

A HISTORY OF CREATING VALUE THROUGH MILK ANALYSIS

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OUR MISSION

We contribute to the sustainable use of our planet's agricultural resources and thus to the nutrition and health of the people of the world.

We provide analytics beyond measure to add value to our customers by improving quality and optimising food and agricultural production.

WHERE WE ADD VALUE?

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RAW MATERIAL

Payment, segregation and quality control of raw material

PROCESSING

Improved predictability and control of manufacturing processes

FINISHED GOODS

Safe products and compliance with regulatory requirements



INFORMATION MANAGEMENT NETWORK

DATA GENERATION

CONTROL & AUTOMATION

DATA INTELLIGENCE

ANALYTICS BEYOND MEASURE

OUR APPROACH

DEVELOPING ANALYTICS

Technology

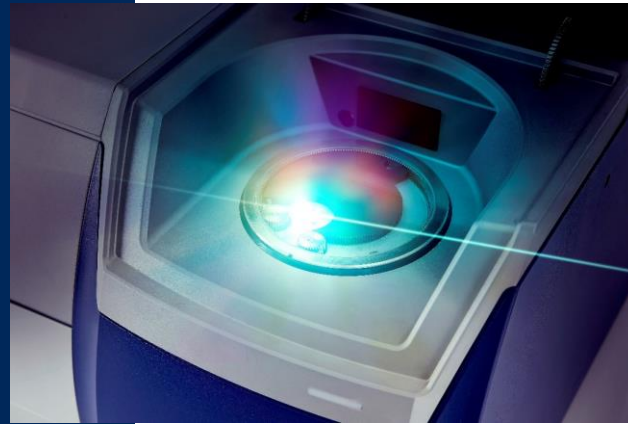
Dedicated, fast and accurate measurements e.g. by infrared and near infrared spectroscopy.

Application

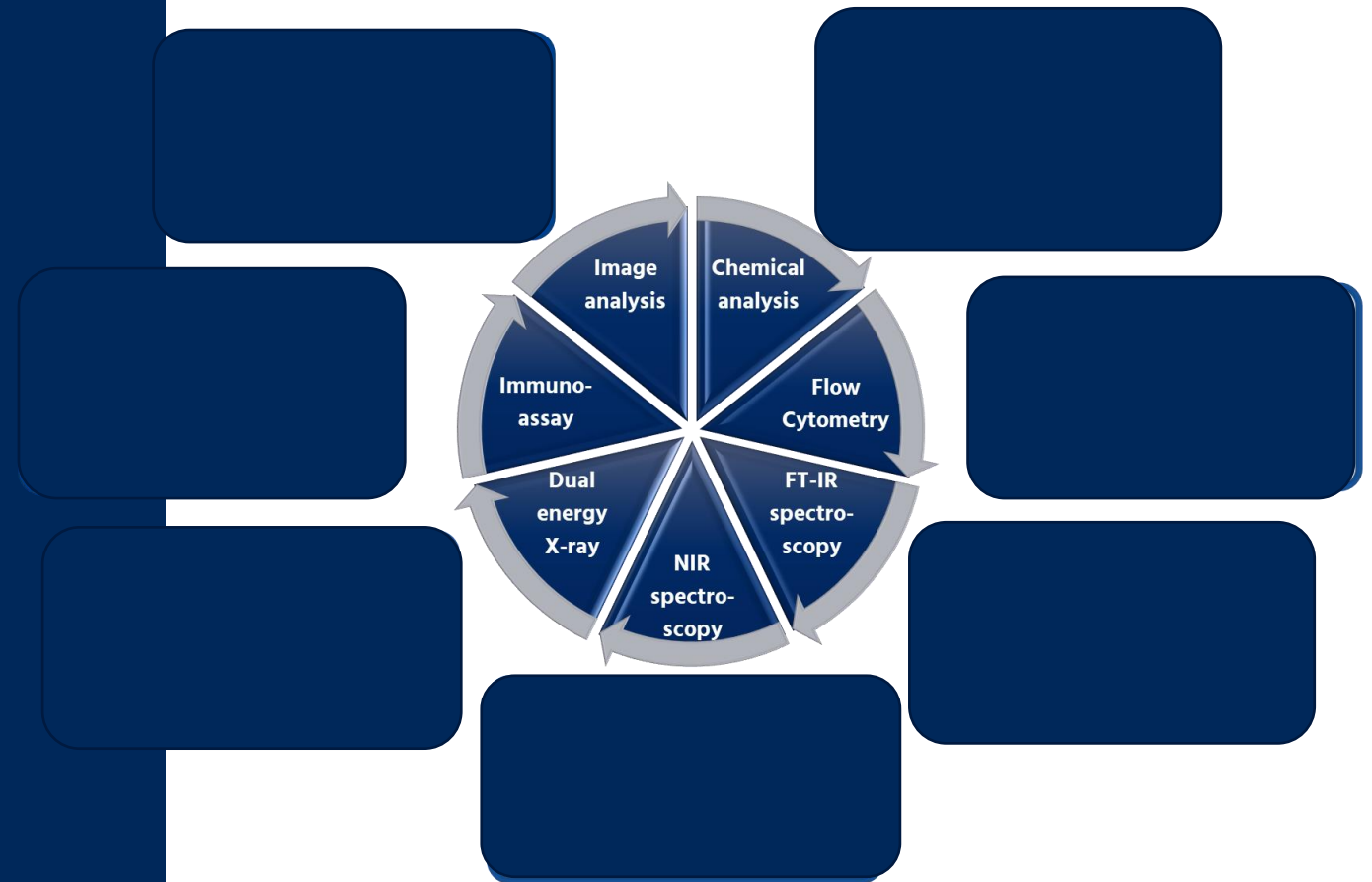
Understand new products and analytical needs. Suit our instruments and develop solutions to fully support the food industry

