



# On- & Inline analysis: Instrument Calibration Management

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# Eurofins Mission & Vision



## Mission:

Contribute to global health  
and safety through our high  
quality services



Delivering customer satisfaction by  
listening to and exceeding customer  
expectations and seeking innovative  
solutions to help our customers achieve  
their goals

# Eurofins Milk Testing Global



**Eurofins Milk Testing-  
North America**  
Horsham, PA  
Mounds View, MN  
Fresno, CA

**Eurofins Milk Testing -  
Europe**  
Vejen, Denmark  
Jonkoping, Sweden  
Castelnuovo di Sotto, Italy  
Malbork, Poland

**Eurofins Milk  
Testing  
APAC**  
Suzhou, China

# Food & Feed Analysis

Agriculture / Farming

Food Processing & Consumption

FROM FARM

TO FORK



Basic

- Soil
- Fertiliser
- Manure
- Seed
- Plants

Primary Production

- Cattle
- Pigs
- Poultry
- Fish
- Vegetables
- Product Value
- Diseases

Primary Processing

- Dairy
- Slaughterhouse
- Brewery
- Gardeners

Processing

- Cereals
- Meat products
- Cooked Infant Formula

Retailer

- Imported goods
- Local suppliers
- Hygiene
- Consumer Sensory

Restaurant / Kitchen

- Hygiene
- Sensory

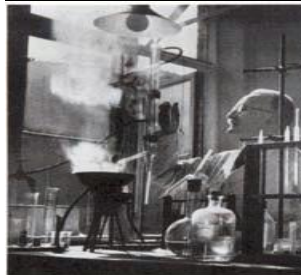
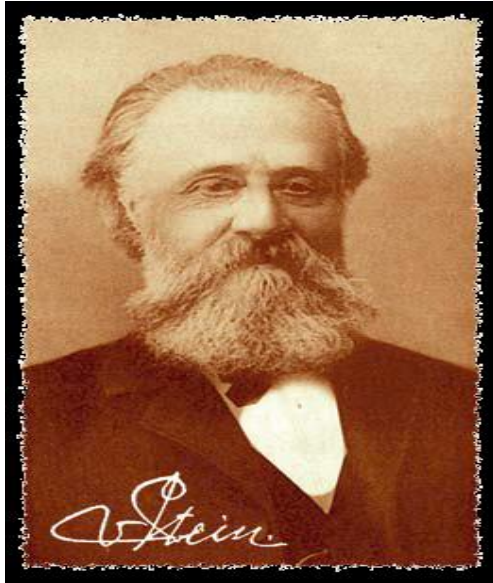
Consumer





# Eurofins History in Milk Testing

Services to dairies and farmers is part of Eurofins DNA – started 1857 in Denmark



# 2019 Eurofins Dairy Testing Capabilities

Eurofins has experience in raw milk and dairy product testing in US, Denmark, Sweden, Italy, and Poland for decades.

- Built significant experience, improved quality, and efficiency
- Enlarged the scope of services significantly
- Established close and proactive cooperation with key costumers with continuous improvements to follow
- Annually, 9 million samples in the USA, 8 million samples in Denmark, 6 million samples in Sweden, 1 million samples in Poland, and 700,000 samples in Italy
  - Services include in-house testing of 2 million samples annually for pregnancy, mastitis (PCR), salmonella, IBR, BVD, P-Tuberculosis/Johnes, and adulterant screening
    - Calibration standards
    - Newest technology
    - Labs run 24/7, as required

# Eurofins Milk Laboratory

Settlement Analyses



Dairy Herd Improvement (DHI)

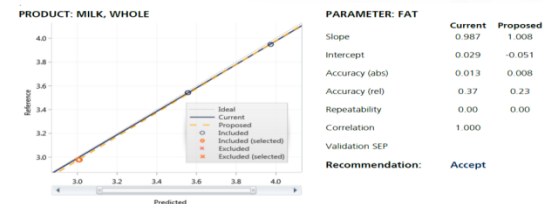


Calibration Services



## Vet. Analysis:

- Johnes
- Mastitis
- S.Dublin
- Pregnancy....



