Application Note 120: Australian Wheat and Barley Validation Study using Multiple Calibration Selection (MCS) in the Cropscan 1000B and Cropscan 2000B.

NIR Technology Systems

Introduction:

The Cropscan 1000B and 2000B are near infrared transmission analysers that scan the wavelength range 720-1100nm using a diode array spectrometer. The Cropscan 1000B incorporates a flow through sampling system where as the Crospcan 2000B incorporates a moving sample cell to collect up to 30 scans from a sample of wheat or barley as they are passed in front of the light beam. The sample scans are averaged and results for protein and moisture are predicted based on Partial Least Squares (PLS) calibration models stored in the instrument's memory.

NIR Technology Systems has accrued spectra of several thousand samples of wheat and barley, which have been used to develop a calibrations for protein and moisture in Australian Hard Wheat and Malting grade and feed Grade Barley samples.

This study provides a validation of the wheat and barley calibration models that are provided with the Cropscan 1000B and 2000B analysers for the 2008 harvest.

Validation:

In order to validate the calibration models developed for Wheat and Barley samples, two sets of Certified Reference Materials, 11 wheat and 11 barley, were sourced from Ceretec Pty Ltd, a subsidiary of ABB Grains, Adelaide, SA, and Graincorp Technical Centre Laboratory, Graincorp Narrabri, NSW. These samples have been tested at least 6 times and as such have highly accurate protein and moisture values.

These samples were scanned in duplicate on 1 Cropscan 1000B and 1 Cropscan 2000B analysers. The results were tabulated and the Standard error of Prediction (SEP) was calculated for protein and moisture

Figures 1 and 2 show the prediction plots for protein and moisture in wheat using the Cropscan 1000B's .
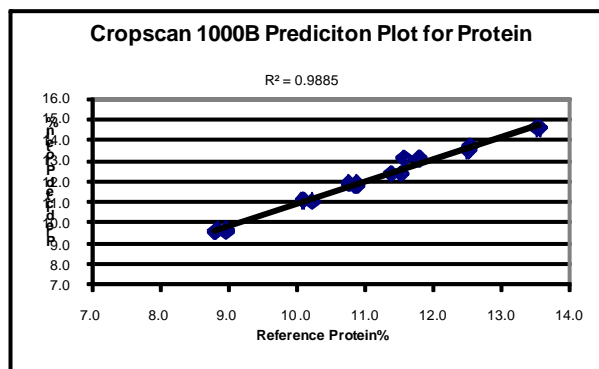

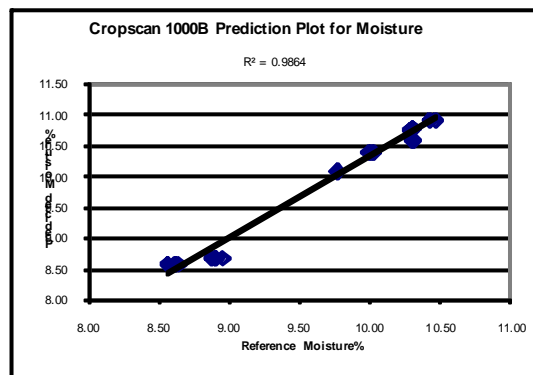Figure 1. Prediction Plot of Protein in Wheat   Figure 2. Prediction Plot for Moisture

Figures 3 and 4. show the prediction plots for protein and moisture in wheat using the Cropscan 2000B.
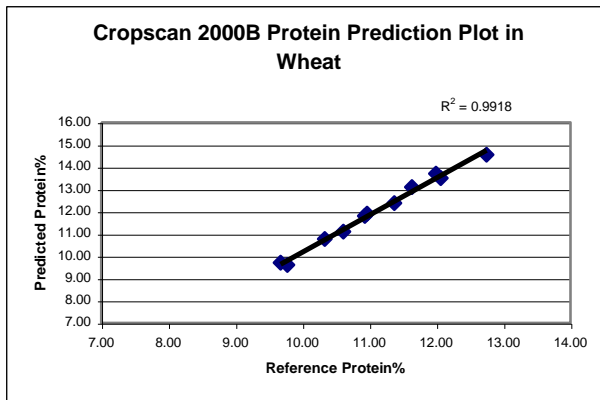

