THE GLOBAL STANDARD
FOR LIVESTOCK DATA

ICAR Chile 2016

Network. Guidelines. Certification.

Full spectral approach fostering the development of new innovative concepts

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Introduction

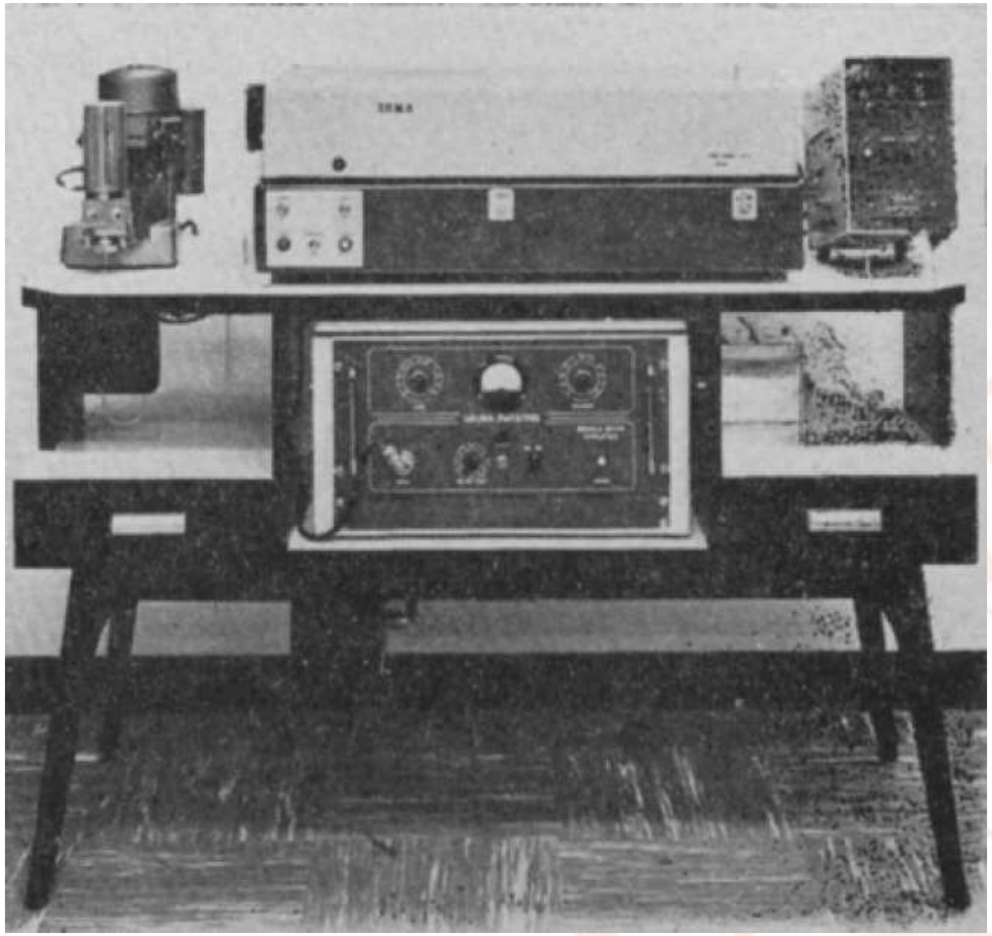
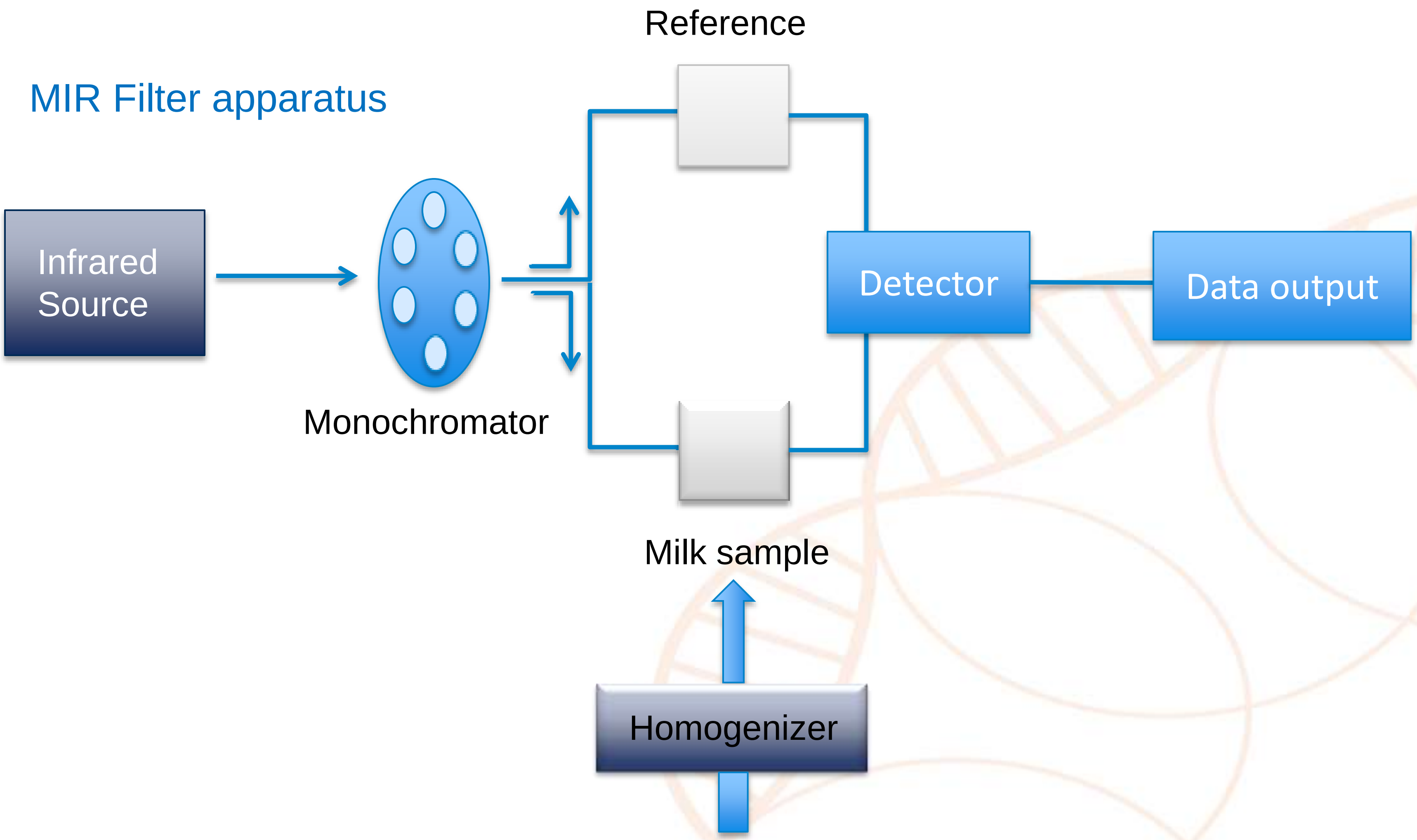