# Our Calibration Standards...

Freshly made calibration standards...

Raw Milk Standards, Unhomogenised						
Type	No.	Fat %	Protein %	Dry Matter %	Lactose	Casein
30	R1.5	1.5% (1.2-1.8)	3-4	10-11.5	4.5-5.5	-
C	R3.0	3.0% (2.5-3.5)	3-4	11-13	4.5-5.5	-
B	R4.0	4.0% (3.6-4.4)	3-4	12-14	4-5	2.6
A0	R5.5	5.5% (4.5-6.5)	4-5	14.5-16.5	-	-
A1	R6.1	6.1% (5.1-7.1)	3.5-4.5	14.0-17.0	4-5	-

High fat content					
18%	PC18	18% (17.4-18.6)	2.5-3.2	24.5-26	-
32%	PC32	32% (31.5-32.5)	2.0-2.7	37-39	-
38%	PC38	38% (37.2-38.8)	1.9-2.4	43-45	2.5-3.5
42%	PC42	42% (40.7-43.3)	1.7-2.5	46-48	-
48%	PC48	48% (47.5-49.5)	1.5-2.0	52-54.5	-

Pasteurised Milk Standards, Homogenised, cont.				
Type	No.	Fat %	Protein %	Dry Matter %
Mik0.5	PH0.4	0.4% (0.2-0.6)	3-4	9-10.5
Mik1.5	PH1.5	1.5% (1.3-1.7)	3-4	10-11.5
Mik3.0	PH3.0	3.0% (2.7-3.3)	3-4	11-12.5
Mik3.5	PH3.5	3.5% (3.2-3.8)	3-4	12-13
Mik4.0	PH4.0	4.0% (3.7-4.3)	3-4	-

Whey Standards, Pasteurised					
Type	No.	Fat %	Protein %	Dry Matter %	Lactose
Whey1	WP0.07	0.07% (0.04-0.10)	0.6-1.1	4-6	3-4
Whey2	WP0.15	0.15% (0.09-0.21)	1.5-3	6-8	3.5-5
Whey3	WP0.22	0.22% (0.15-0.29)	3-4	8.5-10.5	4-5.5
Whey 4	WUP0.39	0.39% (0.15-0.63)	0.6-1.1	4-6	2.7-4.2

New product:

Long-term calibration standards and pilots...



# Mass Balance & Value Chain Impact

## Provided:

<b>Fat</b>	4.2%
<b>Protein</b>	3.4%
<b>Price butterfat</b>	2.54 USD/pound
<b>Price protein</b>	1.34 USD/pound

