Application Note 68: Calibration of Protein and Moisture in Stock Feed Pellets using a Cropscan 2000B.

Introduction:

NIR systems have long tested protein and moisture in grains and other raw materials that are used in the creation of stock feed pellets. The pellets themselves proved to be difficult to scan in their normal state due to the inconsistency in pellet size and packing density. After testing several methods of sampling, it was determined that use of a burr grinder to reduce the pellets to a powdered state, and then sampling using a 3mm wide squeeze cell in a Cropscan2000B, provided the best and most consistent method of sampling.

This study was undertaken to demonstrate the feasibility of measuring protein and moisture in the finished product of stock feed pellets. The Cropscan2000B was used for the purpose of this study.

Procedure:

46 samples of stock feed pellets were prepared using a burr grinder to reduce the pellets to the consistency of coarse sand. With this done the powdered pellets were then placed in the squeeze cell of the Cropscan 2000B and scanned over the wavelength range of 720nm to 1100nm at a pathlength of 3mm. A total of 10 scans were collected and each sample was repacked and presented to the instrument three times. The spectra were averaged over the ten scans and then uploaded into NTAS (NIR Technology Australia Software) and Partial Least Squares Regression (PLS) was used to develop a calibration for Protein and Moisture.

Results:

Figure 1, below, shows the NIT spectra of the 46 samples of ground pellets.

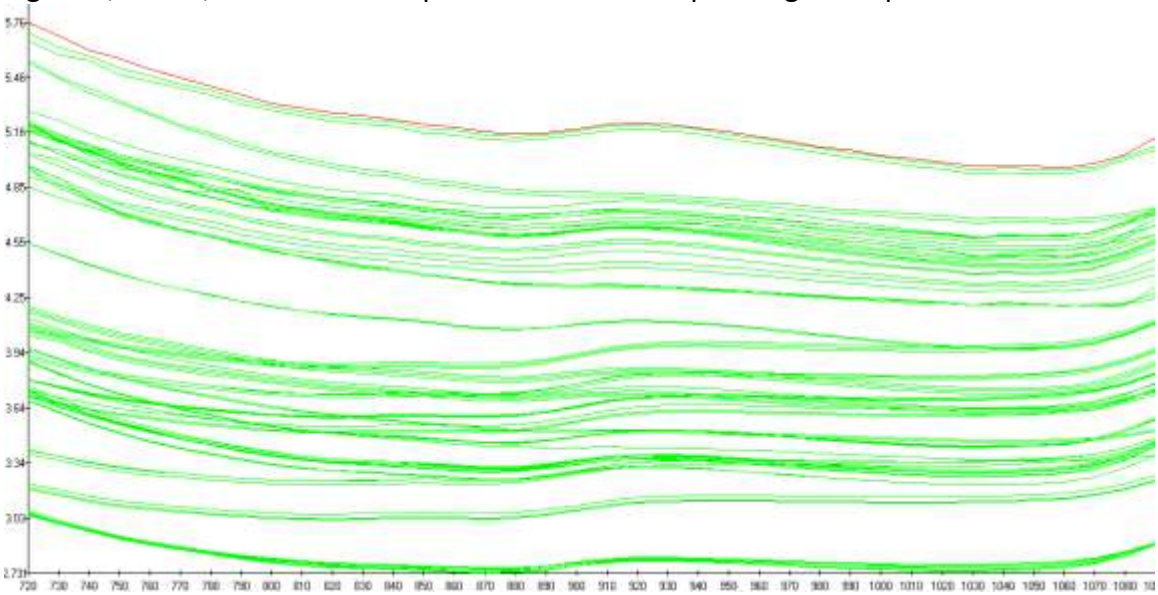

Figure 1: Plot of NIR Spectra for scanned stock feed pellets.

Figure 2 shows the calibration statistics for the NIR protein values versus the reference protein value. The Standard Error of Calibration is 0.36% with a correlation (R^2) of 0.98.

