



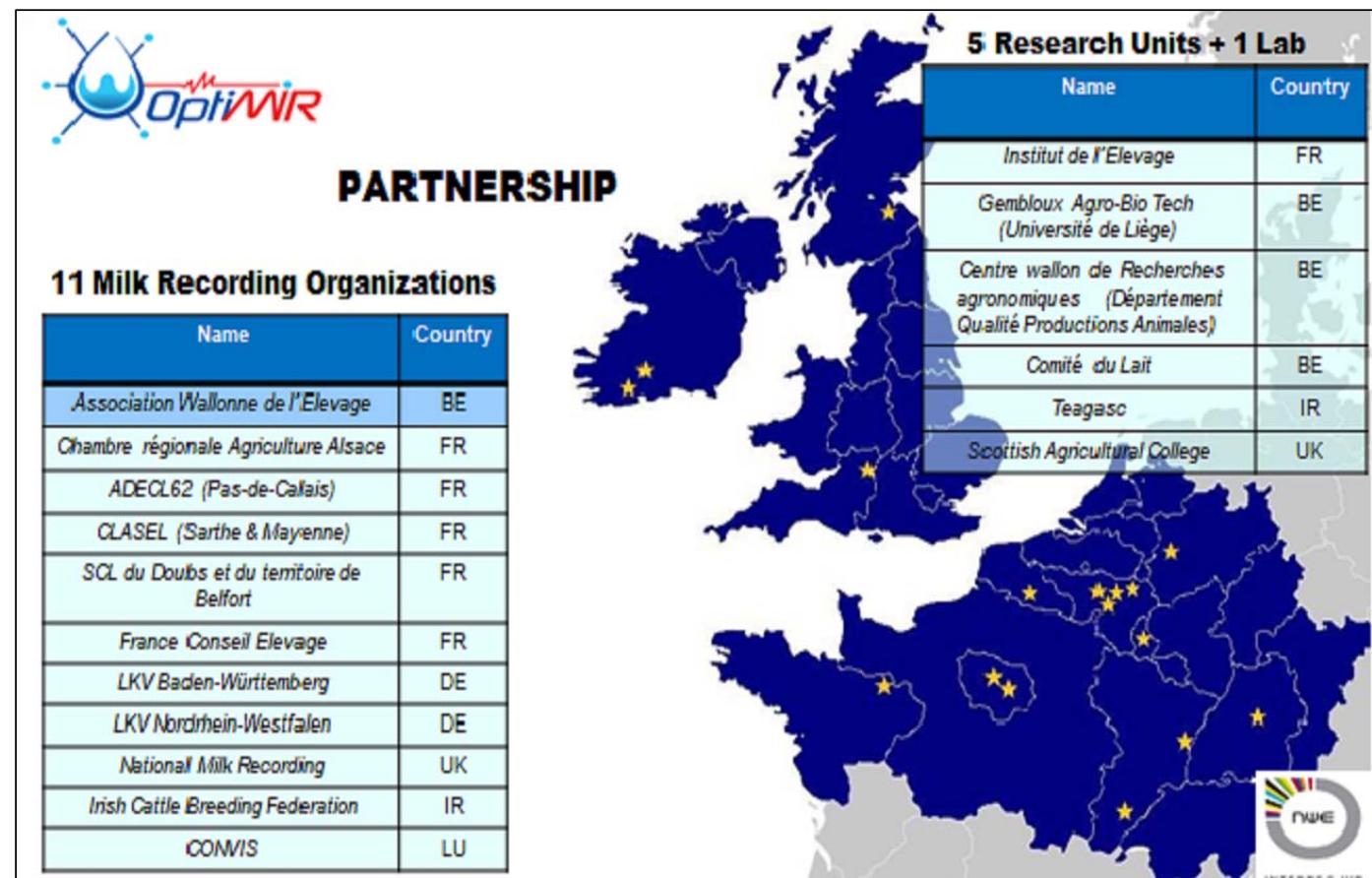
## Challenges and opportunities in the use of milk MIR spectra: experiences learned from the OptiMIR and HappyMoo projects and beyond