Fig. 1 Photograph of infra red milk analyzer fitted with digital voltmeter output

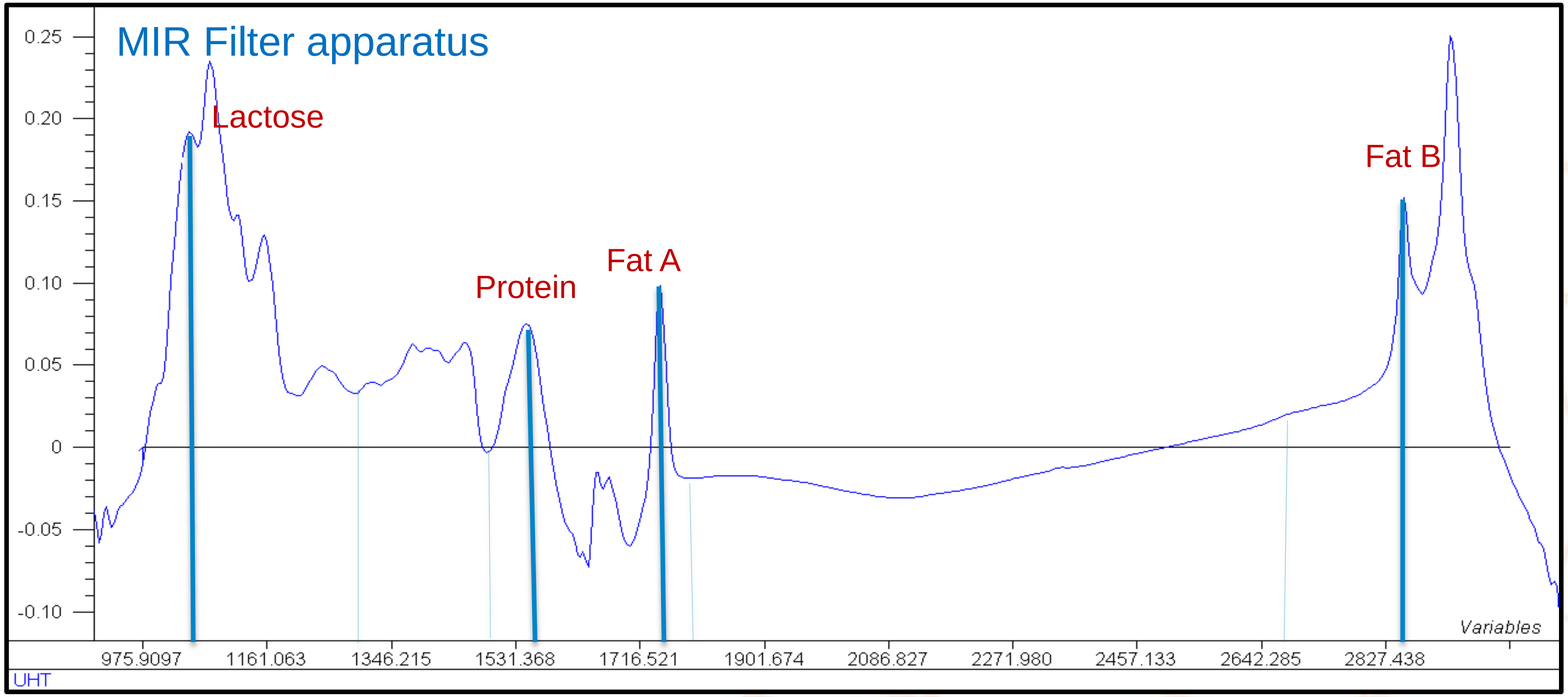
1961 Dr Goulden Developed the first MIR instrument called IRMA. Patented in 1961.

Principle



MIR Filter apparatus
Reference
Infrared Source
Monochromator
Detector
Data output
Milk sample
Homogenizer