Innovation

Develop new solutions where customer analytical needs are unmet and significant progression can be achieved.



FOSS



ANALYTICS BEYOND MEASURE

FOSS

**OVER 60 YEARS OF VALUE
THROUGH MILK ANALYSIS**

ANALYTICS BEYOND MEASURE

OVER 125 YEARS OF MILK ANALYSIS IN DENMARK

FOSS

ANALYTICS BEYOND MEASURE

The world first Milk Control Organization was Danish

The organization was established 24th of January 1895

Fat: Is being analyzed since 1895

Fat in milk was the first analyze to be made as the main product produced was butter

Protein/ Lactose: Is being analyzed since 1978

Protein in milk is at the base of cheese production. The importance of low fat feeding brought focus to the protein level in milk.

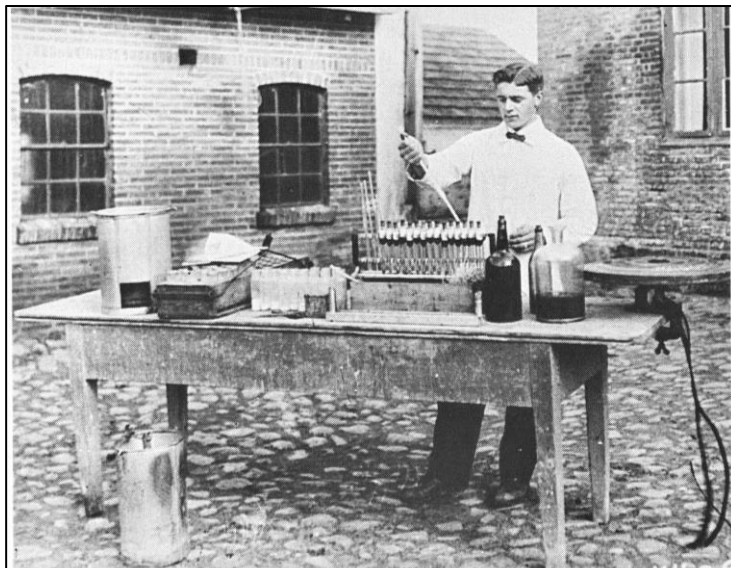
SCC Is being analyzed since 1989

Important indication of the udder health. The dairy farmer uses the information to manage heard. Low cells levels indicate milk of good quality.

