Analysis of Moisture and Fat in Corn chips using the Diode Array 7200

Introduction

In the production of snack foods such as corn chips, moisture and fat are important control parameters that have a great impact on production costs as well as product quality.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of these parameters, but in the past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements such as grinding or special cups made analyses laborious, time consuming and error-prone.

Diode Array 7200

The DA 7200 is a new full-spectrum NIR instrument designed for use in the food industries. Using novel diode array technology it performs a multi-component analysis in only 6 seconds with no sample grinding or sample preparation required. During this time approximately 300 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

Spectral data was collected on approximately 100 samples of corn chips provided by a large US based corn chips manufacturer. Data was collected on a DA 7200. Each sample was analyzed with 2 repeats and 2 repacks in a 5" diameter open faced sample dish. The samples were analyzed as received with no grinding or other sample preparation. Reference analyses were supplied by the customer. Calibrations were developed by Perten Instruments using Partial Least Squares (PLS) regression. Multiplicative Scattering Correction (MSC) was used as a data pre-treatment to improve the calibration models.

Results and discussion

The DA 7200 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

| Parameter	Range	Samples	R^2	SECV[*]
Moisture	1.2–6.9	98	0.98	0.22
Fat	17.4–25.5	95	0.86	0.63

The differences between the DA 7200 and the reference method are of the same magnitude as typical differences between two different reference labs. The DA 7200 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it is concluded that the Diode Array 7200 can analyze corn chips for the aforementioned constituents. It should be noted again that these results are for whole chips – i.e. no grinding before the analysis.

Moisture

The samples analyzed cover a fairly wide range. Analytical accuracy is excellent, with an error quite comparable to that of the reference method itself. With this performance the DA 7200 will be a valuable tool for corn chips QC.
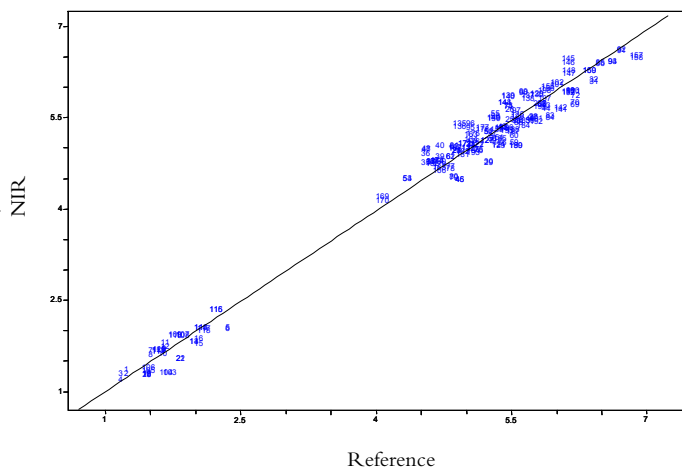
Fat

As with moisture, the DA 7200 can predict fat with an accuracy close to that of the reference method. In this study the range was fairly narrow, but the error will remain approximately the same over a larger range.

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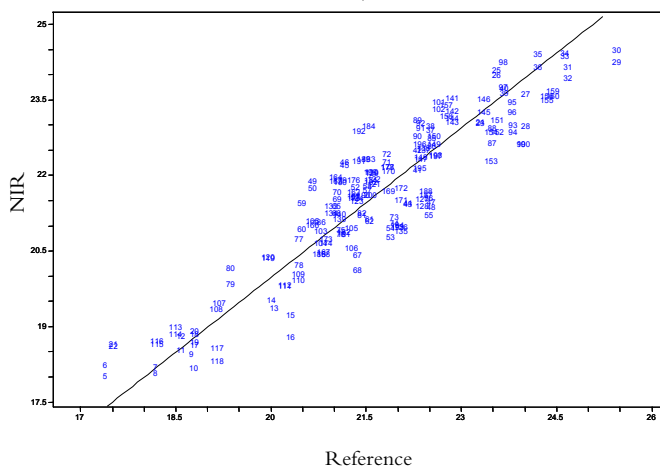
[*] SECV is the standard deviation between NIR and Lab data calculated in a way that describes the future performance of the calibration.