

Application Note AN # 278

QC of Raw Milk and Dairy Products with FT-NIR

Routine QC of raw milk and liquid milk products is commonly performed by FT-IR analyzers while solid and paste-like dairy products are analyzed by additional NIR instruments. Bruker's new Dairy Analyzer "MPA-D" sets a new standard by providing state-of-the-art analysis of raw milk and highly viscous liquid milk products as well as products which can contain particles or sugar crystals. Moreover the measurement of solid or paste-like samples can be performed using the same analyzer.

Raw milk and liquid samples

The Liquid Sampling Module (LSM) is a dual system allowing either the homogenization of a sample or a simple pumping through a 1,000 μ m pathlength flow cell for the NIR analysis.

The LSM provides:

- excellent precision by analyzing more than 20x larger raw milk sample volume (compared to FT-IR analyzers).
- unique homogenizer efficiency check informs operator if homogenizer valve needs maintenance.
- easy pumping of viscous samples like concentrates.
- full software control with configurable sampling volumes and automated cleaning cycles.
- visible tubing for easy inspection.



Solid and paste-like dairy products

With the additional integrating sphere module, the MPA-D can analyze any solid or paste-like dairy product in

- sample cups for powder samples
- disposable Petri dishes (Polystyrene)
- glass or quartz Petri dishes

The sample is rotated during analysis to obtain the average result from a larger sample volume.

For the different sample types, Bruker offers ready-to-use calibrations for a quick and efficient start.

Milk and Dairy Product Analysis with MPA-D



Homogenized liquids

- Raw milk
- Standardized milk
- Whey



Non-homogenized

- Cream
- Condensed milk
- Milk drinks
- Concentrates



Paste-like material

- Cheese (hard & soft)
- Yoghurt & Greek yoghurt
- Butter (salted & unsalted)
- Desserts



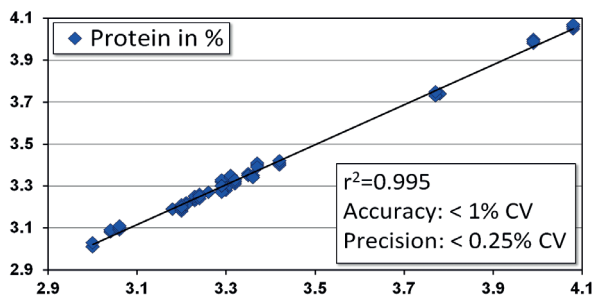
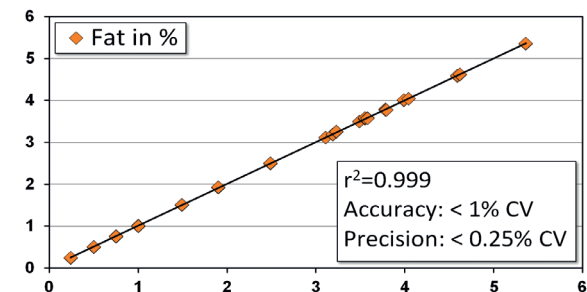
Solid material

- Whole milk powder
- Skimmed milk powder
- Whey Protein Powder

Validation of raw milk calibrations

The LSM module and the calibrations for raw milk were checked with certified standard milk samples sets from the dairy laboratory service company Eurofins DQCI in the US. The results show excellent accuracy and linearity for fat and protein.

NIR Validation Results vs. Reference Values



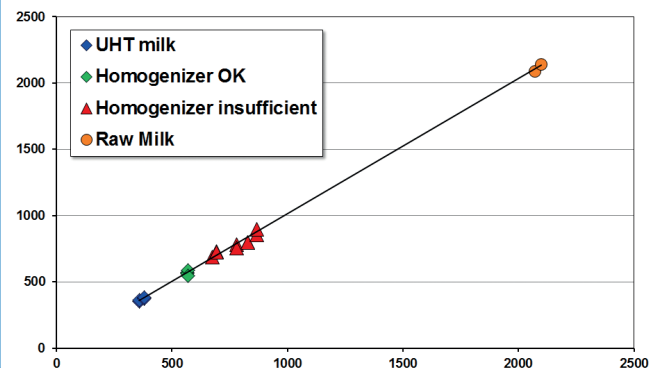
CV = Coefficient of Variation for Raw Milk

Homogenizer efficiency check

An important part of the LSM module is the homogenizer valve which needs regular maintenance. With FT-NIR the fat globule size can be determined for regular accuracy and precision tests in addition to the other parameters. Depending on the results it will be indicated if the homogenizer valve needs to be replaced.

The plot below shows the results for samples homogenized with LSM (green) compared to UHT milk samples (blue) homogenized during production. As soon as raw milk samples (orange) tend to show values toward higher globule sizes (red), the homogenizer efficiency check will request a maintenance action.

Fat Globule Size Determination with FT-NIR



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