ISO 16756:2024 | IDF 259:2024
A New International Standard
for Rapid Fat Analysis of Milk and Milk Products

Impact of Fat Testing

Milk Production

- 965.7 million tons of milk produced annually (FAO Market Review 2023)
  - $^{1}/_{3}$ is used for further dairy processing
- Average QA test rate is about one test per 10,000 Liters
  - Total of ~40,000,000 tests each year globally

Current Cost

- Butterfat market rate $3.6/lb
- More accurate testing has the potential to provide significant savings to the bottom line

Options

Reference Methods

Long Methods, Primary Methods

Pros

- Reliable
- Accurate
- Accredited

Cons

- Hazardous
- Difficult SOP
- Expensive

Rapid Methods

NIR, FTIR, TD-NMR

Pros

- Rapid
- Easy SOP
- Cheap Cost/Test

Cons

- Unreliable
- High Maintenance
- Indirect Analysis

Universal Fat Determination

Reliable

- No method calibrations
- No calibration maintenance

Accurate

- Results equal to or better than extraction and hydrolysis methods

Green

- Does not require solvents

Uses Accredited Technology

- ISO 16756:2024 | IDF 259:2024

ISO Method

ISO 16756:2024 | IDF 259:2024

Milk and milk products – Guidance for the application of Carr-Purcell-Meiboom-Gill (CPMG) pulsed time-domain nuclear magnetic resonance (TD-NMR) spectroscopy for fat determination

ORACLE is the only commercially available system that utilizes CPMG TD-NMR, meeting all requirements of ISO 16756:2024 | IDF 259:2024.

CEM

Workflow

Record sample weights and pre-dry samples

Prepare ORACLE samples

Condition samples in heater block

Place sample in ORACLE and press “Run”

The Proof is in the Pudding… Analysis

- Whole Wheat
- Wheat Flour
- Sweet-Digestive Biscuit
- Milk Chocolate
- Baking Chocolate
- Peanut Butter

- Boiled Sausage
- Meat Homogenate
- Processed Meat

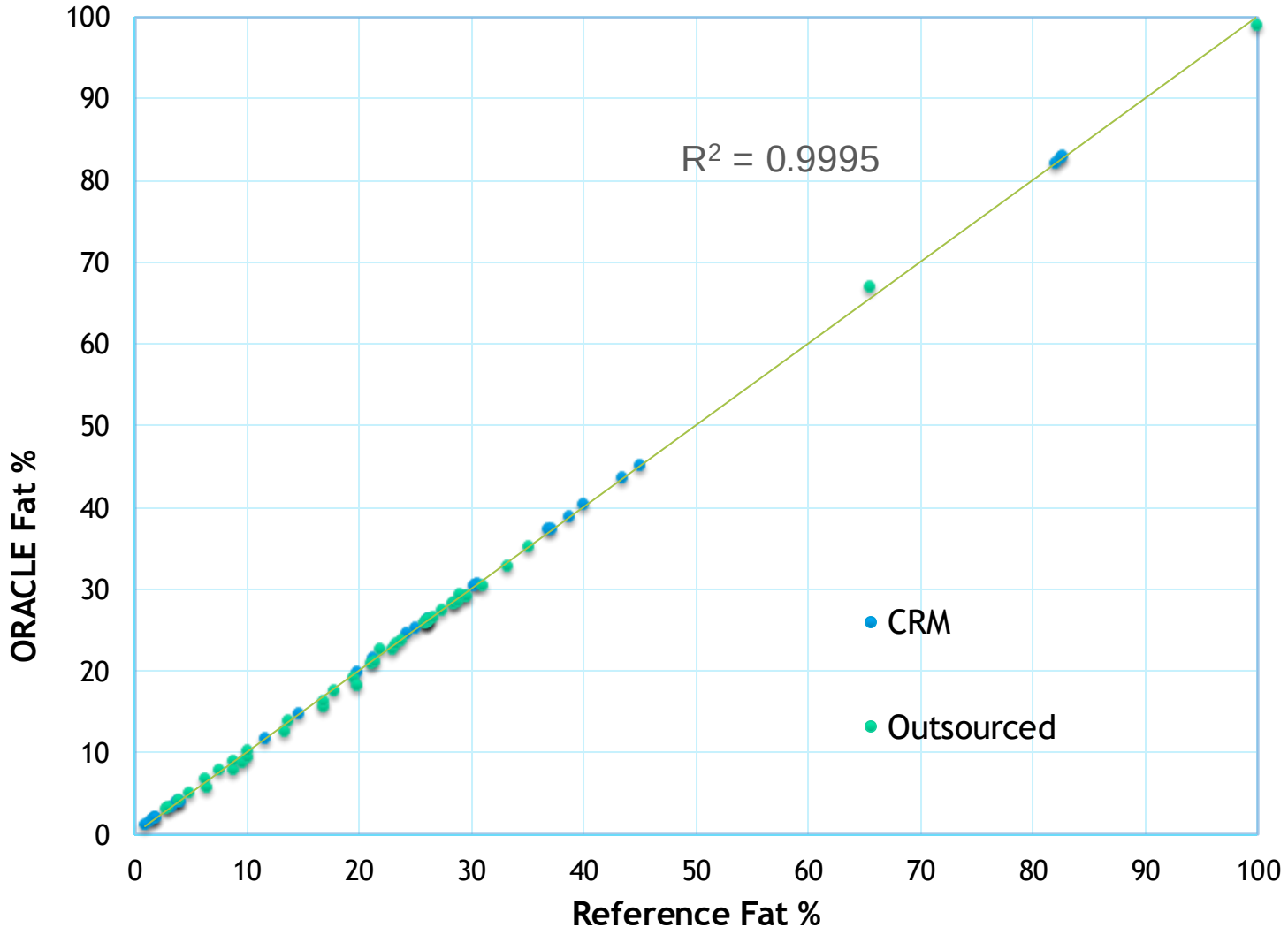
- Poultry Feed
- Equine Feed
- Swine Feed
- Lamb Feed
- Dairy-Beef Feed
- Pheasant and Turkey