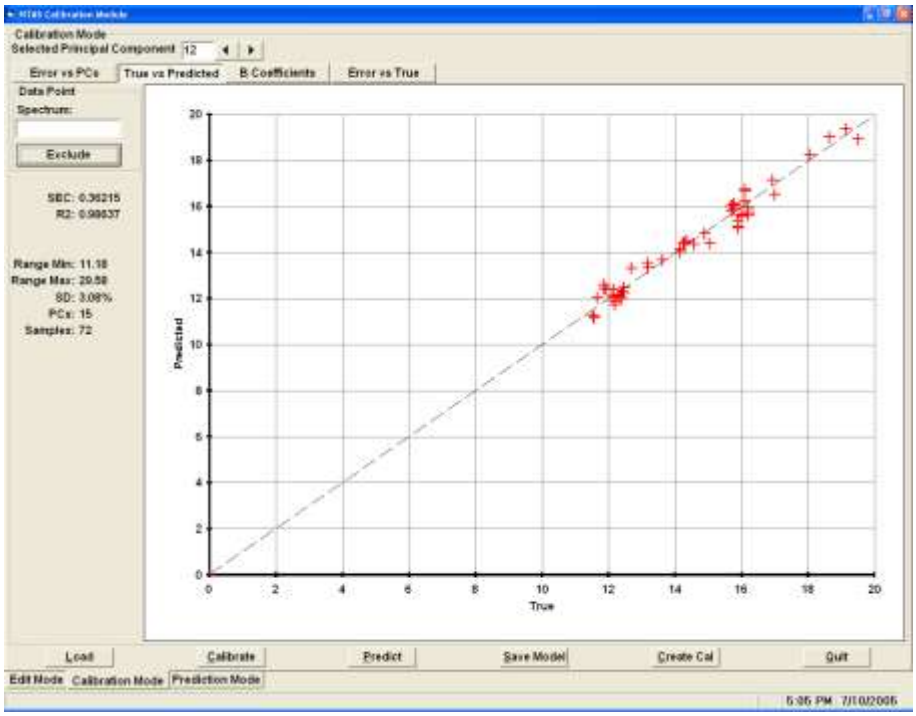

Figure 2: Plot NIR Predicted Protein value vs. Reference Protein value.

Figure 3 shows the calibration statistics for the NIR moisture values versus the reference moisture values. The Standard Error of Calibration is 0.17% with a correlation (R^2) of 0.89. The narrow range of the available samples is a potential area of concern and in time additional samples can be added to this calibration to further improve it's performance.

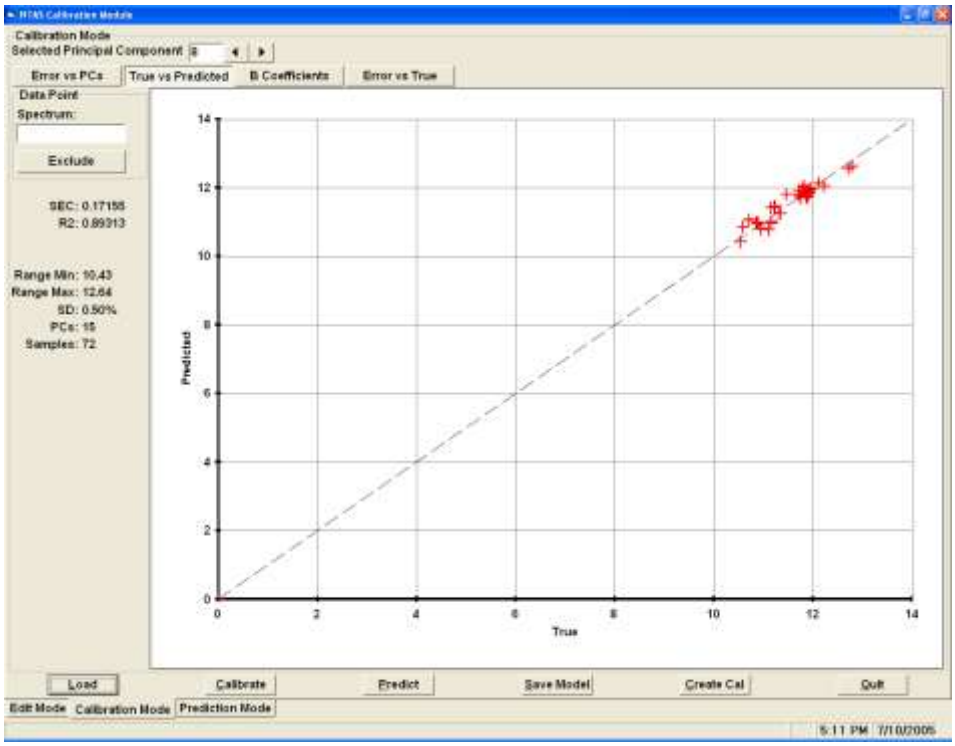

Figure 3: Plot NIR Predicted Moisture value vs. Reference Moisture value.

Conclusion:

It can be seen in figure 2 that the Cropscan 2000B can be calibrated to measure the protein values of stock feed pellets. The sample set is sufficient to develop a calibration for protein with a wide enough spread to enhance robustness of the calibration.

From figure 3 it can be noted that the moisture calibration is sufficient. However, due to the limited range of the moisture values the addition of samples outside the current range should be added to the calibration further enhancing it's robustness.

The available samples clearly demonstrate the ability of the Cropscan 2000B to measure protein and moisture in stock feed pellets.

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