## Raw Milk Intake

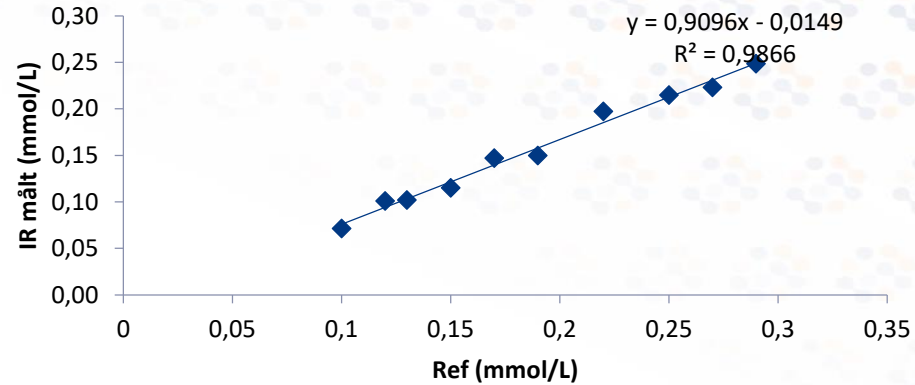
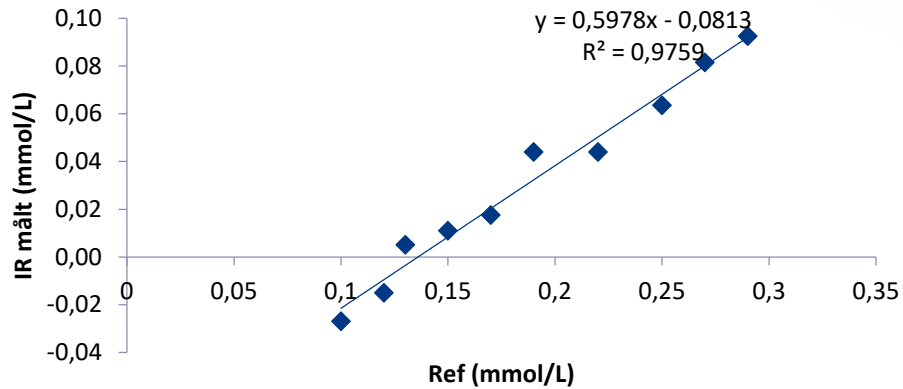
	Qty Pounds	Accuracy %	Value impact USD
<b>Milk Intake</b>	1 300 000 000		
<b>Butterfat</b>	54 600 000	0.02	660 400
<b>Protein</b>	44 200 000	0.02	348 400

Product Line	Standardisation %	Qty Pounds	Butterfat Pounds	Accuracy %	Value Impact USD
<b>Light cream</b>	18.00%	90 000 000	16 200 000	1.0	2 286 000
<b>Heavy cream</b>	38.00%	50 000 000	19 000 000	2.0	2 540 000
<b>Whole milk</b>	3.50%	400 000 000	14 000 000	0.3	3 048 000
<b>Semi milk</b>	2.00%	245 000 000	4 900 000	0.2	1 244 600
<b>Skim milk</b>	0.10%	515 000 000	515 000	0.0	0
<b>SUM</b>		1 300 000 000	54 615 000		9 118 600

# Initialisation of in-line instruments

- Either based on already defined calibrations
- Build own calibration based on the desirable matrix