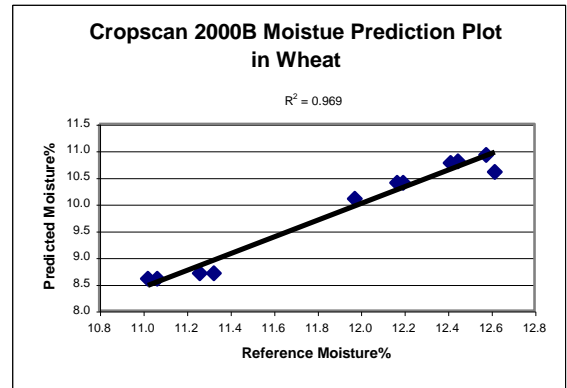Figure 3. Prediction Plot for Protein in Wheat

Figure 4. Prediction Plot for Moisture in Wheat

Figures 5 and 6 show the prediction plots for protein and moisture in barley using the Cropscan 1000B
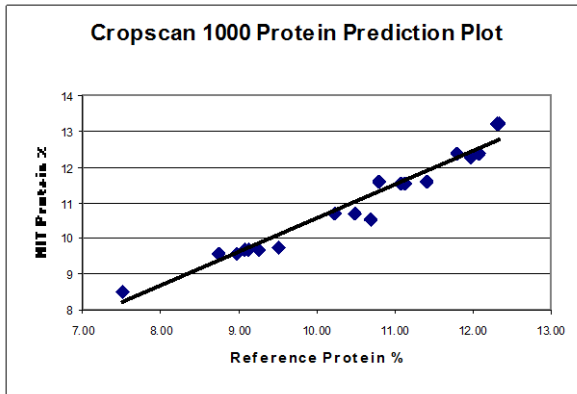

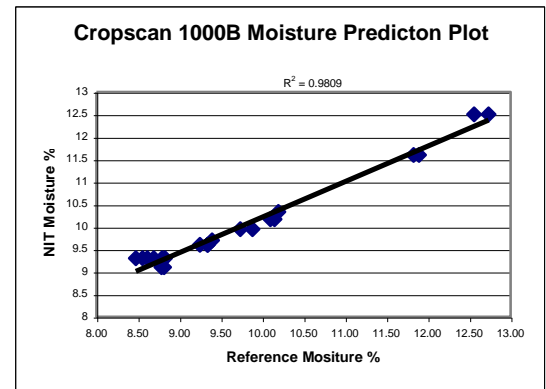Figure 5. Prediction Plot for Protein in Barley

Figure 6. Prediction Plot for Moisture in Barley

Figures 7 and 8 show the prediciton plots for protein and moisture in barley using the Crospcan 2000B
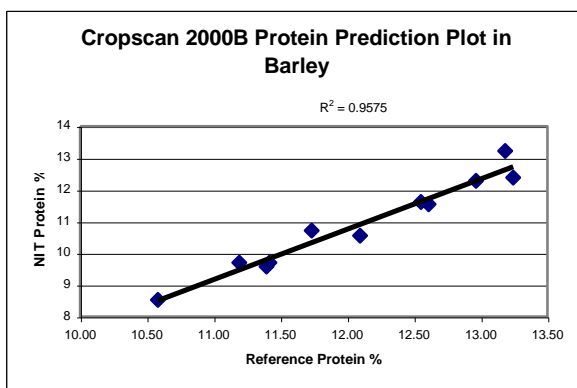

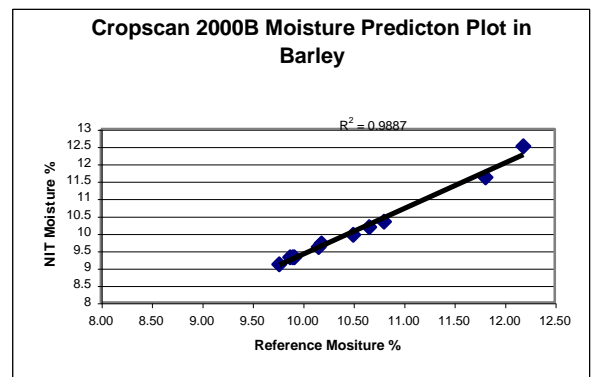Figure 7. Prediction Plot for Protein in Barley

Figure 8. Prediction Plot for Moisture in Barley

The Standard Error of Prediction (SEP) for each set of dgata are show in table 1.

Table 1.

Product	Cropscan 1000B		Cropscan 2000B	
	Protein	Moisture	Protein	Moisture
Wheat	0.17	0.08	0.30	0.11
Barley	0.28	0.15	0.15	0.18

Discussion:

The SEP data for protein and moisture in wheat and barley lies within the Maximum Permissible Errors as described in the NMI V10 Certification Procedures:

Wheat +/- 0.4%
Barley +/- 0.5%

The fact that the same calibration models have been used on all three Cropscan systems, demonstrates the transferability of these calibration models.