- UHT Milk
- Milk Powder
- Whole Milk Powder
- Infant Formula
- Powdered Infant Formula
- Cream Powder

- Salted Butter
- Butter

- Yogurt
- Fresh Cheese (multiple fat levels)
- Processed Cheese (multiple fat levels)
- Fresh Cheese (Lact. Red.)
- Parmesan Cheese

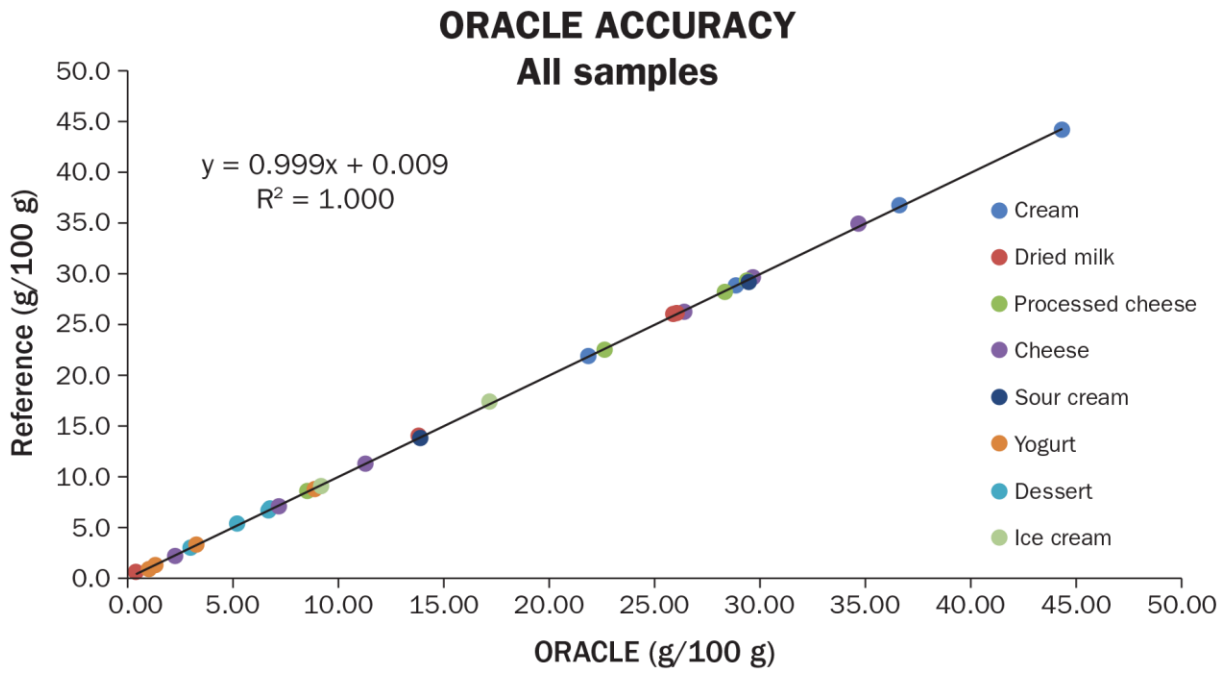
The Proof is in the Pudding… Analysis



- 36 CRMs initially validated on the ORACLE
- CEM outsourced 1000s of samples to contract labs
  - Submitted samples in “blind” and “non-blind” fashion to capture true sample variability