# New instrument vs. old

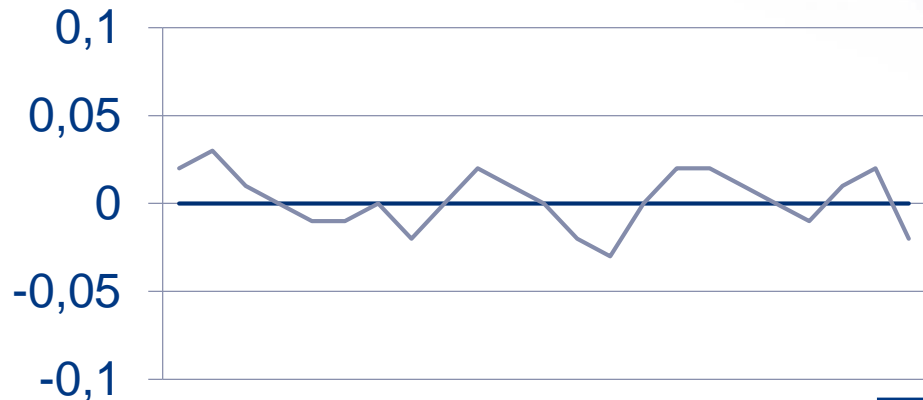
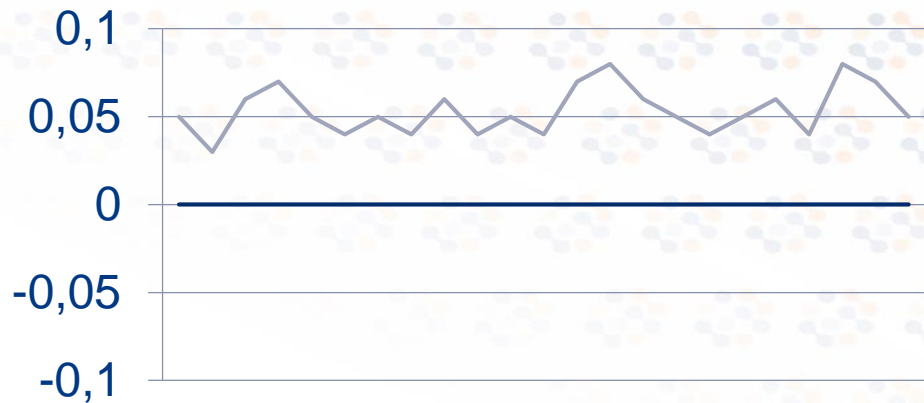
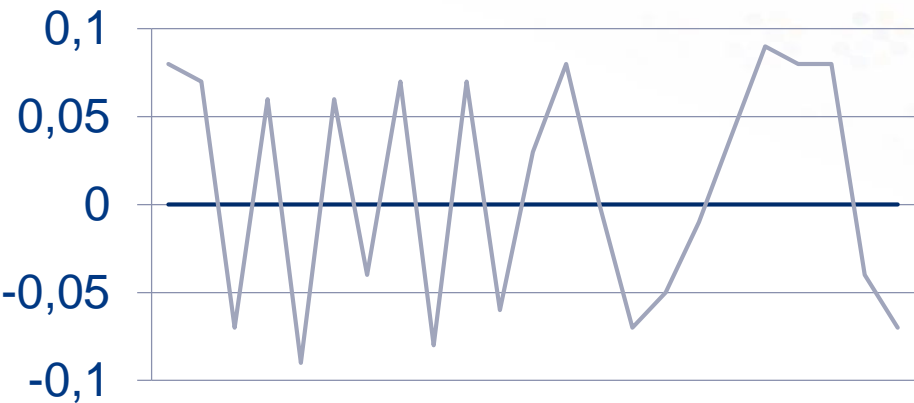


# Optimal calibration control of in-line analyzers

- Using Certified Reference Material directly on the in-line equipment
- Calibrating in-line equipment with a master instrument at the Dairy Lab
- Reverse calibration, by sending samples to reference chemistry (late calibration!)



# How often should I calibrate?

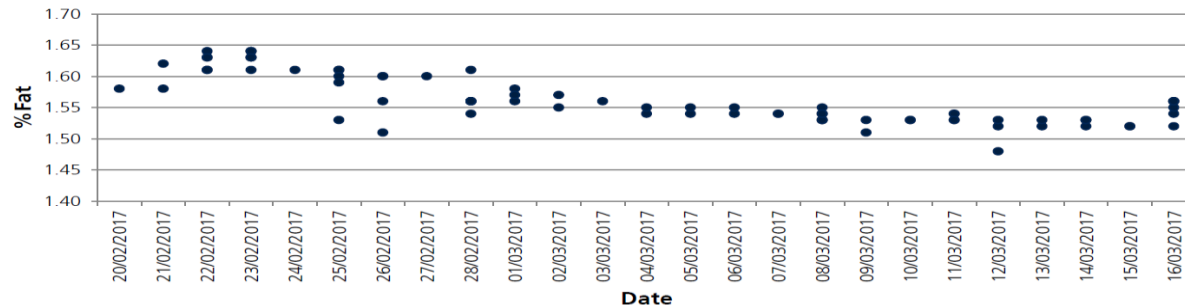


# Pilot Samples – single point of analysis to be run daily

Type	Fat %	95%Conf.
Whole milk	3.5 (3.2-3.8)	±0.02
Raw milk	4.0 (3.5-4.5)	±0.03
Cream	38 (37.0-39.0)	±0.20

