

Moisture, Fat, and Protein Analysis of Cultured Dairy Products



Introduction

Milk and cream make up the largest portion of dairy products. However, cultured products have been the largest growing sector, both in volume and variety.

Yogurts are being embraced as nutritious snacks, while spreadable products like cream cheese, cottage cheese, and sour cream are seeing a rise in new flavors and functions.

While there are a growing number of products, they all start with milk. In order to maintain high-quality and maximize profits, moisture, solids, and fat must be accurately analyzed at every stage of production. The ability to test raw materials and in-process products is therefore, increasingly critical.

Key Benefits

- Test any product, liquid or powder, raw ingredient or in-process product, and finished product with inclusions like fruit, granola, and more
- AOAC approved technologies with better accuracy than NIR
- No fat method development or calibrations required
- No homogenization or tubing to be clogged or damaged
- Largest potential for cost savings of any rapid or reference fat testing method
- CEM process control equipment has received numerous awards, including:
 - o US EPA Green Chemistry Award
 - o Multiple R&D100 Awards
 - o 2016 WOTS Innovation Award
 - o 2017 IFT Innovation Award
 - o 2016 & 2017 Pittcon Best New Product Awards

SMART 6

The SMART 6™ is the newest moisture/solids analyzer from CEM Corporation. Improving upon the SMART Turbo™, which is used by dairy companies around the world for the most accurate solids analysis, the SMART 6 utilizes proprietary iPower® technology to test any sample faster and more accurately than ever before. This dual-frequency heating technology allows the system to analyze any product, regardless of whether it is liquid, powder, viscous, or contains added ingredients. Most analyses are complete in less than 3 minutes with results that compare to the precision previously only obtainable by AOAC oven methods, which can take hours to perform. With a touchscreen interface, built-in training videos, and full LIMS integration potential, the SMART 6 is the most advanced solids analyzer on the market. Data can be sent directly to the production floor to approve incoming ingredients, in-process formulations, and finished batches more quickly and with more confidence. With the increased accuracy of the SMART 6, formulations can be adjusted to optimize ingredients, giving the highest quality product at the optimal yield.

ORACLE

The ORACLE™ is the first and only system that can accurately test the fat content of any food product in 30 seconds with no method development, calibration, or sample validation necessary. As one of the most expensive ingredients, and a large contributor to the quality and mouthfeel many consumers base their purchases on, cultured dairy producers have always required a fast and accurate fat analysis. Historically, there have been two types of fat analysis; reference extraction methods and rapid technologies. While each provides various benefits, both are flawed. Reference extraction methods, such as mojonner, gerber, and babcock, have been approved for decades as an accurate, primary fat analysis. However, these extractions take hours to perform, involve handling hazardous solvents, and require a highly trained technician to correctly execute the testing procedure. Even with trained technicians, independent studies have shown extraction repeatability from user to user can be unacceptable, questioning results from any non-duplicate testing. Rapid technologies, such as NIR and FT-IR, provide a faster, safer, and simpler testing alternative to extractions, but are limited to specific sample matrices and require frequent method development and recalibration. Even with constant maintenance, the margins of accuracy are worse than reference techniques and worsen over time.

Using a recent breakthrough in NMR technology developed by CEM in 2016, the ORACLE applies the benefits of both reference extraction and rapid testing, while overcoming their flaws. The ORACLE has proven its ability to achieve accuracy comparable to standard extraction methods, with better reproducibility, and does so for any known or unknown food product, a previously impossible feat. When paired with the SMART 6 analyzer, the ORACLE can provide moisture/solids and fat results in under 5 minutes. The SMART 6 – ORACLE combination system is capable of testing any dairy matrix (powder, liquid, high viscosity solids, low viscosity solids) so samples such as milk, cream, yogurt, sour cream, NFDM powder, and samples with inclusions (i.e. chocolate or fruit), can all be analyzed on one combination system. Infrared users would require separate FT-IR and NIR instruments to analyze this same variety of products. The ORACLE's accuracy and repeatability is achievable across multiple systems, guaranteeing results from plant to plant. By maintaining better control of their production, manufacturers can also improve product formulation and increase yields, leading to huge potential cost savings and increased profitability. As the first and only universal rapid fat analyzer, the ORACLE is the biggest breakthrough in fat testing technology, and will greatly benefit every food manufacturing plant in the world and the consumers that rely on them.

Sprint

The Sprint® Protein Analyzer is a novel technology that fully automates an AOAC approved dye-binding technique that has proven effective since the 1970s. Because it directly measures protein, there is no need for the calculation or calibration that is seen with Kjeldahl and combustion and it is not swayed by the presence of adulterants or other NPN molecules. The hazardous chemicals and complicated gas lines and tubes used with these other methods have been replaced by CEM's patented iTag® solution. The Sprint won the 2009 Presidential Green Chemistry Challenge Award, presented by the EPA due to its lessened environmental impact. With only a two-step testing procedure, analysis is simple enough for first day technicians to use, and yields results that are more accurate than NIR and Dumas systems for better process control.

	Fat Avg	Fat St Dev	Fat Reference	Moisture Avg	Moisture St Dev	Moisture Reference	Protein Avg	Protein St Dev	Protein Reference
Cream Cheese	22.85	0.07	22.91	65.47	0.06	65.40	N/A	N/A	N/A
Strawberry Cream Cheese	18.57	0.12	18.58	59.74	0.16	59.83	N/A	N/A	N/A
FF Cream Cheese	1.20	0.03	1.30	75.62	0.07	75.89	N/A	N/A	N/A
Greek Yogurt	4.04	0.02	4.03	81.85	0.07	82.38	7.18	0.02	7.15
Sour Cream	17.79	0.06	17.67	73.52	0.03	73.46	2.86	0.02	2.81
Cottage Cheese	2.15	0.02	2.12	79.73	0.05	79.98	11.05	0.04	11.02
CRM cream sample	13.43	0.01	13.49	79.46	0.03	79.51	1.86	0.01	1.87
CRM cream sample	42.46	0.08	42.53	53.12	0.04	53.11	1.96	0.04	1.91