Actalia Cecalait Dairy Validation

- Experts in Dairy analysis
  - Validate and publish technologies for the dairy industry
- Independent study published by Actalia and available on cem.com
- Robust review of a wide variety of dairy products



Food Samples Tested

Over 2,000 unique sample types have been tested successfully

Dairy
raw, cultured, egg, alternative (soy, oat, nut, etc.), powders

Meat
raw, processed, smoked/cured, alternative (vegan)

Snack Foods
cookies, crackers, nuts, chips

Prepared Foods
condiments, frozen dinner, cereals, sauces, peanut butter

Alternative Foods
Plant-based meat & dairy, cultivated meat, and more

Confectionary
chocolate, syrup, cake, caramel, cocoa

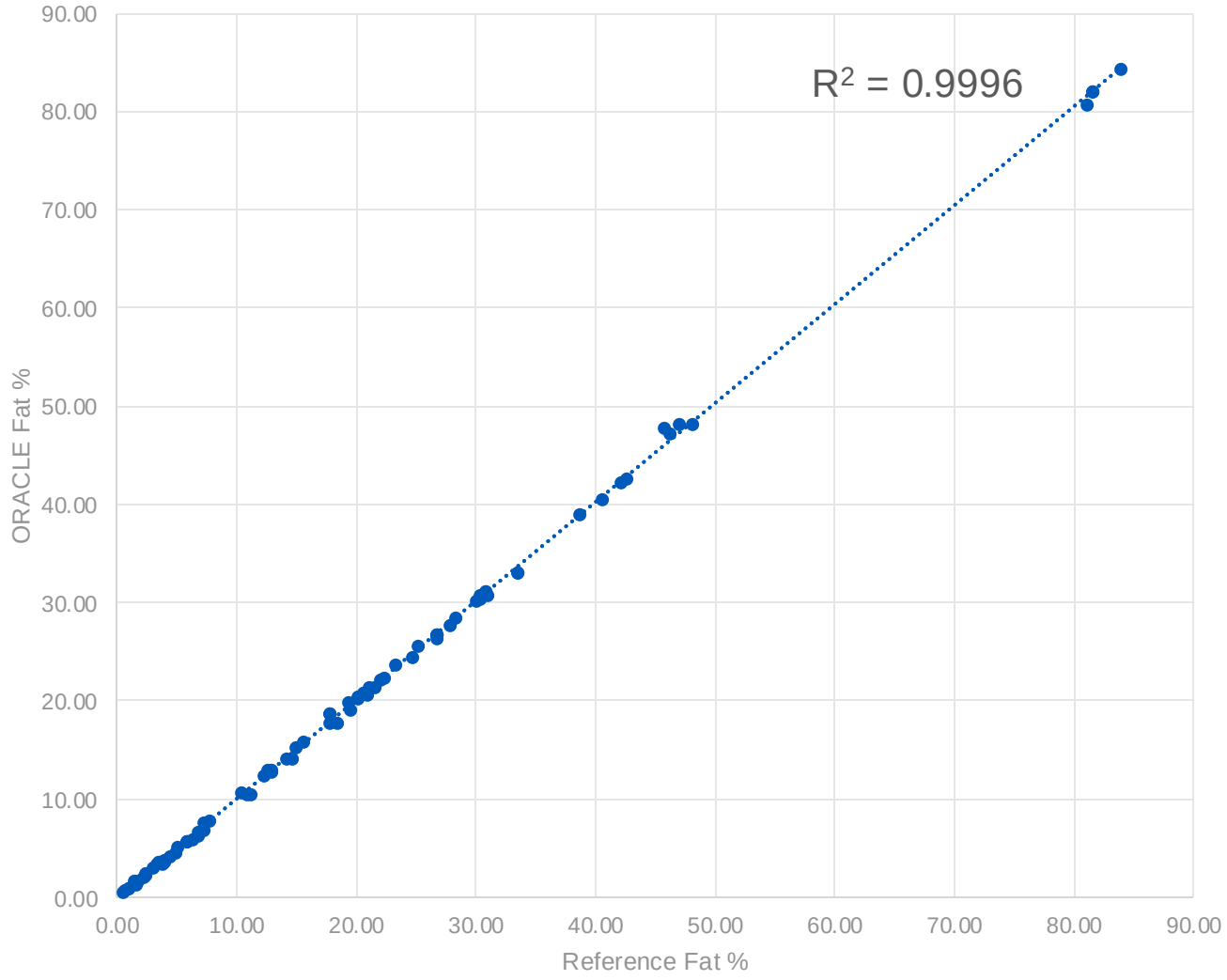
Fats/Oils
rendered fats, cooking oils, fish oil, butterfats

