The Real Lab Cost Savings in Dairy Processing with CEM

Introduction

Undeniable in the dairy industry is the importance of proper product testing, with a need for strong accuracy, consistency, and confidence in laboratory analyses. Milk and its derivative processed products make up one of the biggest sectors of food globally, especially as developing regions are growing and becoming more industrious. Any market share that is lost to plant-based products is made up for in the growing global appetite and resultant increase in demand for processed and cultured dairy. As popularity grows, options for differentiation follow. Yogurt, cheese, ice cream, cream cheese, sour cream, and more are becoming a crowded and competitive marketplace, and cost and variety will always be key drivers in consumer decision making.

Shipping, distribution, and marketing costs will always have drastic impacts on bottom lines, however, one of the biggest costs to any company is the actual production. Of those production costs, the control of manufacturing from the raw ingredients to the finished product is becoming more and more critical. What many companies struggle to realize is that laboratory testing of these products should not be seen as a money pit, but as a tool for improving process control and leading to cost SAVINGS for the entire facility, if used properly.

Most QA/QC lab teams analyze hundreds of samples in order to ensure samples are in spec. However, that spec may not always match the spec that production is trying to achieve. Lab specs are often set by the limitations of the equipment being used, to ensure that inherent error and reproducibility are accounted for, so product is not erroneously thrown out, or accidentally released with less-than-ideal quality.

But with more accurate lab equipment, those specs can be tightened, and tighter specs allow for better process control, better yield, and savings to the bottom line. Many labs focus on equipment qualities like speed, ease of use, cost per test, or size (which are all important qualities), the cost savings achieved by those traits is dwarfed by those that can be obtained with better accuracy and more confidence. Even something as small as a 0.10% improvement in precision can lead to hundreds of thousands of dollars in savings, when utilized properly and integrated into adjustments on the production floor.

Better Process Control for More Savings

Different products, like yogurt, cheese, or ice cream, each have slight differences in how and where process control can have the biggest effect. The underlying need and related cost savings for highly accurate testing of solids, fat, and protein is why these 3 are the biggest focus for labs. Other components to monitor such as salt, pH, etc are necessary for good quality control, but it is important not to sacrifice the accuracy of solids, fat, and protein when considering those secondary tests. Spending a few thousand dollars on a pH meter or calcium titrator will easily be recovered in the cost savings of better process control of your proximate tests. That is why CEM has always focused on direct-analysis technologies, rather than an all-in-one approach, because, like many of our customers, we understand that accuracy should be the top priority, not just another bullet-point to consider.

CEM was originally founded in 1978 to develop a faster, better moisture analyzer for the cheese industry, so we have been working with the dairy industry since our inception. To this day it is our biggest market for Process Control equipment, where the global demand is greatest. A lot has changed since 1978, and our newest SMART 6™ analyzer has made revolutionary breakthroughs in testing moisture and solids. As the first unit with the capacity to test wet or dry samples in under 4 minutes, with repeatability and precision that is closer to reference oven testing than any other rapid analyzer (including SMART 5/Turbo), the SMART 6 is a cornerstone of CEM and successful dairy labs. The patented combination of microwave and infrared heating means that any new products with added fruit, sugars, granola, or any other additives can be tested without worrying about scorching or burning effecting your results. This combination also gives the ability to better test powder or grain ingredients; something that was not possible with CEM solids analyzers until now. Of course, these "best-in-show" results can be sent directly to SAP networks for better data collection and handling for all CEM systems.

ORACLE Shows Better Reproducibility than Reference Techniques

To improve on the great data from the SMART, the ORACLE™ fat analyzer is the first and only rapid analyzer that is universal and capable of testing any sample without worrying about calibrations. Accuracy from the ORACLE is not only equal to the reference extractions for many samples, in some case the reproducibility is BETTER than what can be achieved by the reference technique. The ORACLE was evaluated in 2018 by a third-party accredited group dedicated to evaluating dairy production equipment. The validation included 8 product groups with 30 total samples analyzed in multiple replicates on the ORACLE and by their reference extraction method. With a range of fat from 0.40-44.50%, the ORACLE was able to have an absolute deviation of 0.02, and RSD of 0.72, and a R_2 correlation of 1.0000 (shown in **Figure 1**). That RSD is better than what is promoted by FT-IR suppliers for not ONLY milk, but on a huge range of cultured and processed dairy products also.

All this is achieved without calibrating or adjusting the unit for each product, and without the influence of CEM.

