APPLICATION BRIEF

Near Infrared Spectroscopy

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Analysis of Butter Using the DA 7250 NIR Analyzer

Introduction

Analysis of fat, moisture and salt is of great importance to butter plants. By accurately controlling these constituents, the producer can experience significant savings. The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of butter, but past instrument limitations have not allowed users to reap the full benefits of NIR. Sample presentation requirements such as glass cups that had to be filled properly and were difficult to clean made analyses laborious, time consuming and error-prone.

DA 7250 NIR Analyzer

The PerkinElmer DA 7250 is a proven NIR instrument designed for use in the food industry. Using novel diode array technology, it performs a multi-component analysis in less than ten seconds with no sample preparation 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. Disposable cups can be used, eliminating the need for cleaning between samples. The DA 7250 is IP65 rated and available in a sanitary design version, making it suitable for use in the lab as well as in production environments.

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Method

Figure 1. Disposable Cup Module

Over 800 butter samples from multiple processing plants in North America and Europe served as the calibration set. Spectral data for each sample was collected on the DA 7250 instruments using the Disposable Cup Module. The reference chemistry results for fat, moisture, and salt was supplied with the samples.

Calibrations were developed using multivariate Honigs regression algorithms and scatter correcting spectra pre-treatments.

Results and Discussion

The DA 7250 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 calibration graphs are displayed in Figures 2, 3, and 4.

Table 1. Summary of statistics for fat, moisture and salt.

Parameter	N	Range	R
Fat % asis	800+	75.8 – 86.3	0.97
Moisture %	600+	13.7 – 18.3	0.96
Salt % asis	800+	0.1 – 2.4	0.97

The differences between the DA 7250 and the reference method 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 generally more repeatable and representative.

In summary it is concluded that the DA 7250 can analyze butter for the aforementioned constituents. The speed allows users to easily and accurately analyze many samples a day in nearly real time.

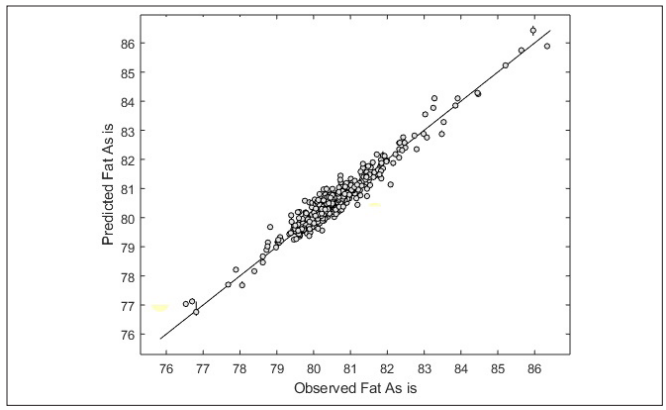

Figure 2. **Fat:** Fat is accurately and readily measured. Fat content is often regulated by governments to ensure proper labeling.

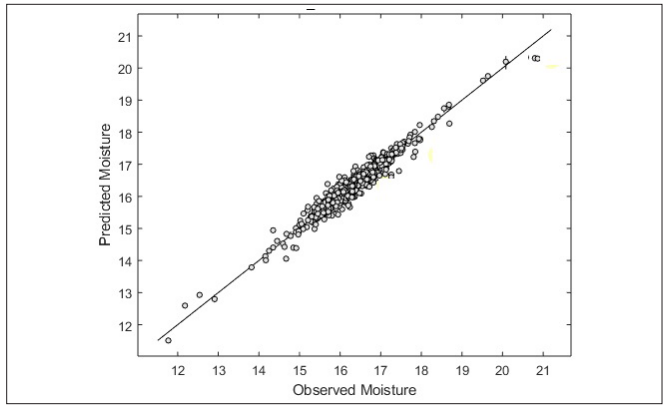

Figure 3. **Moisture:** Proper moisture levels affect the profitability of the plant as well as the quality of the product.

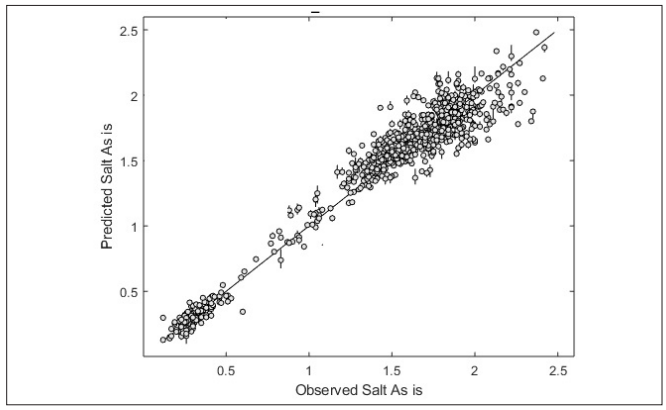

Figure 4. **Salt:** Salt effects taste and performance of butter in baked products.

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