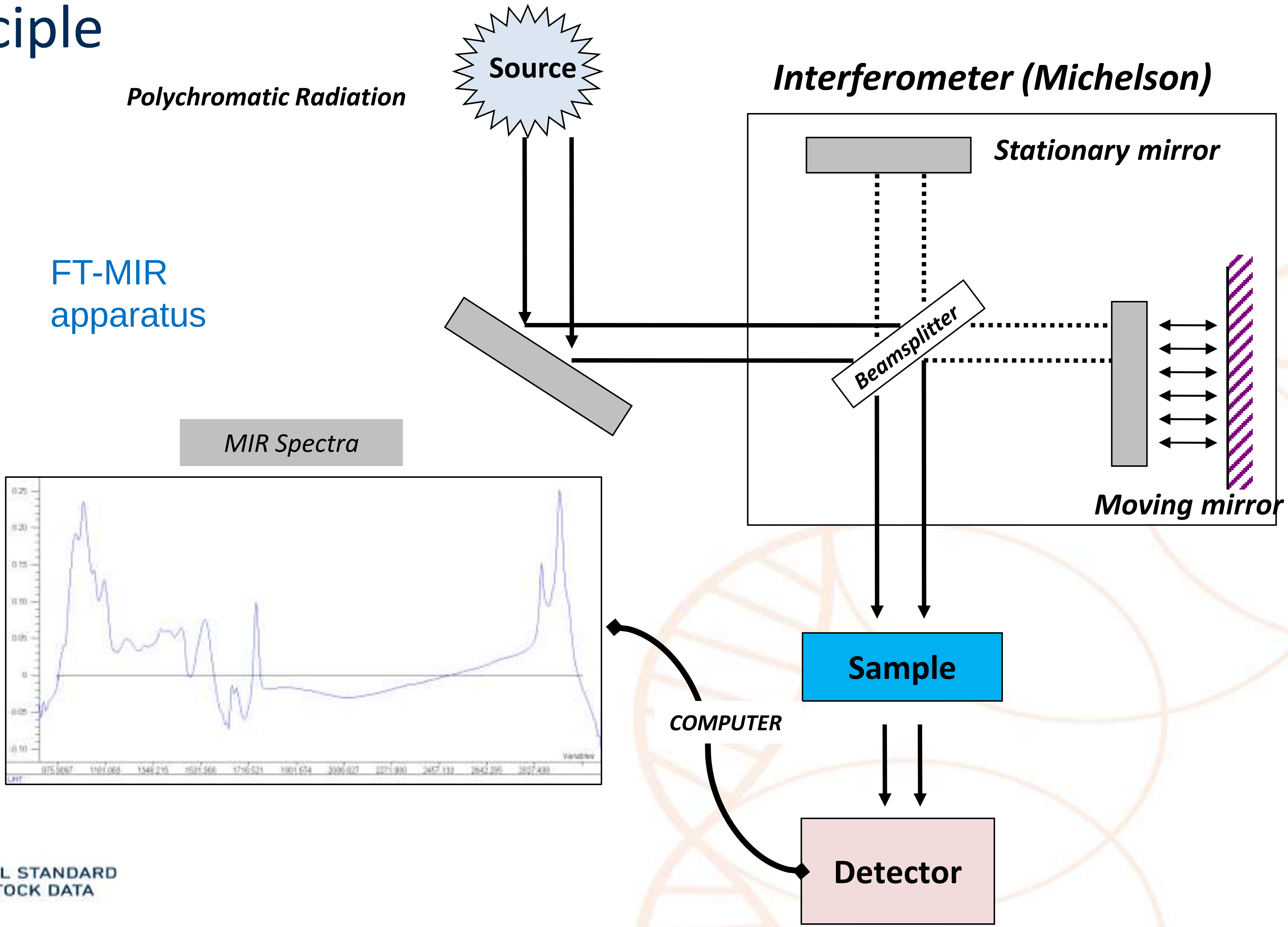
Principle



MIR Filter apparatus
Lactose
Protein
Fat A
Fat B
0.25
0.20
0.15
0.10
0.05
0
-0.05
-0.10
975.9097
1161.063
1346.215
1531.368
1716.521
1901.674
2086.827
2271.980
2457.133
2642.285
2827.438
Variables
UHT

Principle

FT-MIR apparatus



Interest of a full spectral approach ?

1. New parameters
2. Creation of common or global models
3. Spectral standardization
4. Creation of spectral database
5. Future ?

1. New parameters : some examples

Milk MIR spectra

Milk component

Fat, Protein, Lactose, SNF

Casein Hewavitharana, A. K., and B. van Brakel. 1997. Analyst 122:701–704.

