

## Analysis of Moisture, Butterfat and Salt in Butter

### Introduction

Analysis of primarily Butterfat is of great interest in a butter producing facility. By accurately controlling the butterfat level, the producer can make very significant savings. Realizing these savings is dependant on instrument accuracy as well as the availability of results. By using the DA7200 instrument, the production staff can make their own analysis 24/7, and have instant access to results. In addition, the measurements of moisture and salt content enable significant quality improvements.

### Diode Array 7200 Food Analyzer

The DA 7200 is a new full-spectrum, NIR instrument designed for use in the grain, flour, food and feed industries. Using novel diode array technology it performs a multi-component analysis in only 6 seconds with no sample preparation required.

During this time, 300 full spectra are collected and averaged.

With this particular product, we recommend using the disposable cup accessory for the analysis. This removes any requirement for clean up, and can increase sample throughput. It is possible to use the standard DA 7200 sample dish, but this will require course cleaning between analyses. As the sample is measured from the top on the surface, the importance of thorough and time consuming cleaning associated with glass-bottomed cups or other sample cells is eliminated.



Figure 2. – Disposable Dish

### Experimental

Each butter sample was placed into a disposable dish. The surface was struck flat and placed under the

instrument. Each sample was re-packed once and spectra collected again to measure sample homogeneity and reproducibility.

PLS Calibrations were developed using approximately 70 butter samples. The reference data for Moisture, Fat, and Salt for these samples was supplied by the customer and came from two different laboratories. The results for the calibration dataset are listed in the table below.

### Results and Discussion

Parameter	Range	Samples	R <sup>2</sup>	SECV*
Fat	79.7-81.03	67	0.74	0.16
Moisture	15.59-18.35	69	0.851	0.19
Salt	0.0-2.15	68	0.989	0.07

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

In order to evaluate the reference method error for Fat, a set of 12 samples were sent as blind duplicates to one laboratory using the Kohman reference method. The result of this test showed a standard deviation between two tests in the same laboratory of 0.14 % .

Likewise, the standard deviation between the two laboratories was evaluated. The calculated inter-lab standard deviation for fat is 0.32 %

We can therefore conclude that the NIR standard error is as good as the standard error of the reference method.

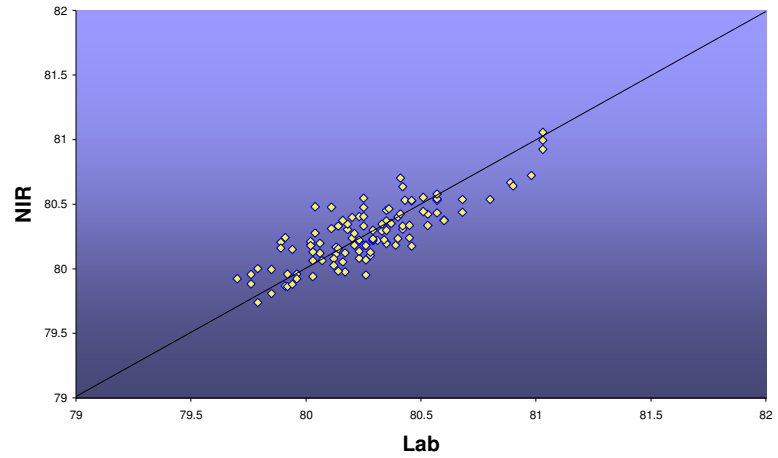
The results for the calibrations indicate that the DA 7200 can accurately measure Moisture, Fat, and Salt in Butter in as little as 6 seconds. The dataset included only 4 unsalted butter samples. This study and past experience shows performance can be improved even further by separating the salted and unsalted butter into two separate calibrations.

Additional data that includes a wider range and standardization to one reference lab using one reference method would likely improve calibration performance.

Perten Instruments Application Note - DA 7200 Butter A

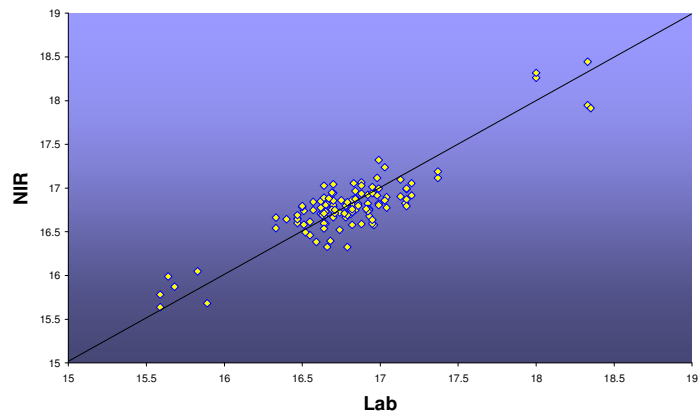
**Butterfat**

Range : 79.7-81.03  
Number of samples : 67  
Correlation : 0.74  
SECV: 0.16



**Moisture**

Range : 15.59-18.35  
Number of samples : 69  
Correlation : 0.851  
SECV: 0.19



**Salt**

Range : 0-2.15  
Number of samples : 68  
Correlation : 0.07  
SECV: 0.989