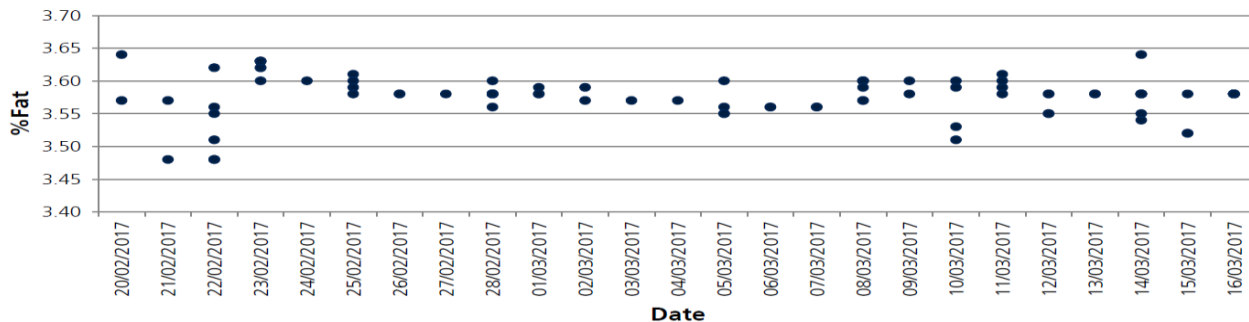
PRODUCT: MILK, SEMI SKIM

PARAMETER: FAT



PRODUCT: MILK, WHOLE

PARAMETER: FAT



Uge Nr.	Fedt SE	Fedt DK	Protein SE	Protein DK
2	0,016	0,000	0,005	-0,001
3	0,028	-0,019	-0,001	-0,021
4	0,002	-0,012	-0,006	-0,018
5	0,023	0,023	-0,014	0,023
6	-0,022	-0,030	-0,010	0,020
7	-0,009	0,028	-0,005	0,022
8	-0,009	0,008	-0,004	0,006
9	-0,020	0,022	-0,003	-0,001
10	0,001	0,016	-0,004	0,003
11	-0,013	0,001	-0,006	0,004
12	0,026	0,053	0,002	0,014
13	-0,014	-0,021	0,003	-0,013
14	0,002	0,019	0,000	-0,006
15	-0,004	0,000	0,000	-0,004
16	-0,018	0,002	0,002	0,007
17	-0,002	0,004	0,005	-0,001
18	0,056	0,018	0,017	0,004
19	-0,007	-0,003	-0,028	-0,026
20	0,023	0,024	0,017	0,004
21	0,005	0,026	0,017	0,030
22	-0,023	-0,007	-0,001	-0,022
23	0,014	0,037	-0,023	0,026
24	-0,006	0,023	0,004	0,013
25	-0,015	0,001	0,026	0,030
26	-0,019	0,016	0,013	0,013
27	-0,015	0,001	0,016	-0,007
28	-0,005	-0,007	-0,003	-0,006
29	0,026	0,011	-0,016	-0,017
30	-0,029	0,005	0,025	0,015
31	0,007	0,017	0,021	-0,002
32	-0,009	0,020	-0,020	-0,023
33	-0,003	0,019	-0,012	-0,010
34	-0,008	0,002	-0,030	-0,025
	<b>-0,001</b>	<b>0,009</b>	<b>0,000</b>	<b>0,001</b>

Alignment of two sites  
- example with Pilot samples

# Next steps...

1. Awareness of the mass balance in production flow-chain:
  - Intake analysis
  - Output analysis
  - Processing analysis
2. Analysis instrument optimization
  - Uniform firm-/software – including IR spectra
  - Uniform standardization protocol
  - Uniform Calibration protocol
  - Uniform Calibration Standards
3. Repeat!

**Eurofins is your one-stop shop in managed calibration services, and a preferred supplier in analytical services!**



# Questions

Contact your Calibration service representative:

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[www.eurofins.com](http://www.eurofins.com)