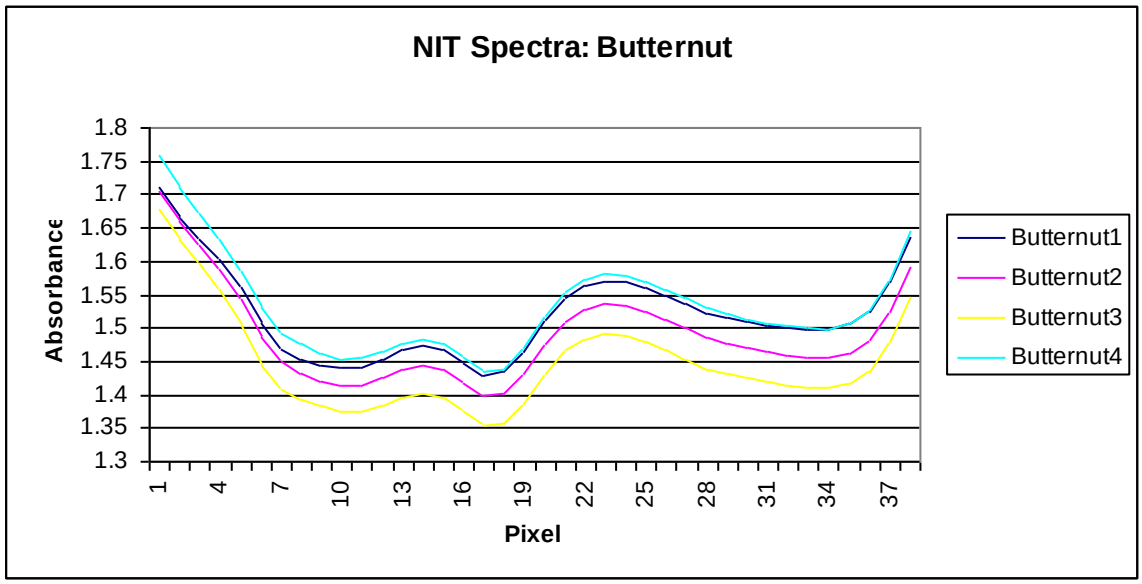

Figure 5. Butternut Crunch Cookies

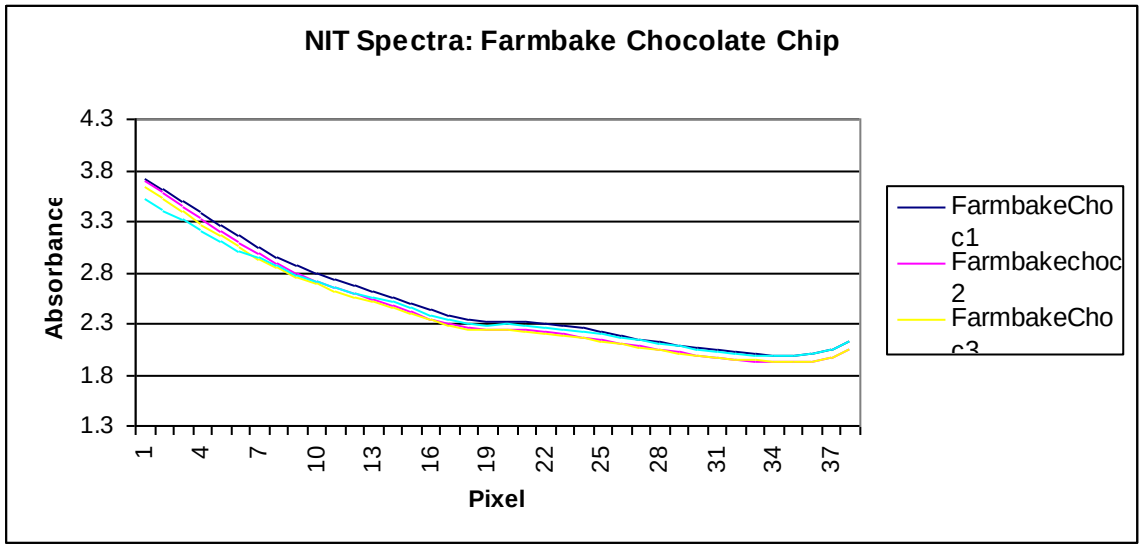

Figure 6. Farmbake Chocolate Chip Cookies

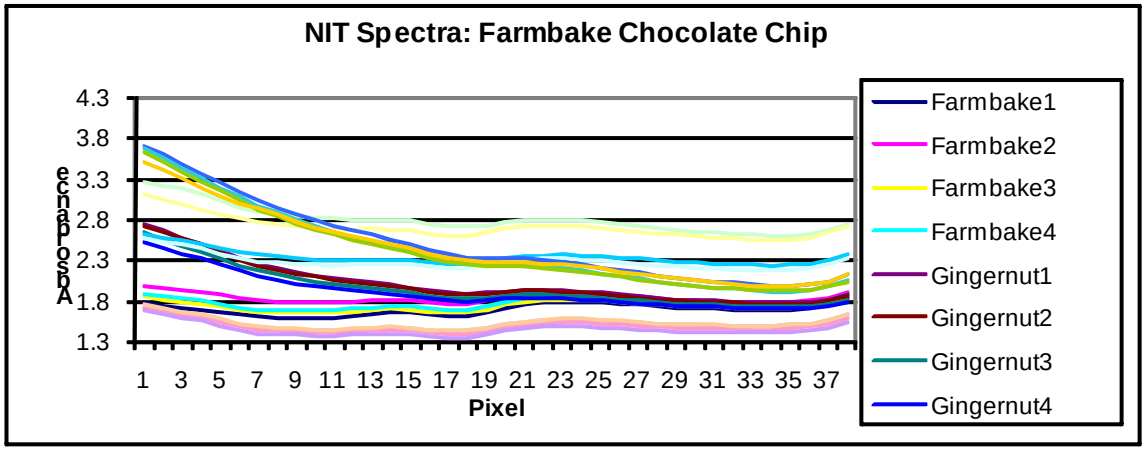

Figure 7. All Cookie Types

Discussion:

The NIT spectra shows broad spectral bands for moisture(pixel 23), protein(pixel28) starch(pixel 15) and fat(pixel20). The major bands seen in the spectra of cookies are moisture and starch. However the protein and fat are detectable, but not by the human eye. Figure 8. shows the second derivative spectra of the cookies. It can be seen that the bands are better separated.

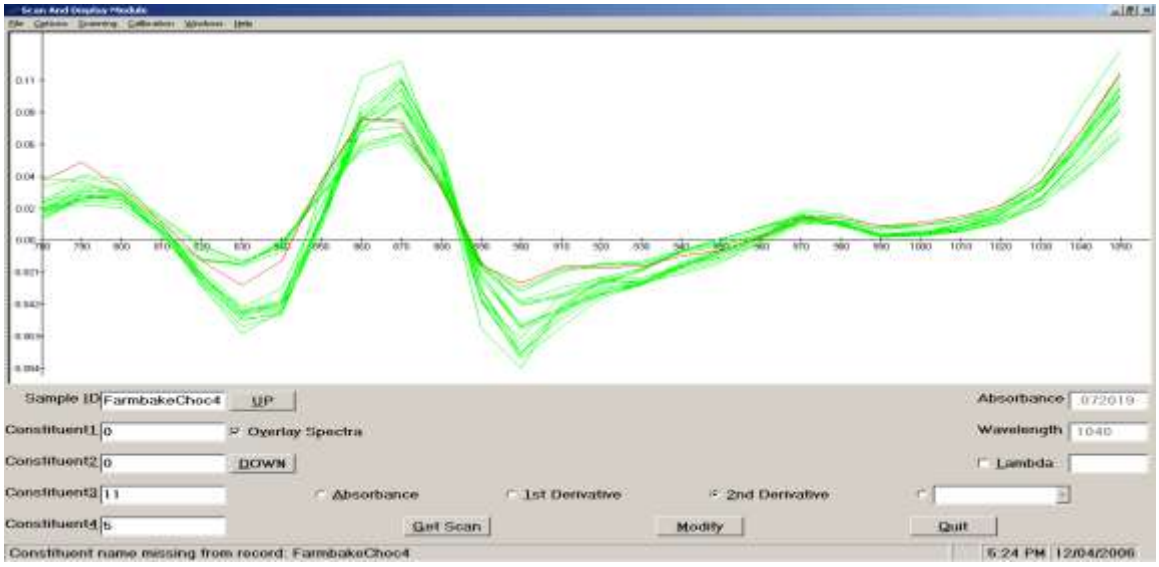

Figure 8: Second derivative spectra of Cookies.

Conclusion:

The study shows clearly that NIT spectra can be collected on all the cookie types. The spectra are very similar to wheat and flour, as would be expected. As such, since we can develop calibrations for protein and moisture in wheat and flour, then it is considered that calibration for measuring at least protein and moisture in cookies should be possible. It is also considered possible to measure the fat content since we have developed calibration for fat in meat, cheese, milk powder, soybean flour and meal, and other samples.

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