Urea Hansen, P. W. 1998. Milchwissenschaft 53:251–255

Fatty acids Soyeurt et al. 2006 J. Dairy Sci. 89: 3690–3695

Phenotype

Body Energy status Mc Parland et al. 2011 J. Dairy Sci. 94: 3651–3661

Methane Dehareng et al. 2012 Animal. 6 : 1694-1701

Milk Indirect

Lactoferrin Soyeurt et al. 2007 J. Dairy Sci. 90: 4443–4450

Major minerals Soyeurt et al. 2009 J. Dairy Sci. 92: 2444–2454

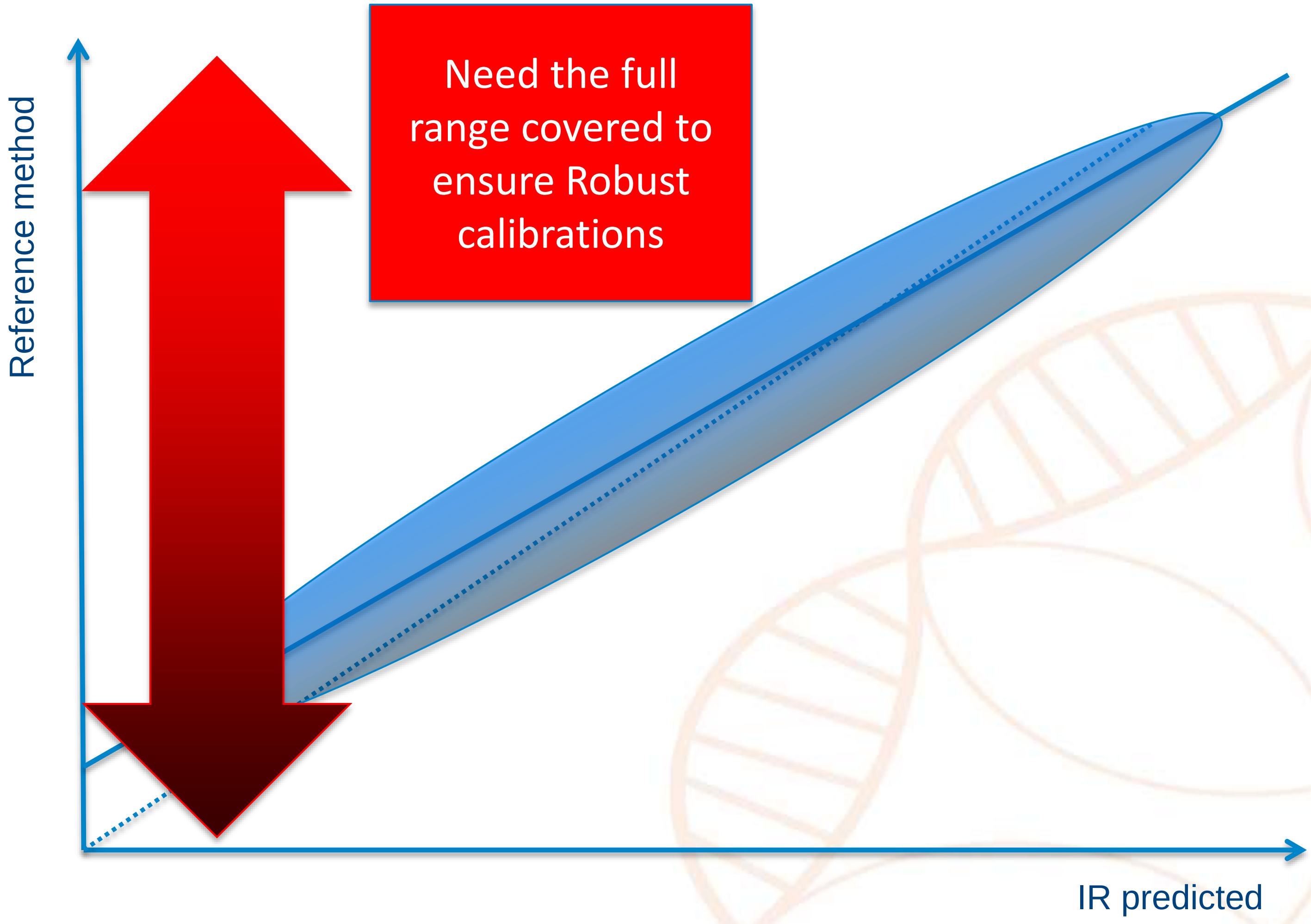
Coagulation, titrable acidity, pH De Marchi et al. 2009 J. Dairy Sci. 92: 423-432

Acetone, β-hydroxybutyrate, and citrate Grelet et al. 2016 J. Dairy Sci. 99 : 4816–4825

Blood component

Blood BHB and NEFA M. Gelé et al. 2015, ICAR

1. New parameters



2. Creation of common / global models

- To cover the all variability (feeding system, breeds, seasons, etc.)

