The Cropscan 2000G On Farm Analyser is portable Near Infrared Transmission Analyser designed for use by farms to measure protein, oil and moisture in whole grains of wheat, barley, oats, sorghum, rice, canola, corn, soybeans, peas and beans. The instrument use a diode array spectrometer to collect the NIR spectrum from 720-1100nm. In this region, N-H(Protein), C-H (Fat) and O-H(Moisture) absorb NIR energy. The NIR spectrum of grains can be analysed to provide rapid analyses of whole grains for protein, oil and moisture in less than 1 minute.

Application Note 01: Cropscan 2000G Wheat Calibration

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NIR Technology Systems

Introduction:

The Cropscan 2000G Whole Grain Analyser has been used to develop a calibration capable of predicting both the protein and moisture content of the four major wheat classes grown in Australia. To the original calibration data, a temperature stabilisation set of samples were added whose NIR spectra were scanned under temperature conditions at the extremes of the normal working range of the instrument. The effects of recalibration with these stabilisation samples are discussed below.

Description:

121 samples of Australian wheat were analysed in the laboratory for protein (Leco) and moisture (Oven) content. These samples were scanned on the Cropscan 2000G between 720-1100nm using a 20mm pathlength cell. A calibration model was developed using partial least squares regression (PLS-1 algorithm in the software package Unscrambler®). A further 80 samples were analysed in the laboratory and scanned between 720-1100nm at various temperatures at the extremes of the normal working conditions expected for the instrument. The sampling procedure is as follows: The instrument was equilibrated to 28°C and five (5) wheat samples (equilibrated to 10°C) were scanned on the Cropscan 2000G. The next step involved scanning five samples equilibrated to 45°C on the instrument at 28°C. The procedure was repeated in reverse order (ie. The samples were equilibrated to 28°C measured on the instrument at 10°C and then at 45°C). These samples were added to the original calibration model and regression analysis repeated.

Results:

The regression statistics for the calibrations are given below

Conclusion:

The addition of samples measured on the Cropscan 2000G at the extremes of the expected working temperature range of the instrument has the effect of reducing the correlation and increasing the SED (>0.1%) of both protein and moisture calibrations. NIR calibrations are sensitive to temperature changes and therefore the incorporation of a temperature stabilisation set of samples provides a means of correction for measurements performed at the extreme temperature ranges.

	Number of samples (n)	Range (%)	Number of PC''s	Correlation (R)	Standard Error of Determination
Original Calibration					
Protein	121	7-16	10	0.9831	0.35
Moisture	121	7-15	6	0.9746	0.26
Original + Stabilisation Set					
Protein	201	7-16	10	0.9710	0.46
Moisture	201	7-15	7	0.9611	0.33

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