

APPLICATION NOTE – QUARK/FRESH CHEESE

Introduction

The production of quark or fresh cheese can be optimised by regulating the flow rate of the raw material based on measurements of the content of dry matter, fat and protein. Normally these measurements are done by traditional laboratory methods which can be cumbersome, expensive and require trained personnel. Most importantly, these methods are much too slow to allow sufficient reaction time for control of the process. As a result, NIR analysers have replaced most of the traditional methods. These analysers can be placed directly in the production area close to the production line and can be operated by plant personnel. The analysis time is less than two minutes.

The analyser



Figure 1: The QFA focus

The QFA focus is an FT•NIR analyser. Samples are measured over a 1.5 cm pathlength along a 15 cm strip at the bottom of a plastic bag. The bag contains approximately 100 g of product. A large detector is located directly after the sampling accessory in order to intercept a significant proportion of the diffusely transmitted light. The large sample area averages the sample heterogeneity, thus improving the repeatability of the measurement.

The QFA focus uses economical, disposable, plastic bags for sampling. The plastic bag is easily filled with quark or fresh cheese by the operator and inserted directly into the accessory for analysis.

Calibration

Since the calibration samples come from different factories they are developed using different chemical reference analysis methods.

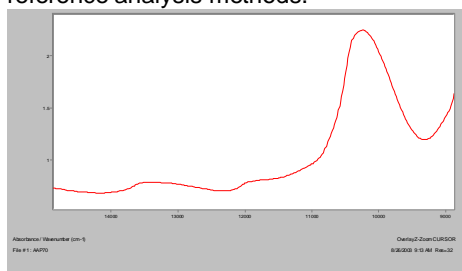


Figure 2: Typical FT•NIR spectrum of quark.

The NIR region contains both combination and overtone information. The most sensitive bands are those derived from the O-H and C-H stretch regions. In order to compensate for pathlength changes due to scattering effects from the sample and pathlength differences derived from the disposable plastic bags, all spectra were pre-processed using baseline correction, thickness correction and mean centring.

The calibration set contained quark and fresh cheese produced at different factories. The calibration samples were collected directly from the production lines to ensure that they were based on the reality. A Partial Least Squares (PLS) model was developed based on the analytical and spectral data.

Calibration Performances

Table 1 shows the performance of the calibrations. Each sample was analysed in the factory laboratories. The quark and fresh cheese calibrations are based on a set of 60 spectra measured in a temperature range going from 6 to 20 °C.

Property	Range %	NIR SECV	Reference Method RMSD
Dry Matter	13 - 26	0.23	NA
Fat	0 - 11	0.21	NA

Table 1: Performance of the quark and fresh cheese calibrations.

The calibrations have not been validated yet and repeatability tests will be performed in the nearest future.

Conclusion

The QFA focus is suitable for use in the production area. It is intended to be placed near the production line and measures moisture and fat in quark and fresh cheese. Plant personnel can do sampling and analysis. The calibration is independent of temperature variations in the process in the area of 6 to 20 °C.