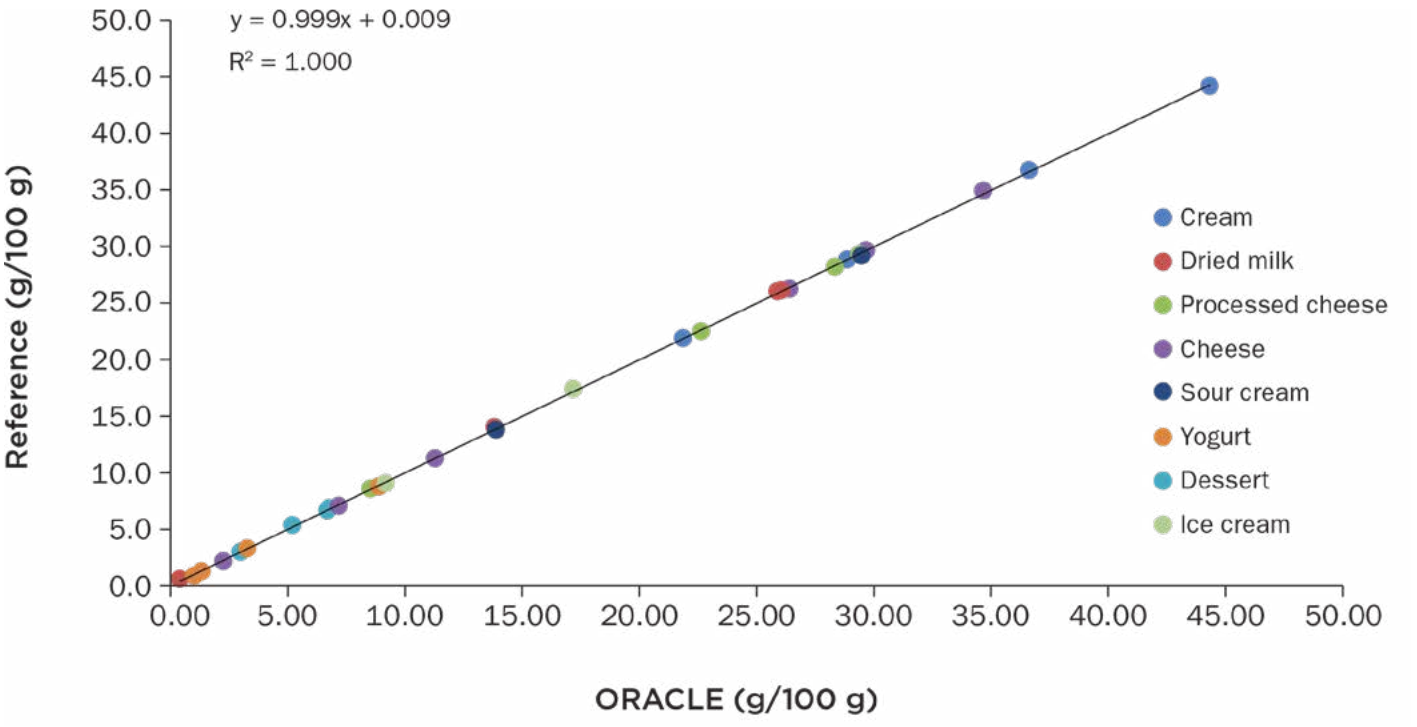

Figure 1. Relation between ORACLE and Reference Results in Dairy Samples.

Improve Efficiency and Yield with Sprint

While the SMART and ORACLE are newer developments and improvements from the last few years, the Sprint® protein analyzer has been serving the dairy industry with success for over 10 years and continues to produce accuracy and repeatability very close to the tightest Kjeldahl precision that can be achieved.

Additionally, the Sprint is constantly referred to as the "simplest system in my lab", since almost the entire SOP is automated, and the system maintenance is minimal compared to other automated units. The Sprint is unique as one of the only systems employing Udy Dye Binding for protein detection, a well-established and AOAC approved technology. This technology, when tightly controlled like the Sprint does with its automation, can be one of the most accurate protein techniques available, and it works for a range of liquid and semi-solid dairy products without the need for any new calibration and method development. As a result, protein can be controlled to similar levels as Kjeldahl, without any hazardous chemicals and delivering an accurate result in just 3 minutes. Ultra filtration, nutritional additives, and other protein adjustments in production can be addressed with huge potential for improvements in the efficiency and yield of milk for the final dairy products.

Conclusion

There are many options for technology in the lab, especially when it comes to proximate analyses, and each one has benefits over the others. Faster results and multi-component testing are available with IR spectroscopy, whereas confidence and accuracy are found with reference techniques. CEM products are alone in their ability to provide speed and ease of use that is necessary in a modern production environment, along with confidence and consistency in the data they can produce. When it comes down to lab equipment decisions, it is really a decision of dollars and cents, and the accuracy and low cost per test from CEM overshadows any other option. As the world changes, and the demand for new products and new health considerations grows, CEM is there to grow with you.

United States (Headquarters)
800-726-3331
704-821-7015
info@cem.com

France
33 (01) 69 35 57 80
info.fr@cem.com

Germany, Austria, Switzerland
(49) 2842-9644-0
info@cem.de

Ireland
+353 (0) 1 885 1752
info.ireland@cem.com

Italy
(39) 35-896224
info.srl@cem.com

Japan
+81-3-5793-8542
info@cemjapan.co.jp

United Kingdom
(44) 1280-822873
info.uk@cem.com

www.cem.com