  Increase the robustness of the equation

- To decrease the cost of reference analysis

- To use on different apparatus from the same manufacturer

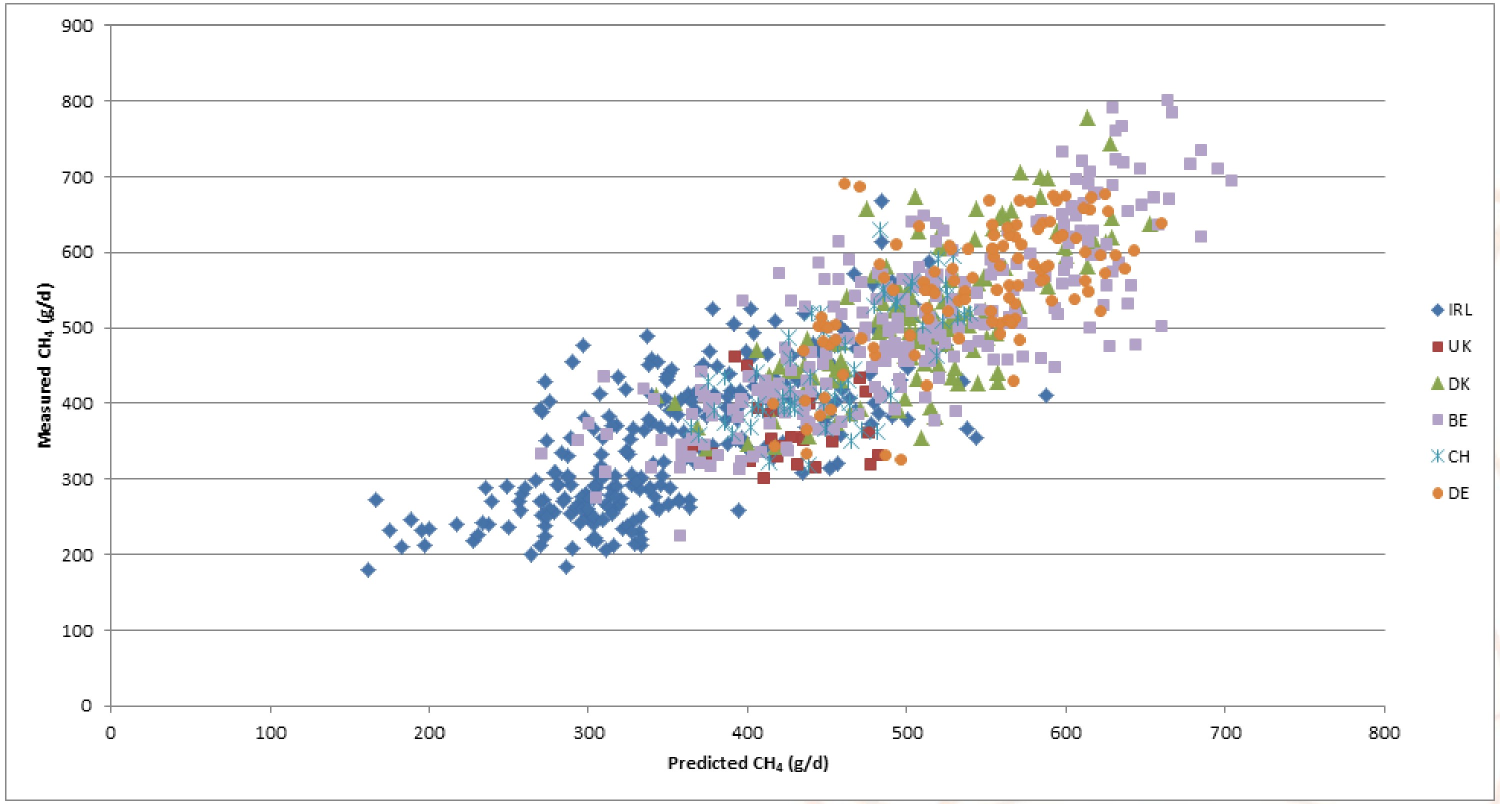
  from different manufacturers

Common procedure for spectral Standardization

2. Creation of common / global models

Gembloux Agro-Bio Tech
Université de Liège

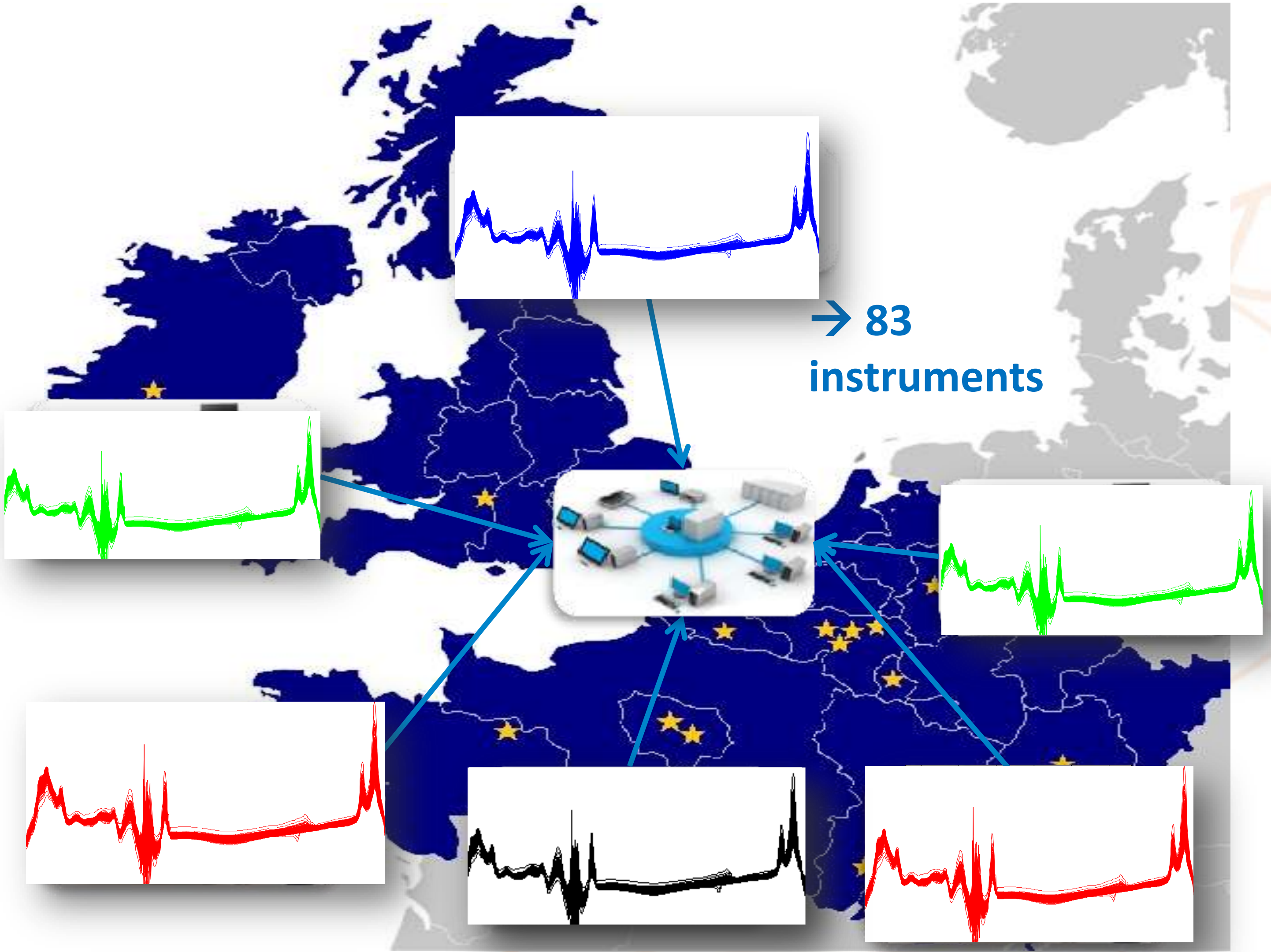
Example : common model for predictions of individual methane emissions (g/d)