Urea: Is being analyzed since 1993

Urea is an indication of the balance between the cows intake of protein and energy. The results give support in optimizing the feeding that has impact both on the cows performance and environment.

Ketosis (BHB and Acetone)...



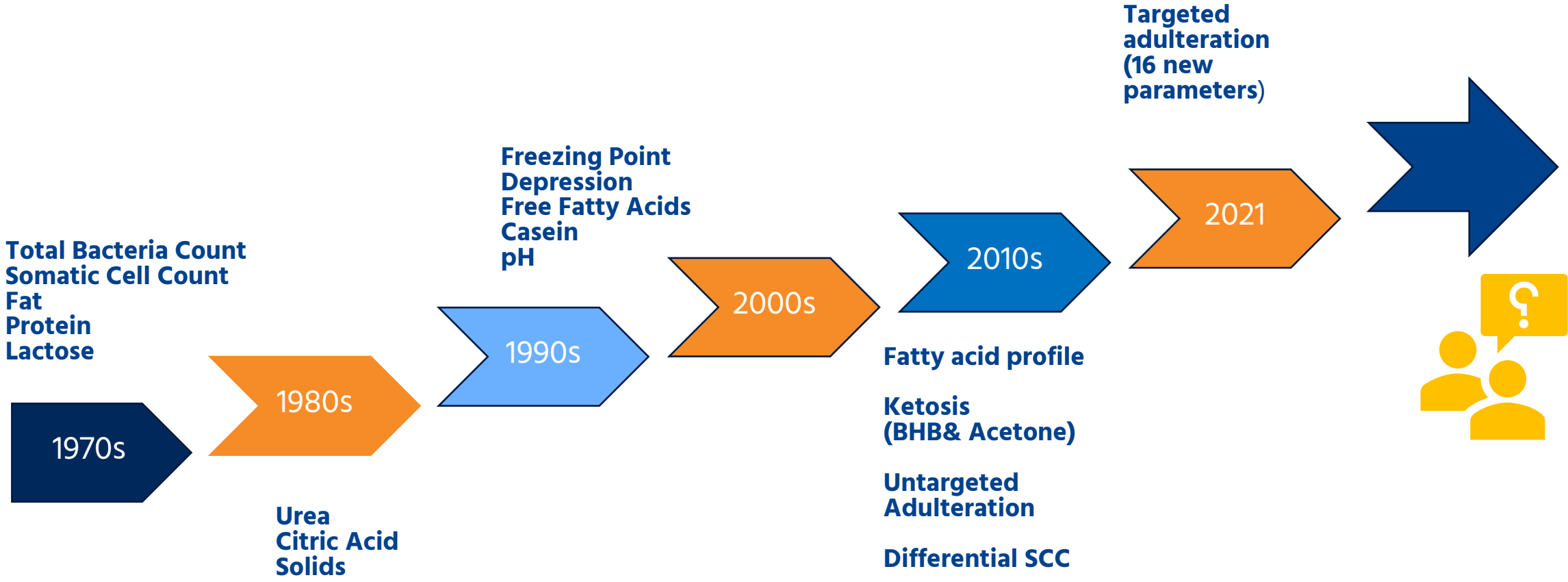
Kontrolassistenten på arbejde i hvid kittel, stående med sine analyseredskaber ude på gårdspladsen ved et gammelt bord. Foto: Nationalmuseet.

