

New TD-NMR Technology Provides Fast, Accurate Results for a Wide Variety of Dairy Products



Streamlining costs while producing a high quality product presents quite a challenge to any manufacturing organization and dairy production is no exception. A fast, accurate answer is critical to being able to rapidly respond to and adjust product composition.

APPLICATION NOTES

The all new CEM HYBRID Trac presents a unique solution to the wide variation of products tested every day. Both wet and dry products can be tested for solids/moisture and butterfat on a single system. The entire sample is examined, not just the surface, providing accuracy beyond what is possible with other rapid techniques. The system combines proven microwave moisture analysis with a 2nd generation, patent-pending Time-Domain NMR system with a rapid sample conditioning feature and the ability to accurately determine moisture over a broad fat content range, which 1st generation NMRs were unable to do.

Incoming milk at a milk powder facility is separated, processed, dried, and leaves as milk powder, among other products. It sounds simple, but can be incredibly complicated, as each product throughout the process must be tested, evaluated, and adjusted as necessary before moving along to the next step. Testing to determine what adjustments, if any, are required must be done quickly and accurately to ensure a high quality product.

Traditionally, testing can be done using either wet chemistry methods or various pieces of equipment that are designed to be more accurate and rapid. However, tests for incoming fluid milk and the final dried product are typically not performed using the same system: specialized instruments are required to deal with either wet or dry products.

Currently, incoming milk is received by the plant and the solid and butterfat content is determined using a test for wet samples. Then, it is moved to a holding tank, mixed with other milk samples and cooled. The combined milk can also be tested for overall solids and butterfat content

prior to separating it into cream and skimmed milk. The separated milk is remixed and adjusted to produce the appropriate product (whole milk powder, skim milk powder, powdered infant formula, buttermilk powder, and more). Then, using a test for wet samples, the solids and butterfat content is determined before drying. Once dried, a test for dry samples is used to measure the solids and butterfat content, again. Any modifications to increase solubility are performed and the final product is tested again shortly before it is shipped.

Now, all of these tests can now be performed on one system. The HYBRID Trac tests the solids and butterfat content of fluid milk, separated cream, and other liquid products, as well as the final dried powder in as little as 2 minutes. Because the HYBRID Trac measures the entire sample, not just the surface of the material, the results are extremely accurate and can easily be used to make adjustments to the process. Having accurate results ensures the best quality product is produced in the most cost effective manner. For example, adjustments can quickly be made to increase or decrease the amount of butterfat in the sample or dry the sample further. The capability to maintain a tighter specification range directly translates into cost savings.

The HYBRID Trac combines the proven technology of the SMART Trac II with the advancements brought about with the FAST Trac to create a system that can test both wet and dry products. Products ranging from incoming milk to separated cream/skimmed milk to milk powder are tested quickly and accurately. The HYBRID Trac's combination of accuracy, flexibility, and speed are unmatched by any other testing system commercially available.

Powdered Milk

Reference: 2.81% Moisture, 27.66% Butterfat

Sample	Solids	Butterfat
1	2.82	27.66
2	2.80	27.66
3	2.81	27.63
4	2.81	27.68
5	2.81	27.71
6	2.79	27.69
7	2.80	27.70
8	2.83	27.69
9	2.80	27.72
10	2.81	27.66
Average	2.81	27.68
St dev	0.011	0.027
Error	0.00	0.02

Heavy Cream

Reference: 45.57% Solids, 39.93% Butterfat

Sample	Solids	Butterfat
1	45.59	39.83
2	45.61	39.95
3	45.53	40.01
4	45.63	39.92
5	45.56	39.83
6	45.61	39.86
7	45.59	40.01
8	45.66	40.00
9	45.56	39.85
10	45.65	40.00
Average	45.60	39.93
St dev	0.041	0.078
Error	0.03	0.00

Reduced Fat Milk

Reference: 9.87% Solids, 1.00% Butterfat

Sample	Solids	Butterfat
1	9.93	0.99
2	9.93	0.97
3	9.92	0.97
4	9.87	0.98
5	9.93	0.99
6	9.90	0.96
7	9.92	0.96
8	9.93	0.96
9	9.93	0.98
10	9.87	0.98
Average	9.91	0.97
St dev	0.025	0.012
Error	0.04	0.03

Incoming Milk

Reference: 11.79% Solids, 3.02% Butterfat

Sample	Solids	Butterfat
1	11.77	2.99
2	11.78	2.98
3	11.80	2.97
4	11.81	2.98
5	11.77	2.96
6	11.79	3.01
7	11.79	3.01
8	11.78	3.01
9	11.78	2.99
10	11.79	3.01
Average	11.79	2.99
St dev	0.013	0.019
Error	0.00	0.03

CEM Corporation

United States
Tel: (800) 726-3331 [USA & Canada]
e-mail: info@cem.com
www.cem.com

FRANCE

CEM μ Wave S.A.S.
Tel: (33-1) 69 35 57 80
e-mail: info.fr@cem.com
www.cemfrance.fr

GERMANY

CEM GmbH
Tel: (49) 2842-9644-0
e-mail: info@cem.de
www.cem.de

IRELAND

CEM Technology (Ireland) Ltd
Tel +353 (0)1 885 1752
Email: info.ireland@cem.com
www.cemmicrowave.co.uk

ITALY

CEM S.R.L.
Tel: (39) 35-896224
e-mail: info.srl@cem.com
www.cemmicroonde.it

JAPAN

CEM Japan K.K.
Tel: +03-5368-2507
e-mail: info@cemjapan.jp
www.cemjapan.jp

UNITED KINGDOM

CEM Microwave Technology Ltd.
Tel: (44) 1280-822873
e-mail: info.uk@cem.com
www.cemmicrowave.co.uk