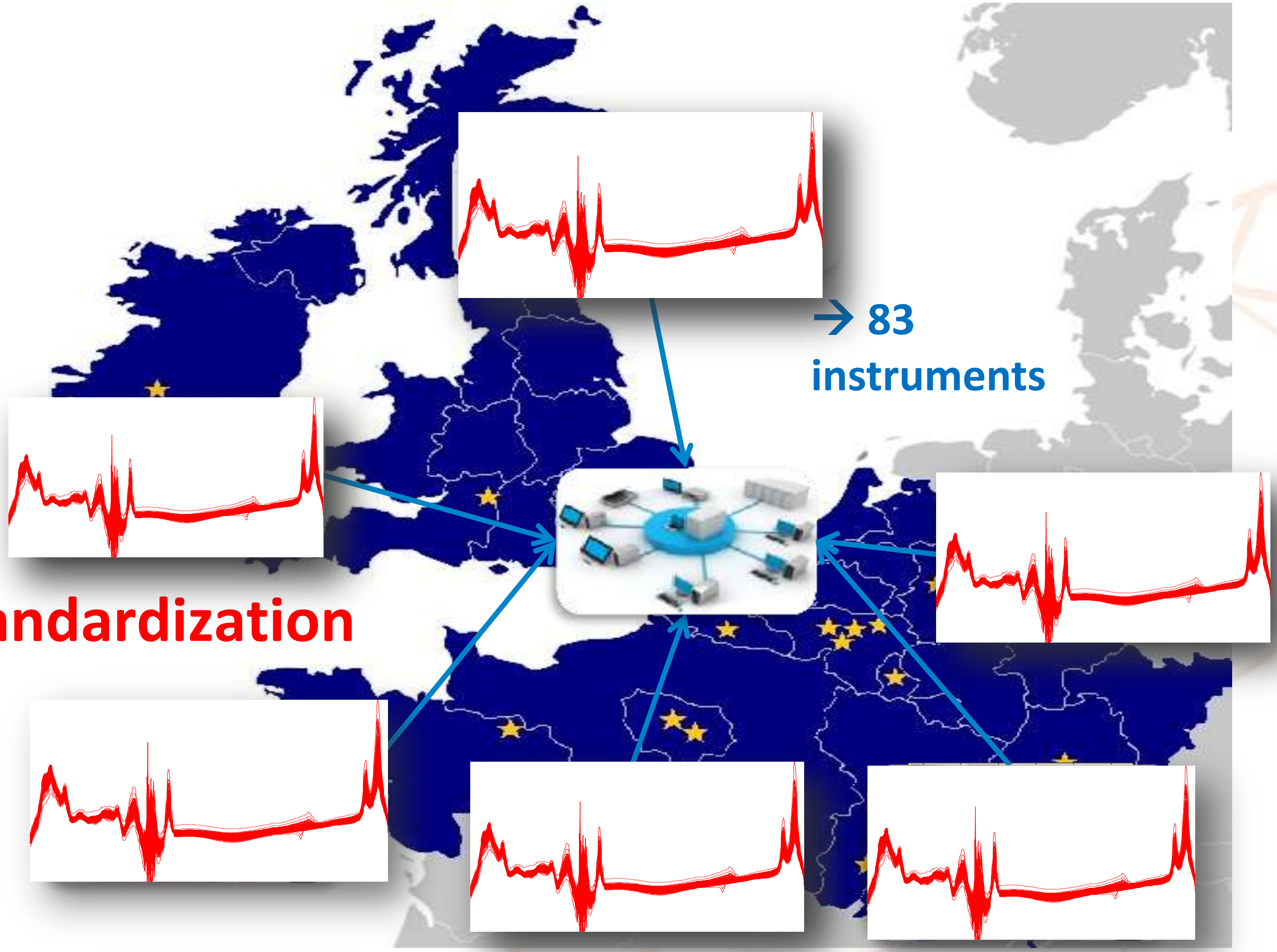
Constituent	N	Mean	SD	R^2c	R^2cv	SEC	SECV
CH_4	863	459	123	0.71	0.67	66	71

