

Analysis of Dairy Powders for Moisture, Protein, Fat, Lactose, Alkalinity, and Ash Using the DA 7250 SD

Introduction

Analysis of dairy powders is of great importance to both the production plants producing them and to those using them as ingredients. By accurately controlling many constituents, the producer can experience significant savings by optimizing production to meet specifications. The dairy powder user can avoid mistaken deliveries as well as formulate products to meet functional and compositional requirements.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of dairy powders, 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 SD

The DA 7250 SD is a proven NIR instrument designed for use in the food industry. Using novel diode array technology it performs a multi-component analysis in only 6 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 petri dishes can be used, eliminating the need for cleaning between samples. The stainless steel sanitary design of the instrument makes it hygienic and easy to clean.



Experimental

More than 600 samples of various dairy powders from multiple processing plants in the USA and Canada were analyzed in the DA 7250. The variety of powders included Whey Protein Concentrate, Non-fat Dry Milk, and Butter Milk Powder. The reference chemistry was supplied by the customers with the samples.



Calibrations were developed using Partial Least Squares (PLS) regression. Standard Normal Variant Transform and Savitsky-Golay 1st Derivative were used as data pre-treatments to improve the calibration models.

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 graphs are displayed on page 2.

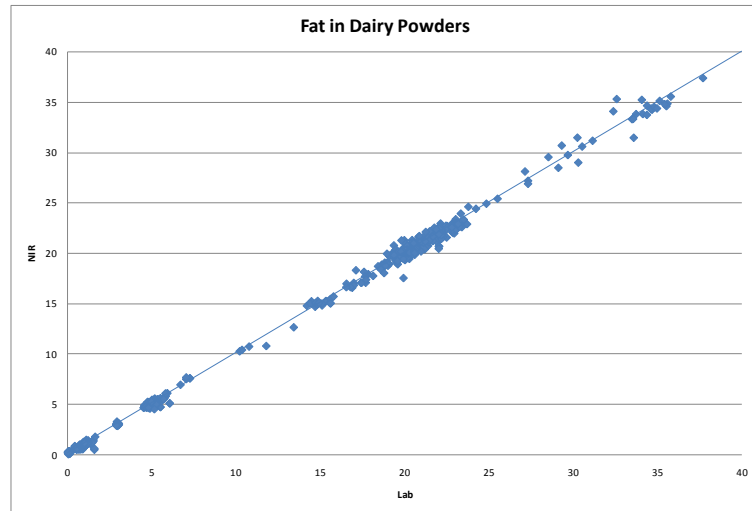
Parameter	Range	Samples	R
Moisture	1.3-5.3	600+	0.99
Protein	3.8-38.7	500+	0.99
Fat	0-37.6	600+	0.99
Lactose	36.8-79	300+	0.99
Alkalinity	1-320	200+	0.91
Ash	4.8-10.2	300+	0.95

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 Diode Array 7250 can analyze dairy powders for the aforementioned constituents. The ease-of-use and flexibility – it can analyze cheese, butter etc. as well – make it ideal for use at dairy plants worldwide.

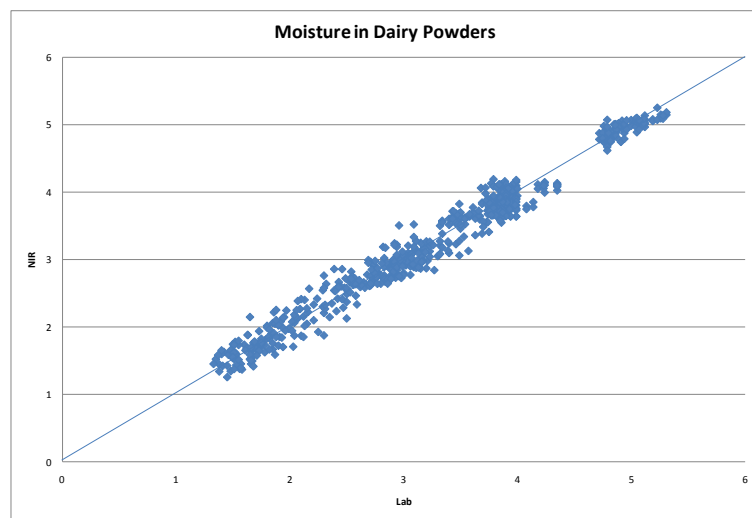
Fat

Fat is accurately and readily measured across a wide range of values. Fat effects product taste and functionality.



Moisture

Proper moisture levels affect the profitability of the plant as well as the quality of the product. Incorrect moisture levels can cause clumping.



Protein

Different protein level dairy powders are required to provide specific functionality in formulated products. The DA 7200 can verify shipments quickly.