N. Gengler, J. Leblois,  
OptiMIR Consortium, HappyMoo Consortium

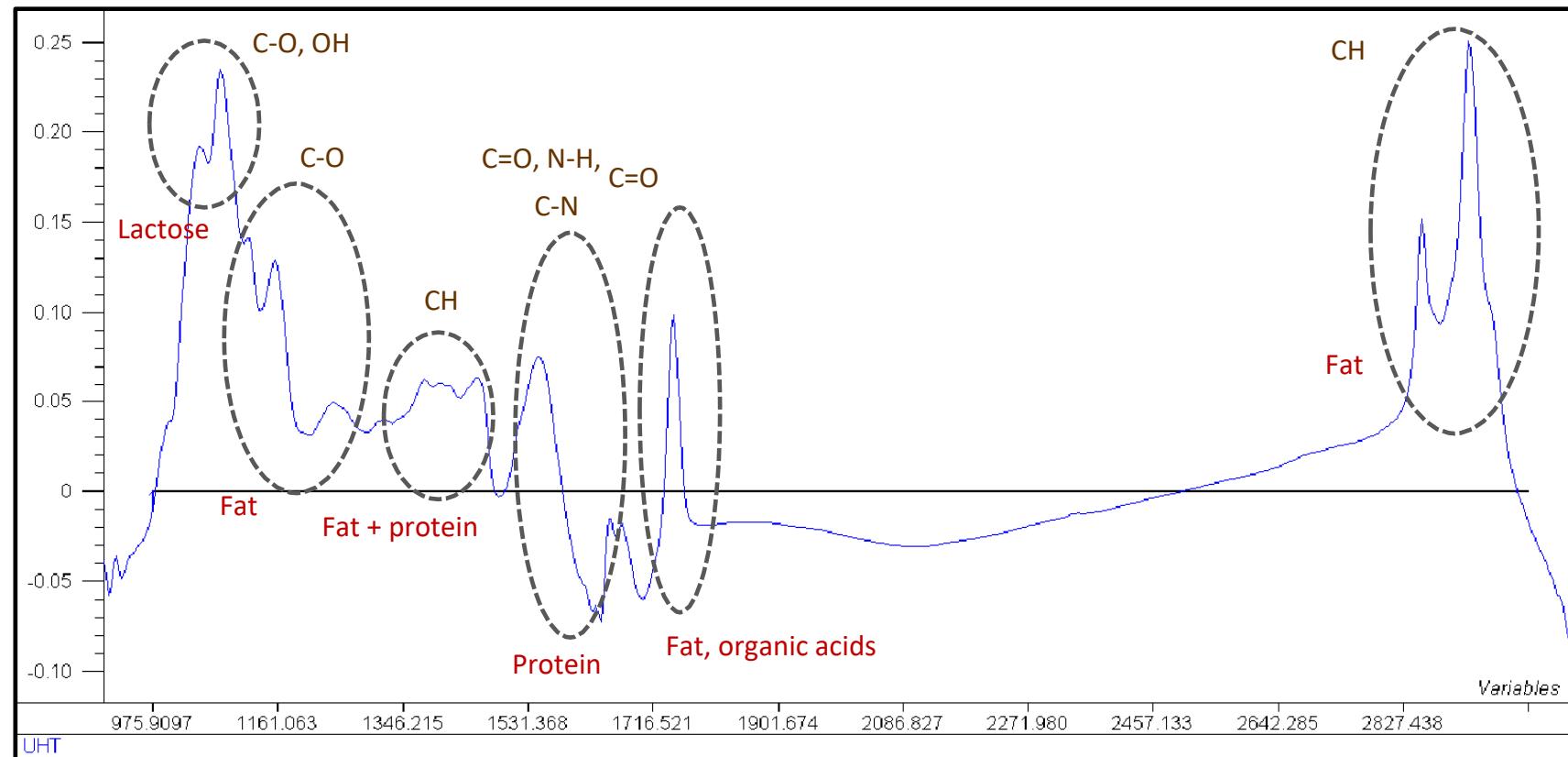


# OptiMIR project

- Program 2007 - 2013  
INTERREG NWE
- Project start:  
2009-09-25
- Project end:  
2015-09-30
- Total budget: 7.4 M€