FOSS - A HISTORY OF CREATING VALUE THROUGH MILK ANALYSIS

FOSS

GLOBAL CALIBRATIONS FOR PAYMENT AND DHI

49 parameters in **6 sec.**



WHAT MORE IS POSSIBLE ? WHY IS POSSIBLE?

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Blood metabolites

Methane emission

BHB

Acetone

Minerals

Protein

Fat

Dry matter

Fatty Acids

FFA

Adulteration

Lactose

Urea

**VALIDATION
VALIDATION
VALIDATION**

Always validate the
model
in
real life



Global calibrations & Standardization

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Analytics beyond measure

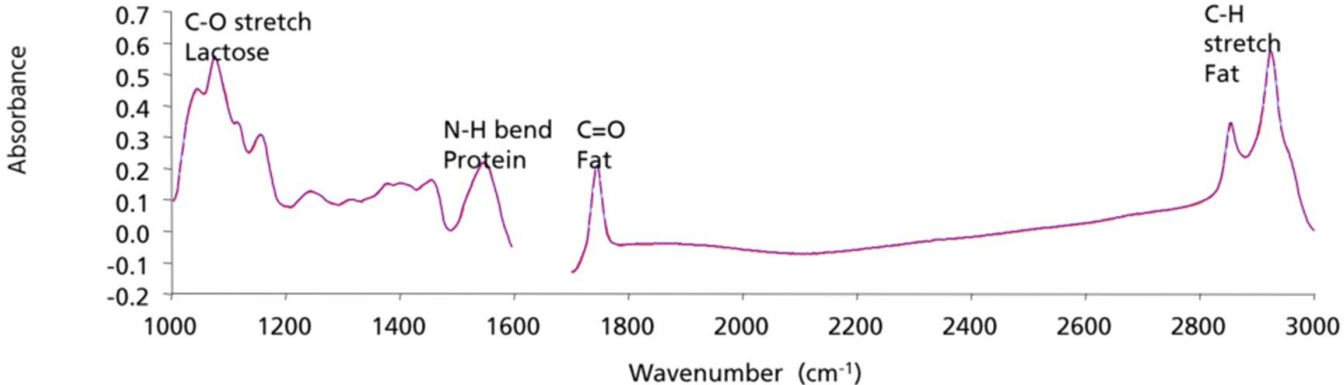
FTIR SPECTRUM OF MILK

FTIR Spectroscopy

Fourier-Transform Infrared spectroscopy

Mathematical treatment of the signals from the interferometer in the FTIR instrument into a spectrum

Molecules absorb energy from the different wavelengths



The spectrum gives information on chemical composition

Source: <https://edepot.wur.nl/472245>

FTIR – PATENTED STANDARDISATION METHOD

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Standardisation:

**A method to uniform individual instruments
Correction of spectra's based on a known components
specific spectrum from one specific instrument – the
Master**

