

# Perten Instruments Application Note

## Processed Potatoes

### Analysis of Processed Potatoes for Total Solids and Color Using a DA 7200 NIR Diode Array Based Analysis System

#### Introduction

Analysis of Total Solids and Color is of great importance to potato processors. By accurately controlling these constituents, the producer can experience significant savings. Realizing these savings is dependent both upon the accuracy of the analyses and the availability of real-time results. Using the DA 7200, production staff can perform their own analysis 24/7 and have instant access to the results. The results can be used for process optimization (drying times, temps etc.) and to avoid costly mistakes and potential penalties.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of potatoes, but past instrument limitations have not allowed users to reap the full benefits of NIR. Sample presentation requirements such as glass sample cells that had to be filled properly and were difficult to clean 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 food processing industries. Using innovative diode array technology it performs a multi-component analysis in only 6 seconds. During this time a large number of full spectra are collected and averaged. Since the sample is analyzed in an open dish, the problems associated with cells are avoided and operator influence on results is minimal.



#### Experimental

Over 200 potato samples from several processing plants served as the calibration set. The set includes several potato varieties (Shepody, Russet, Yukon Gold, etc.). The samples

were taken directly from the process after flash freezing. Some samples were par-fried, others were battered or coated, and others were raw. Sample types included fries, shoestrings, cubes, hash browns, and wedges. Each frozen sample was ground using a Hobart type meat grinder. The ground sample was placed in the standard open faced sampling dishes and spectral data was collected. Moisture ovens (more accurate +/-0.3%) and moisture balances (less accurate +/- 0.8%) served as the reference methods for Total Solids. The Agtron Colorimeter (+/-2.4 units) served as the reference method for color. Note: color data was collected on unground hash browns.



Calibrations were developed using Partial Least Squares (PLS) regression. Standard Normal Variant Transform and was used as a data pre-treatment to improve the calibration models.

#### Results and discussion

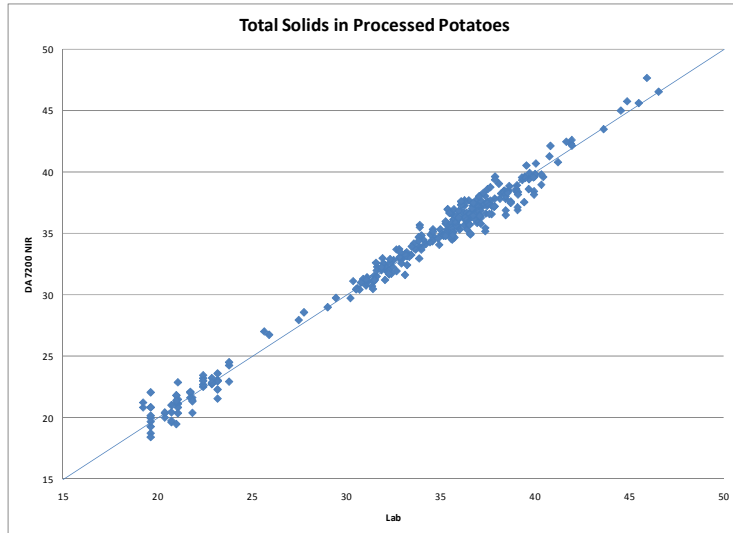
The DA 7200 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

Parameter	Range	Samples	R
Total Solids	19.26 - 46.56	+200	0.992
Color	44.0 - 60.6	>50	0.800

The differences between the DA 7200 and the reference methods 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 generally more repeatable and representative.

### Total Solids

Total Solids is accurately and readily measured across a wide range of values. Many different potato forms are included in the calibration.



### Color

Color is an important quality characteristic of par-fried potato products. The DA 7200 quickly and accurately measures this processing quality attribute.