METHAGENE

3. Spectral Standardization



3. Spectral Standardization

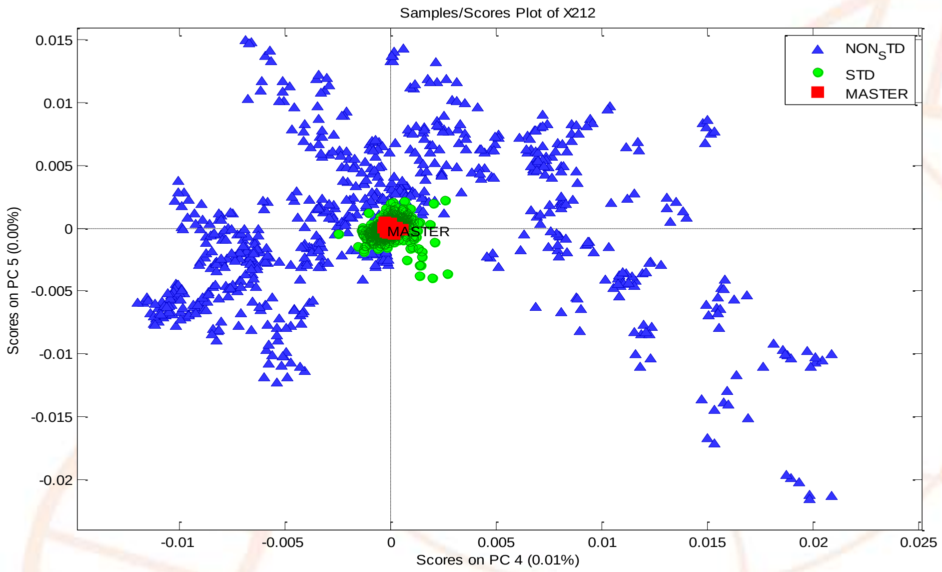


3. Spectral Standardization

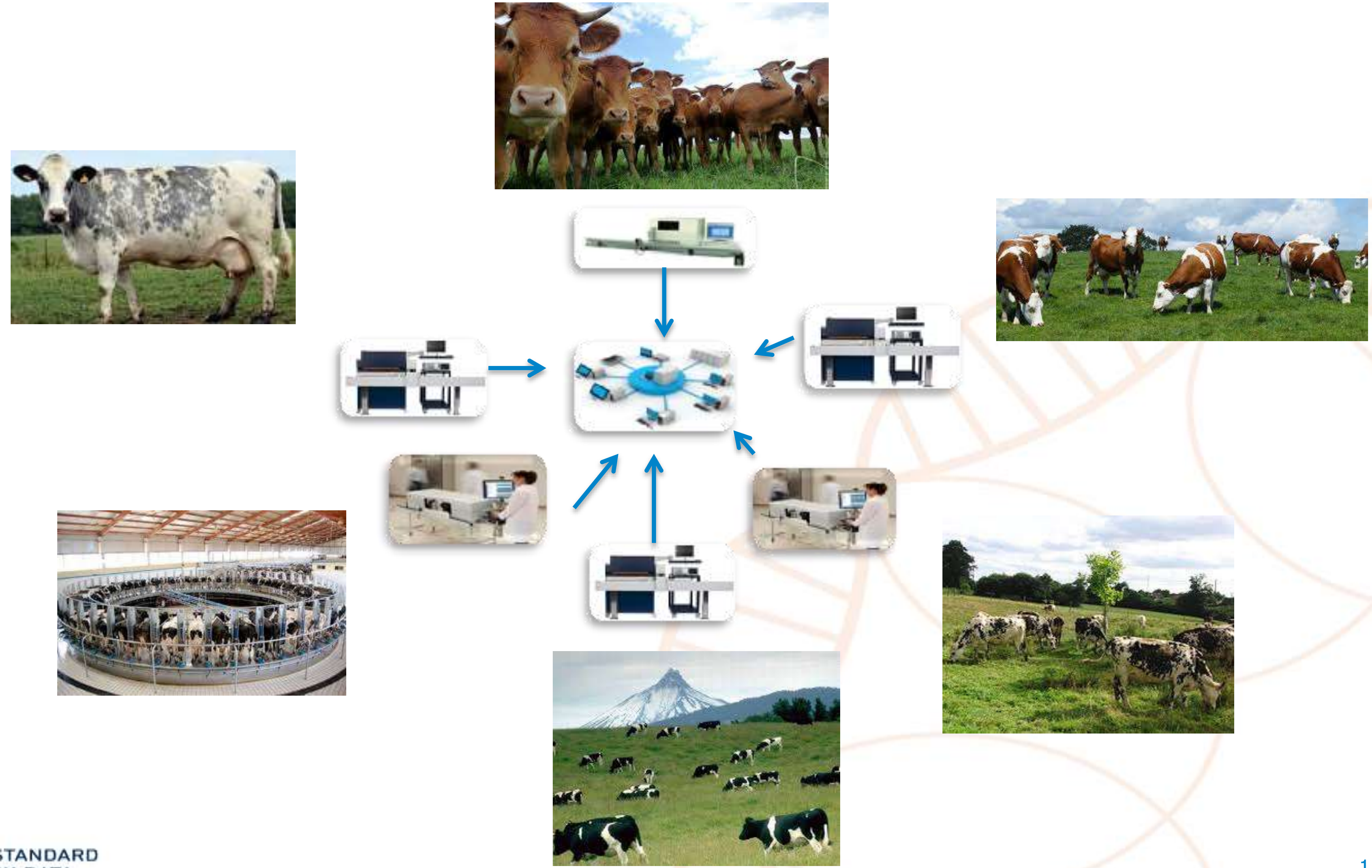
Impact of standardisation

- Harmonize the spectral format
- Allow merging of data
- Creation of common models