Feeds/Meals
feed ingredients, additives, nutraceuticals, corn germ

More than 1000 units installed globally since release

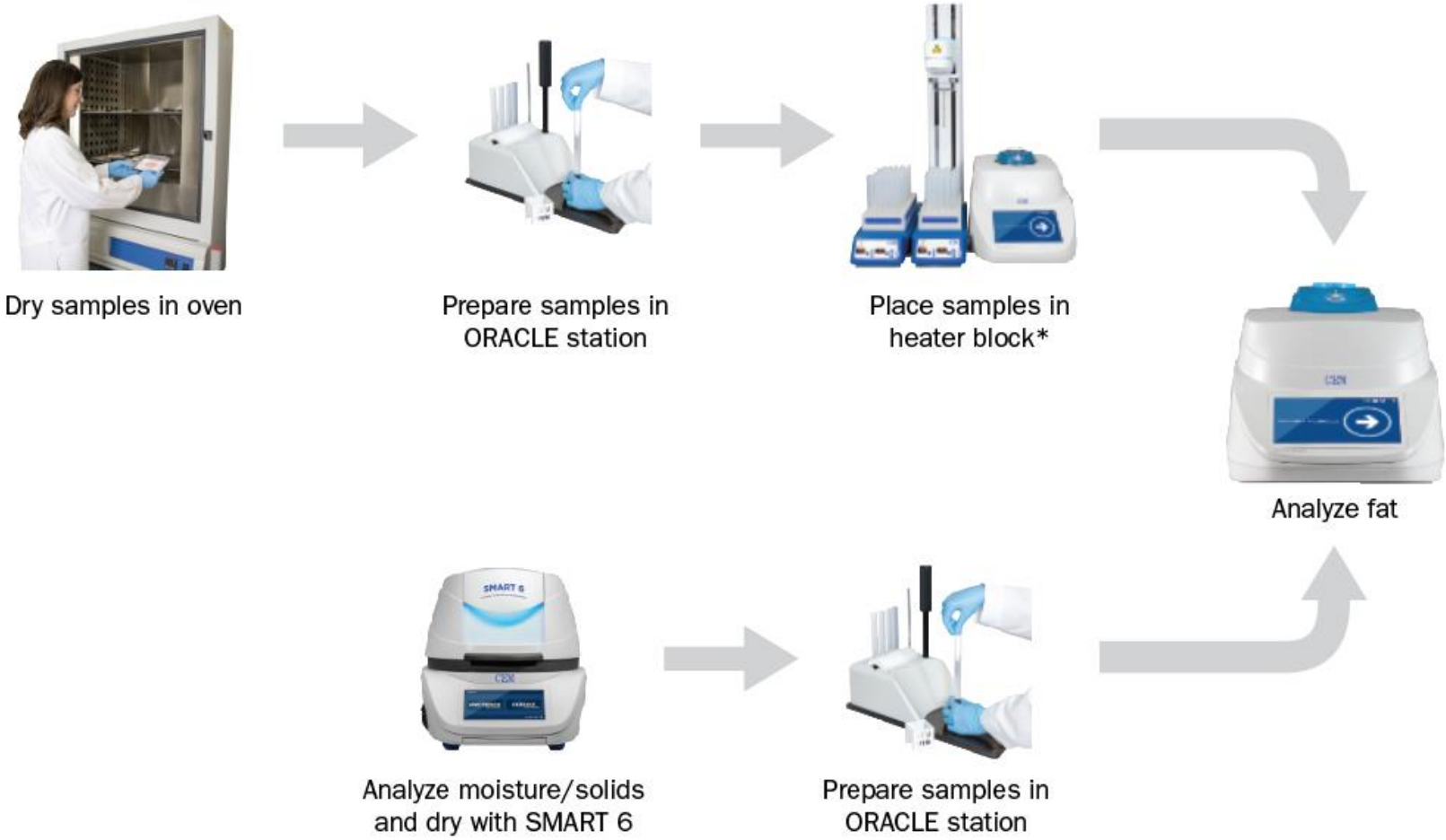
- Manufacturing, R&D, Contract/Certified Labs, Government Labs, Academic

Universal Calibration – Large Food Testing Lab Validation



- Over 100 sample types
- Validated across 4x ISO 17025 accredited labs
  - 0-84% Fat range
  - RSD <1.0%
  - Bias is <0.03%

Options for Drying



* ORACLE can be paired with an optional robot for automated high-throughput sample testing

CPMG-NMR Benefits

Precise and reliable

- Results are comparable to reference chemistry
- Multiple independent laboratories have validated

Simple workflow integration

- Rapid results
- No harmful chemicals or waste
- Easy to use

Meets ISO 16756:2024 | IDF 259:2024 requirements for milk and milk products