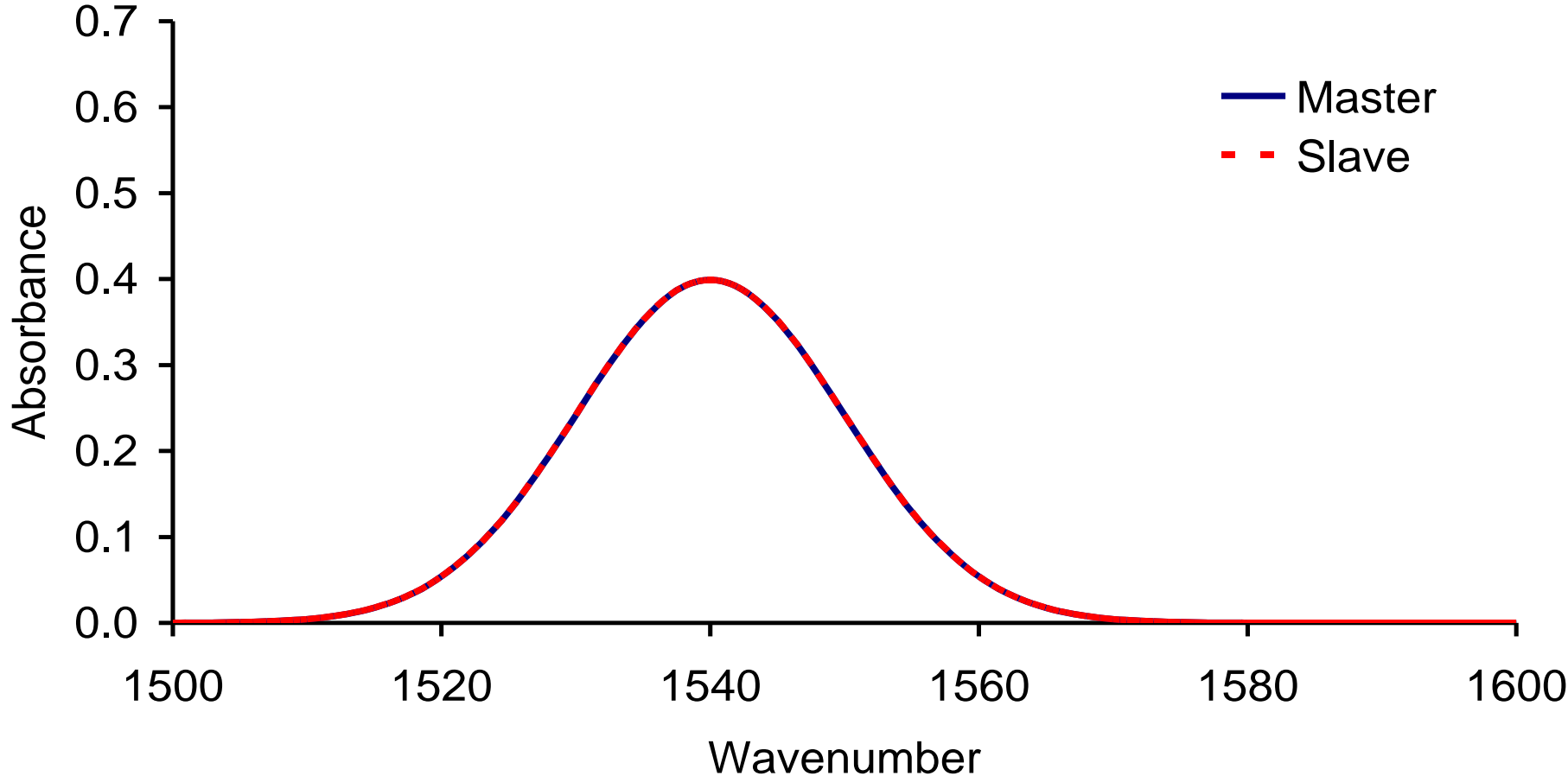
When do we standardise?

- **At regular time interval**
- **After wearing of the cuvette**
- **Before calibration**
- **After major service**



STANDARDISATION, WHAT DOES IT MEAN

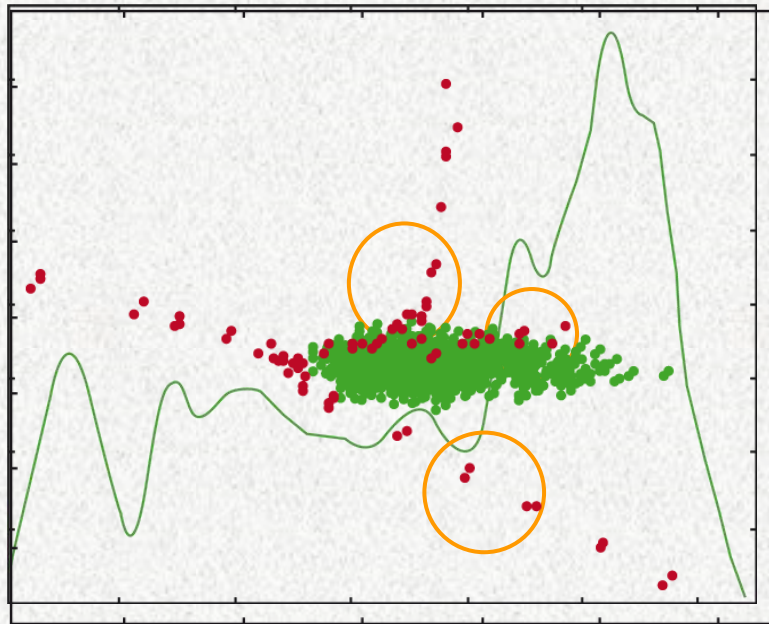
After wavelength and intensity correction