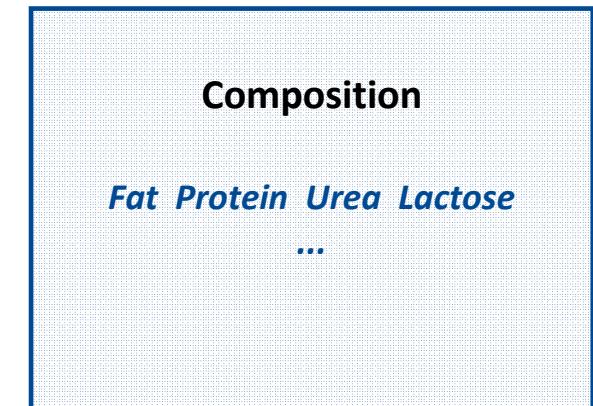


# MIR technology

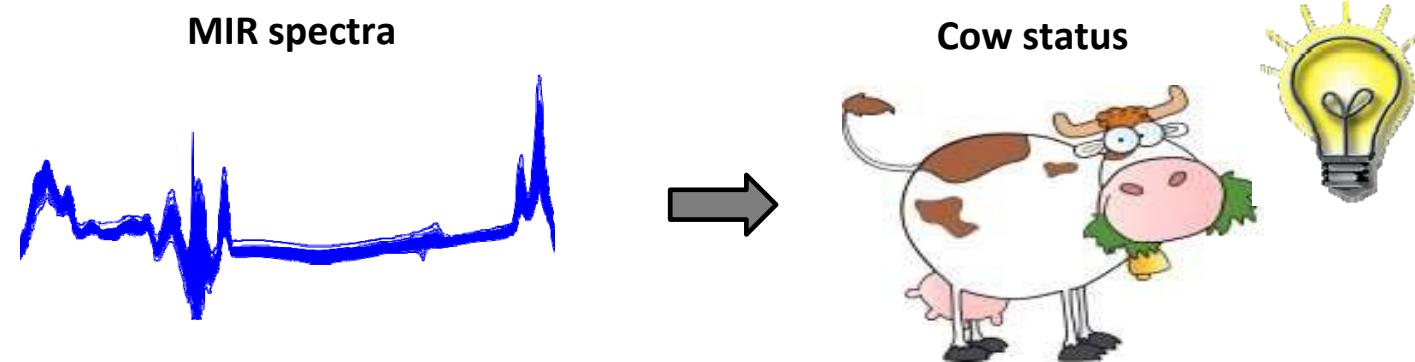


# Classical use of MIR spectra

Milk recording - DHI



# Innovative view of OptiMIR (intended)

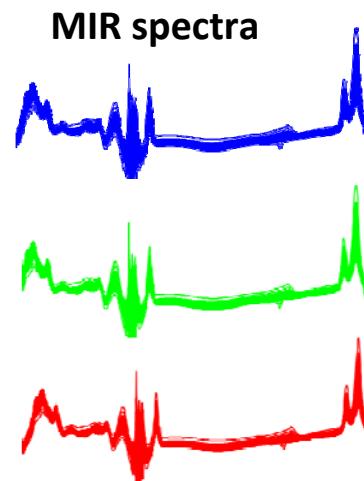


**Prediction tools fast, cheap, via milk recording and advisory organisations (DHI)**

- Information on :**
- **Feeding** (acidosis, ketosis, energy balance...)
  - **Health** (mastitis...)
  - **Environmental impact** (methane...)
  - **Fertility** (pregnancy...)



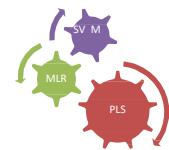
# Development of new tools



**Reference analysis**



+



**Chemometric tools**

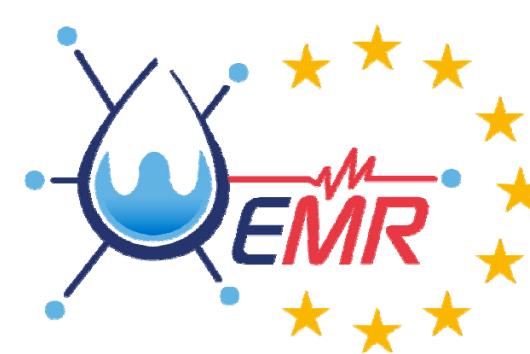
**Model predicting reference data from MIR spectra**

$$\frac{3\alpha(y+G)^2 + (3y+G+H)}{39} \cdot \frac{\alpha^2 G^3}{(y+A)^{13}} + \frac{2}{3} \cdot \frac{4^4 H^4}{(x+G)^{14}}$$

