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 03:

Cropscan 2000G Performance Evaluation

February 2000

NIR Technology Systems

Introduction:

A performance evaluation was carried out at the Bread Research Institute (BRI) in Sydney, Australia on the Cropscan 2000G Portable Whole Grain Analyser to measure protein and moisture content in wheat. This evaluation was conducted at the request of NIR Technology Australia to have an evaluation of the Cropscan 2000G based on the USA National Institute of Standards and Testing (NIST) for Near Infrared (NIR) analysers. The testing protocol included:

Accuracy and Reproducibility:

Ten (10) samples (equilibrated to room temperature) were analysed in duplicate. The results were compared against a reference analyses for protein and moisture. The Standard Error of Prediction (SEP) and Bias were calculated as well as the Standard Deviation of Differences (SDD) of the duplicate analyses.

Repeatability:

The same ten samples above were analysed in duplicate over three (3) consecutive days to assess the day-to-day repeatability. After comparison of the results over the three days, the SDD was computed for each sample against the average of the three daily readings.

Temperature Stability:

The instrument was equilibrated in a refrigerated incubator at 5°C for 4 hours along with five samples. The instrument was removed, switched on and allowed to equilibrate for 10 minutes at room temperature. The five cold samples were analysed in duplicate along with five samples kept at room temperature and the results were compared against the average of the results for the three previous days. The average bias was computed for each sample against the three-day average. In a similar experiment, the instrument and five samples were placed in the incubator set at 45°C for 4 hours. The samples along with five kept at room temperature were analysed as above and the average bias was computed.

Results and Specifications:

The following table shows the results of the evaluation and the performance specifications proposed by NIR Technology Australia.

Conclusion:

The Cropscan 2000G Whole Grain Analyser was calibrated for measuring protein and moisture in wheat and subsequently used to measure these properties in independent samples to an accuracy and precision consistent with NIST standards. The Cropscan 2000G is an accurate NIR analyser providing stable results within a wide temperature range.

Test	Variable	Cropscan 2000G Results (%)		Specification (%)
Accuracy	Wheat Protein	Bias	0.17	0.20
		SEP	0.22	0.35
		SDD	0.15	0.15
	Wheat Moisture	Bias	-0.34	0.20
		SEP	0.16	0.25
Reproducibility	Wheat Protein	SDD	0.15	0.15
	Wheat Moisture	SDD	0.05	0.15
Repeatability	Wheat Protein	SDD	0.10	0.20
	Wheat Moisture	SDD	0.06	0.20
Temperature Stability	Wheat Protein	Cold Bias	0.13	0.35
		Hot Bias	-0.04	0.35
	Wheat Moisture	Cold Bias	-0.13	0.30
		Hot Bias	-0.17	0.30

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