

Analysis of Moisture, Protein, Oil and Starch in Corn using the DA 7250

Introduction

Whenever corn is used as a raw material it is important to have full knowledge of its composition and properties. In wet or dry milling, feed milling, ethanol production and other processing, the raw material will affect the process efficiency as well as the quality of the final product.

The Near Infrared Reflectance (NIR) technique is highly suitable for this purpose, but in the past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements like grinding or special cups made analyses laborious and time consuming.



DA 7250 NIR Analyzer

The DA 7250 is a proven, full-spectrum NIR instrument designed for use in the grain and feed industry. Using novel diode array technology it performs a multi-component analysis in only 6 seconds. Thanks to excellent signal-to-noise ratio and solid state optics no grinding is required.

During this time a large number of full spectra are collected and averaged. As the sample is analyzed in an open dish, the problems associated with sample cups are avoided and operator influence on results is minimal.



Experimental

A total of about 2900 corn samples from North and South America, Europe, Asia and Africa, were analyzed in multiple DA 7250 units. The samples were analyzed as is, with no grinding or any other sample preparation. Reference analyses were performed for moisture, protein, oil and starch. Calibrations were developed using The Unscrambler from Camo Software. The calibration method was PLS1 with SNV and 1st derivative data pretreatment.

Results and discussion

The Diode Array 7250 proved to predict results very close to the results from the reference methods. Statistics are presented in the table below and graphs are displayed in page 2.

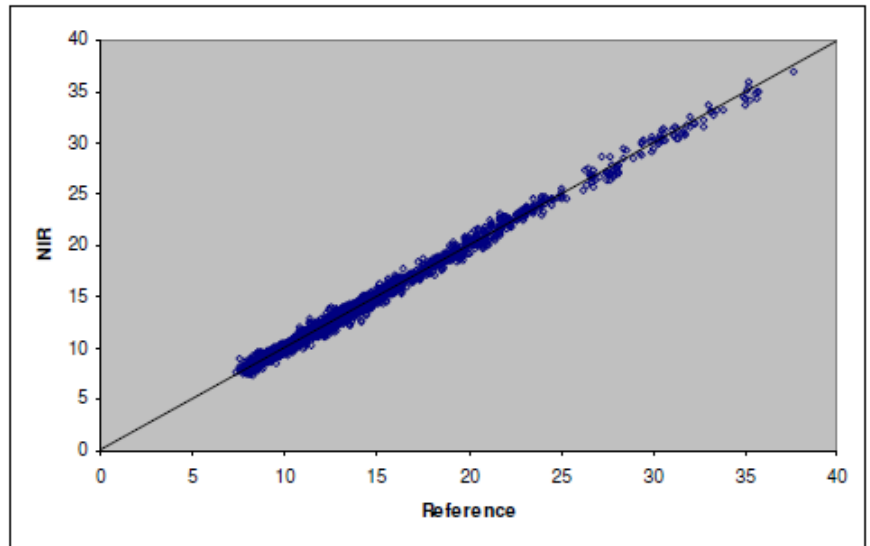
Parameter	Range (%)	Samples	R
Moisture	7.4 – 37.6	2800+	0.99
Protein	4.9 – 15.3	1700+	0.97
Oil	2.16 – 13.6	1700+	0.97
Starch	48.3 – 67.9	800+	0.8

The differences between the DA 7250 and the reference methods are of the same magnitude as typical differences between two different reference labs. The DA 7250 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it can be concluded that the DA 7250 can determine moisture, protein, oil and starch in corn, with the same accuracy as the respective reference method. It should be noted that the sample were not ground before the analysis.

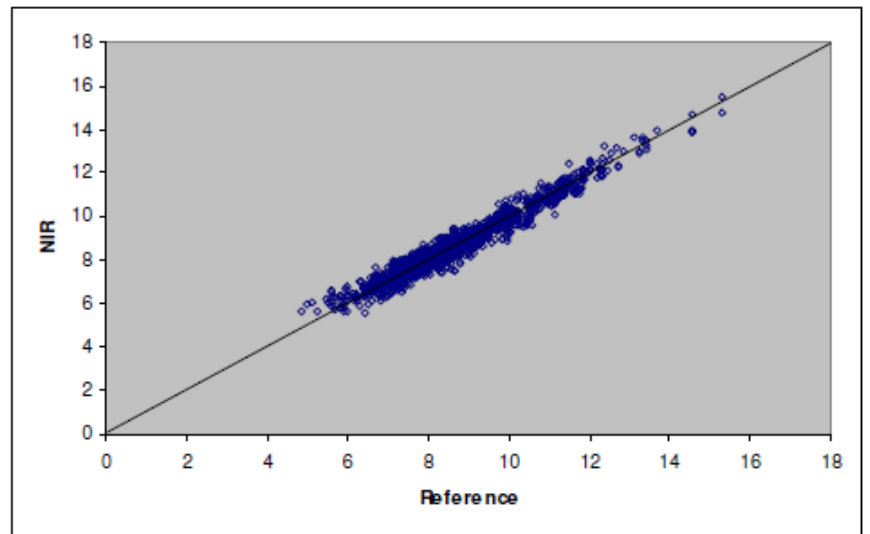
Moisture

The calibration covers a very wide range which and is applicable for stored corn as well as freshly harvested corn. The accuracy is excellent throughout the range.



Protein

The protein content is an important parameter in feed production as well as in corn milling. of this calibration makes the DA 7250 a very good tool for protein content determination.



Starch

The DA 7250 determines starch content with an accuracy very similar to the reference method.