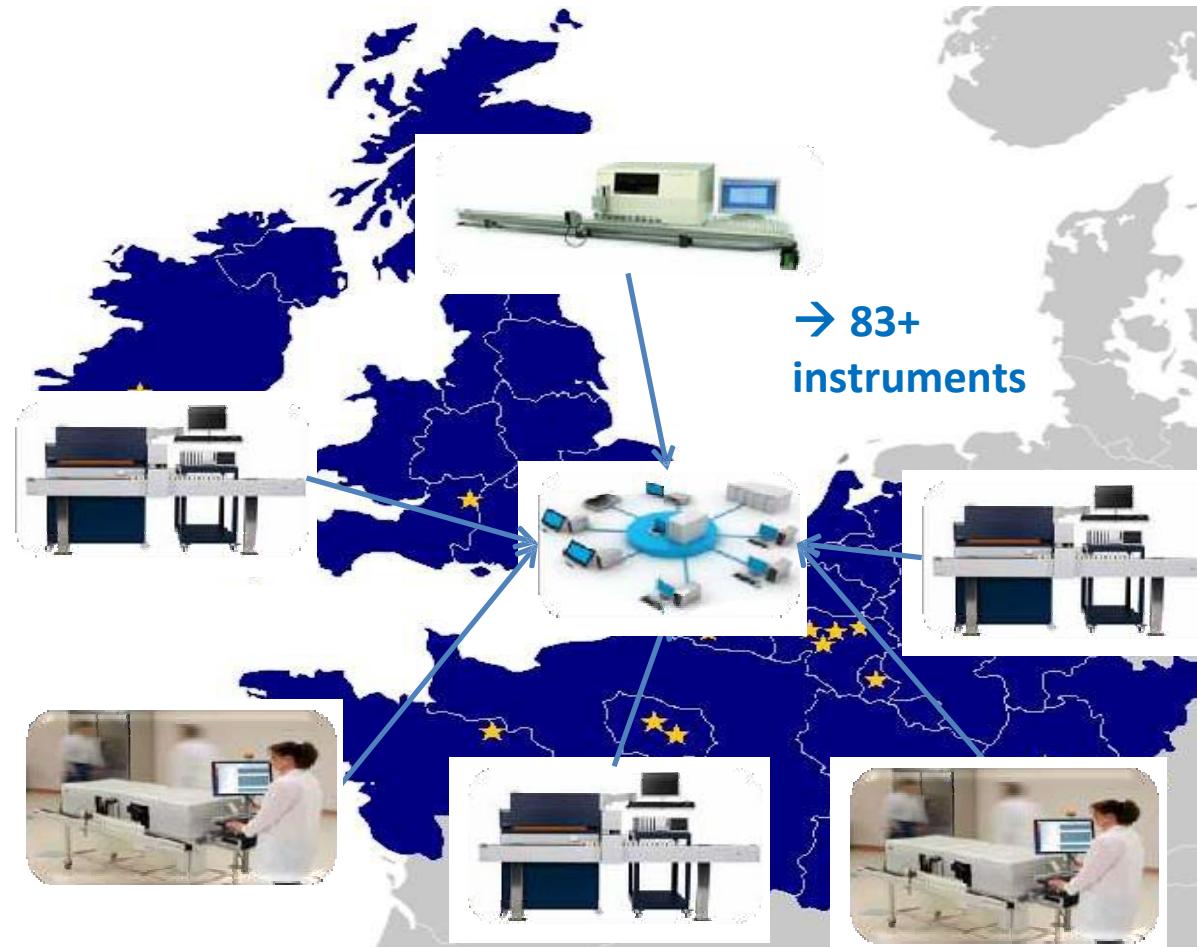


## Major achievements...

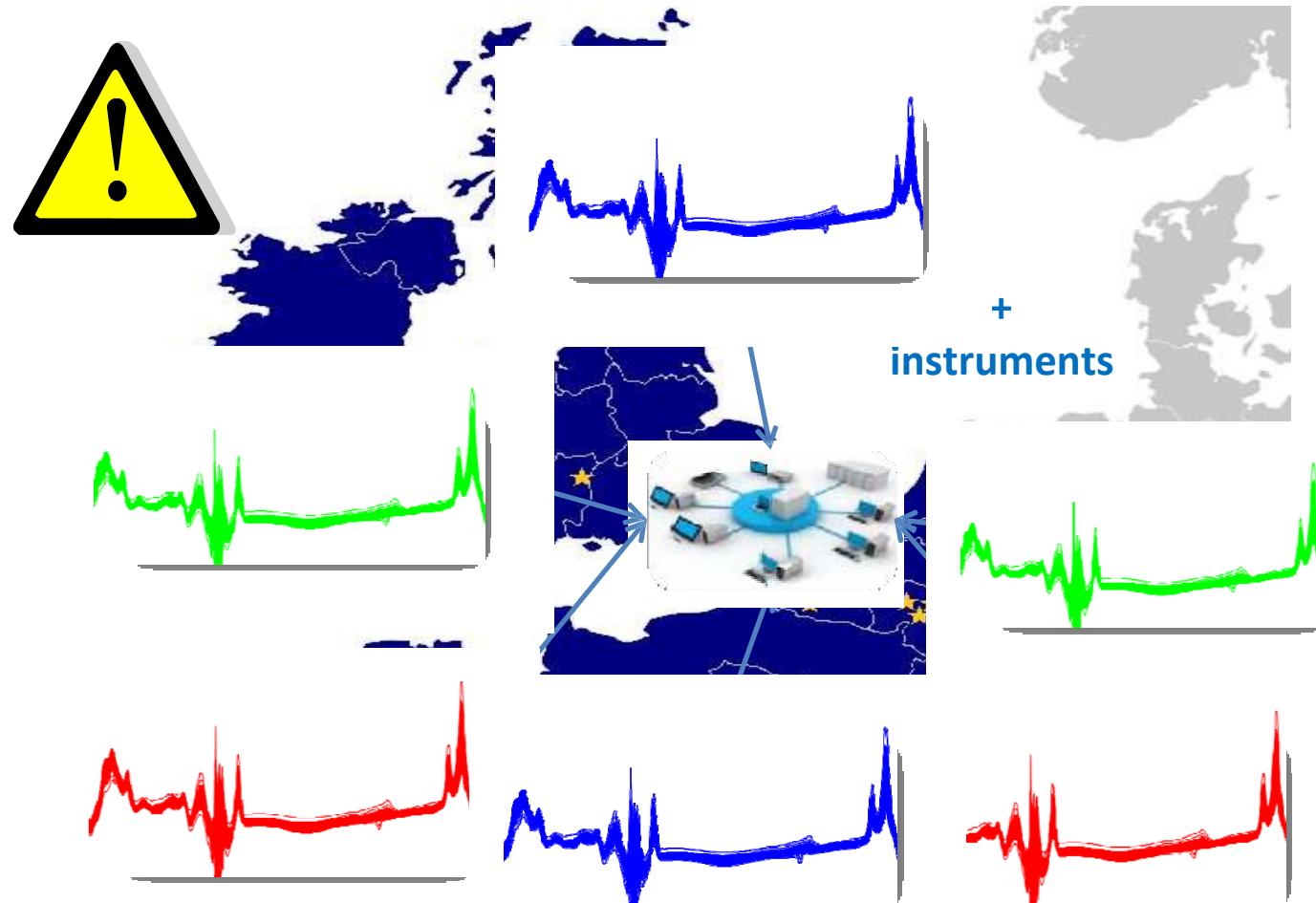
- Novel equations.... obviously
- But also...
  - Joint development and sharing of expertise and knowhow
  - Creation of the OptiMIR network →