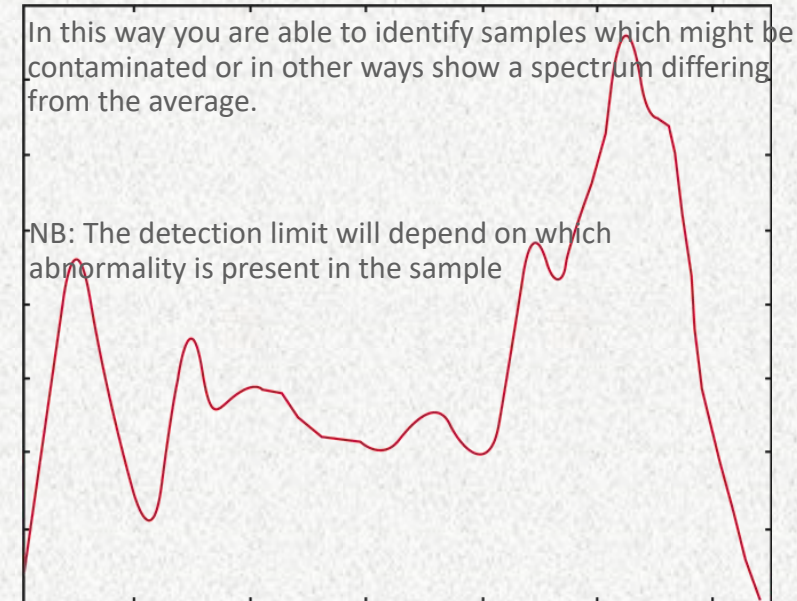
WHY IS STANDARDISATION CRUCIAL? ABNORMAL SPECTRUM IN MILK - AN EXAMPLE

- FTIR spectra from your natural raw milk samples is a unique finger print of your normal milk
 - By means of mathematical algorithms the finger prints are grouped to get a "picture" of normal milk from your population