Models can be used on all instruments

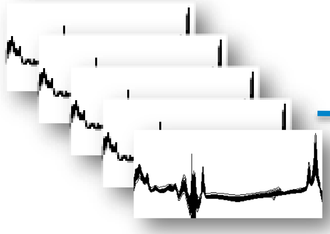


4. Creation of spectral database

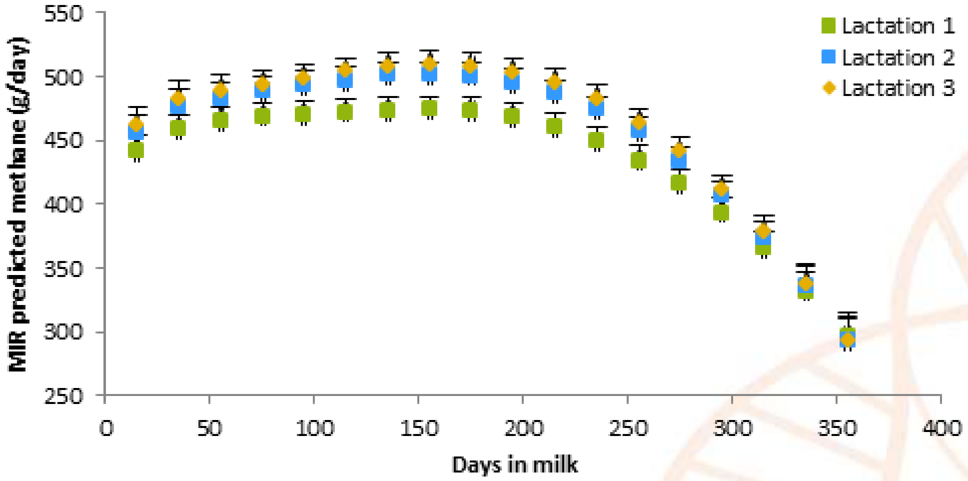


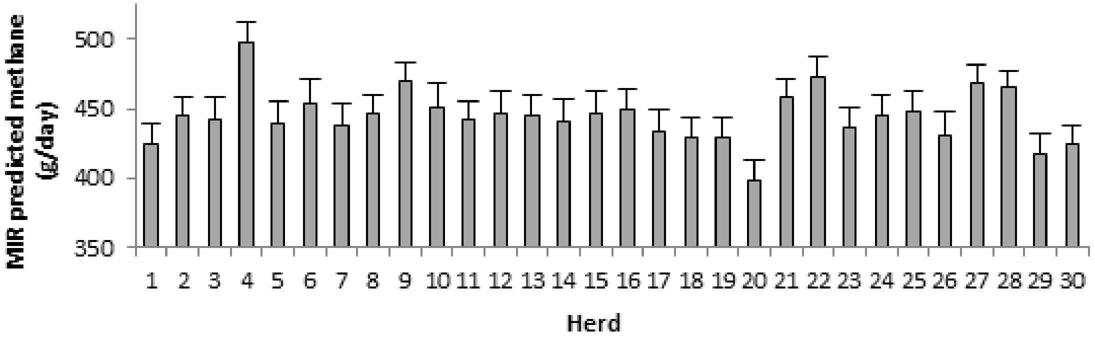
4. Creation of spectral database

New equation



e.g. Methane equation





5. Future ?

A lot of new opportunities

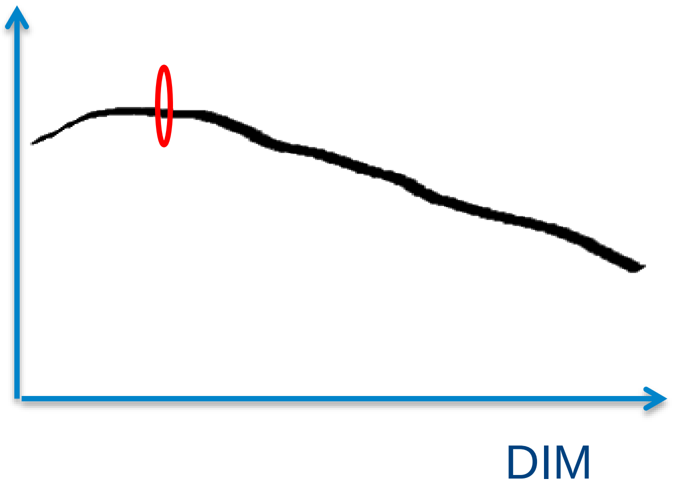
Examples

- New management tools

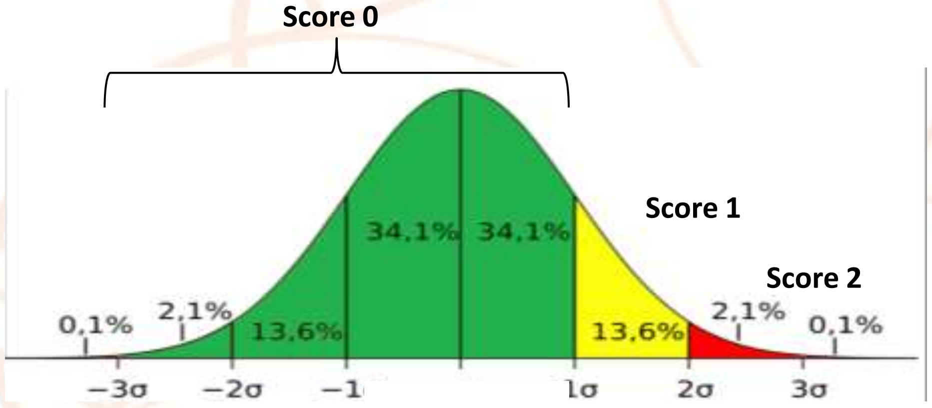
5. Future ?

Example of management tool developed by AWE (BE)

- Walloon breeding association (AWE) tool using models developed in Optimir project
- Global Ketosis index tool: Combination of BHB, acetone predictions and fat/protein ratio
- Relative approach for each biomarker: Cow value compared to population values at same DIM



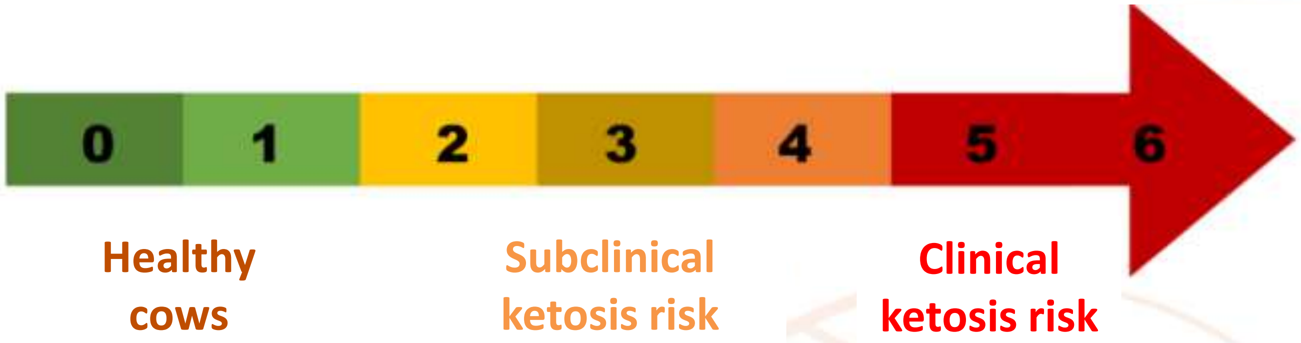
Score 0,1 or 2 for each component



5. Future ?

Example of management tool developed by AWE (BE)

- Global score from 0 to 6 as a global indication for ketosis status



- Currently in test in 75 farms
- Good feedback from cattle breeders

5. Future ?

Example of management tool developed by CLASEL (FR)

CÉTO DÉTECT

5. Future ?

A lot of new opportunities

Examples

- New management tools
- New tools for genetic evaluation/genomic
- New tools for milk adulteration
- But… ! →
  - International collaboration needed
  - Spectral Standardization

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Thank you

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Hélène Soyeurt and Nicolas Gengler from GxABT, Université de Liège, Belgium

European Milk Recodring (EMR)