Raw milk sample



Adulterated milk sample

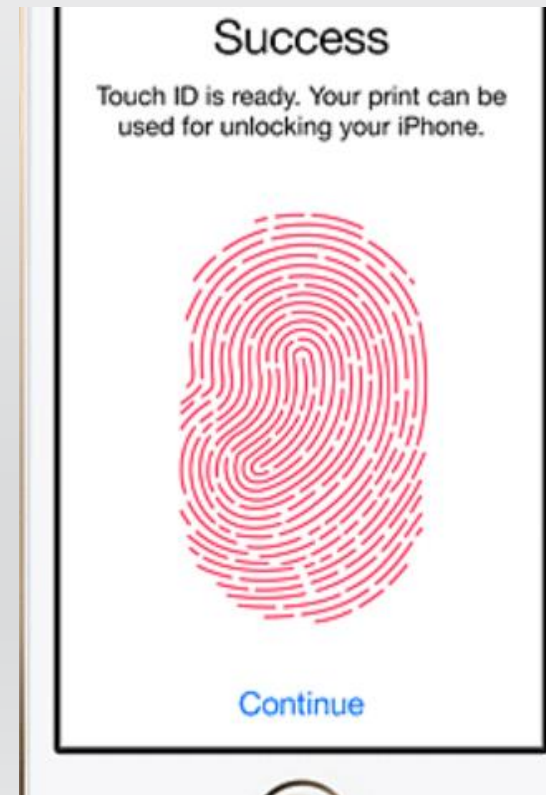
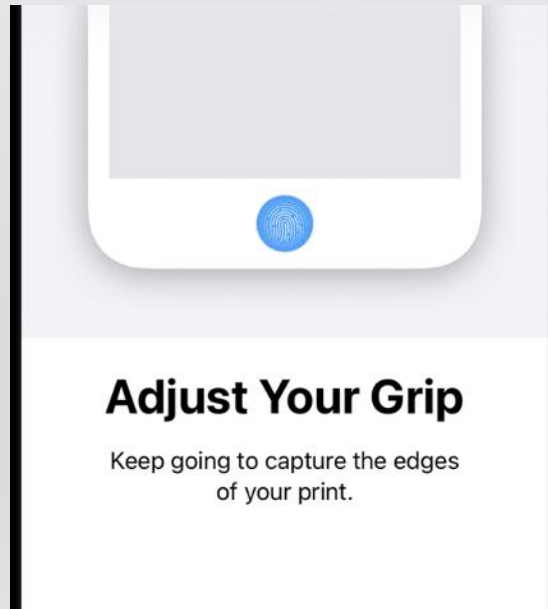
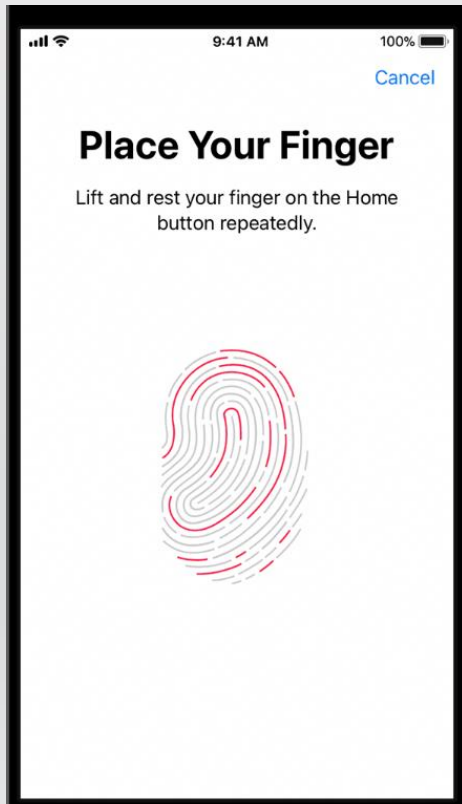


TOUCH ID- A MATHEMATICAL REPRESENTATION OF YOUR FINGERPRINT

AN EXAMPLE OF STANDARDIZATION IN TECHNOLOGY

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Standardization ensures that the Touch ID can read **your** fingerprint, on all devices and all available apps that have incorporated **your** touch ID – the information and quality is consistent and comparable between devices.



HOW TO CREATE A GOOD CALIBRATION!

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- **Collection of data sets**
 - For calibration
 - For validation
- **Qualification of data**
 - **Variation and range in data**
 - On reference method
 - On routine method
 - **Qualify repeatability, S/I, unit conversion**
- **Inclusion of interfering effects**
 - Temperature
 - Instrument status
- **Breaking indirect correlations**
 - Samples from several markets needed
- **Creation of a variety of models**
- **Validation of models with independant samples from several markets**
- **Selection of one calibration!**

SUM-UP

BENEFITS OF STANDARDISATION

- **One global calibration can be made for all FOSS customers**
- **We can use samples from all markets to create a calibration!**
- **We can make robust calibrations**
- **More resources can be invested in each calibration in order to compensate for**
 - **Temperature variations**
 - **Instrument status**
 - **Ensuring uniform results from reference analyses**

THANK YOU!

FOSS



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