# OptiMIR network

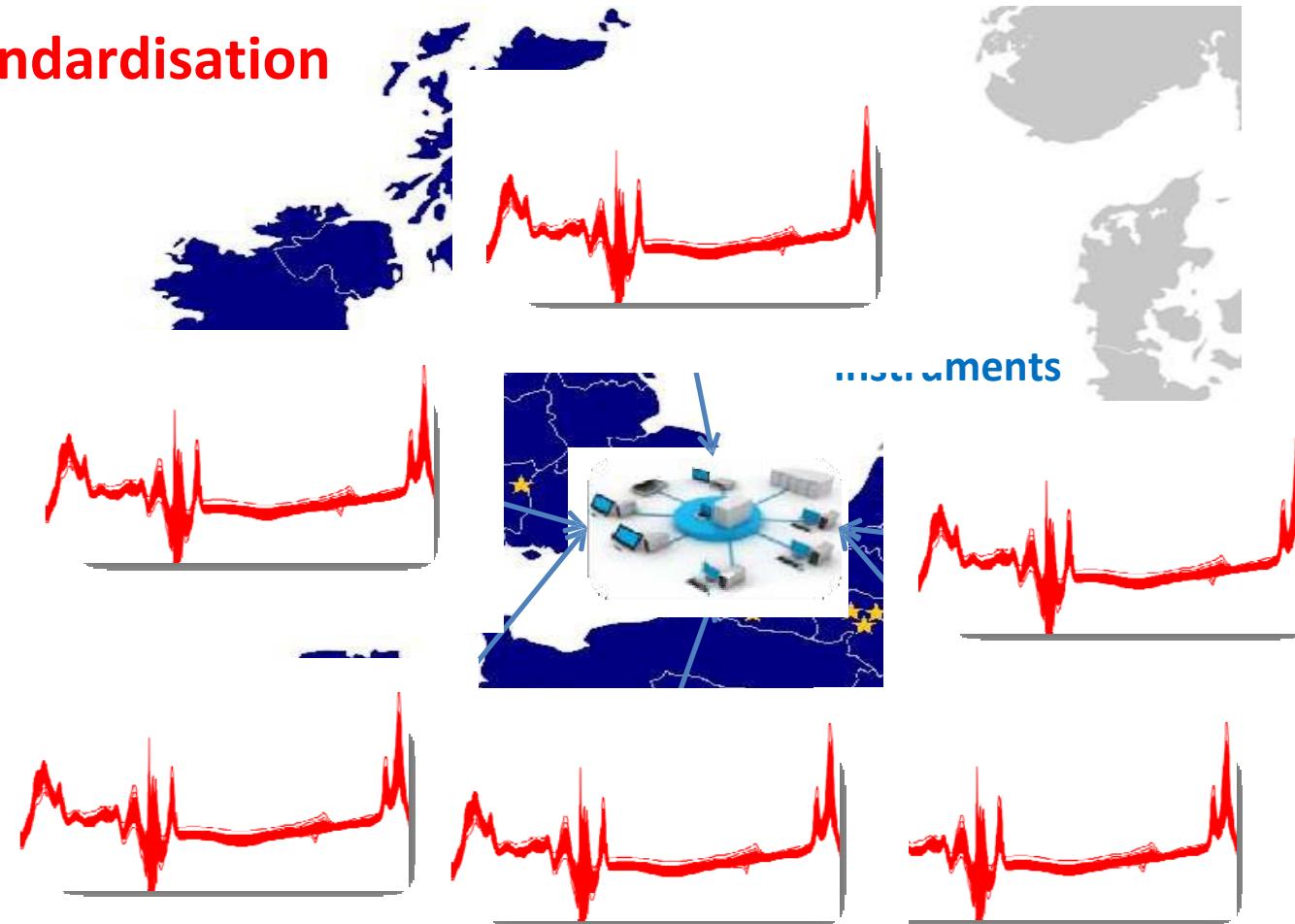


# OptiMIR network

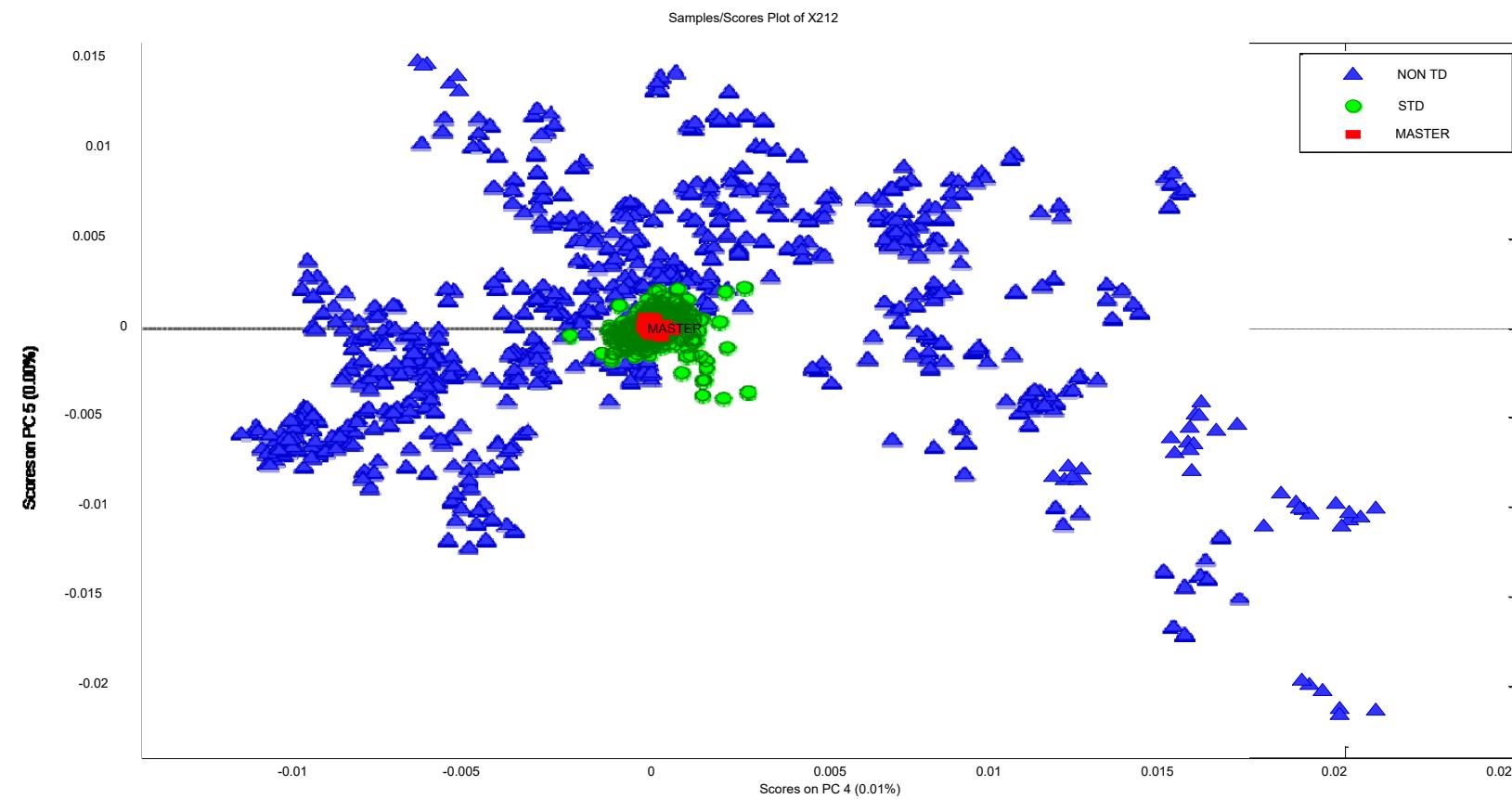


# OptiMIR network

## Spectral standardisation



# Impact of standardisation



Grelet et al. 2015 J. Dairy Sci. 98: 2150-60

15-11

11



→ EMR (<http://www.milkrecording.eu>)

The screenshot shows the homepage of the European Milk Recording (EMR) website. On the left, there is a sidebar with the EMR logo at the top, followed by links to HOME, PROJECTS, STANDARDISATION & PREDICTION SERVICE, PARTNERS, PUBLICATIONS, CONTACT, and WEB SERVICE. Below the sidebar, a small text reads "TOUS DROITS RÉSERVÉS ESTEL © 2017". The main content area features a large banner with a collage of images related to dairy farming and research. The banner has a yellow header bar with "Languages" and a "Login" button. The central text on the banner reads "EUROPEAN. MILK. RECORDING.". Below this, two descriptive statements are visible: "To pool, coordinate resources and means, and carry out together activities of common interest in the service of dairy farmers" and "To generate new traits and phenotypes for the upgrade of management indicators and breeding values". At the bottom of the banner is a red "TAKE A TOUR" button. In the bottom right corner of the main area, there is a small envelope icon.

→ Please visit the booth in the exhibition hall



# Joint development and sharing of expertise and knowhow

- Most important result discovered during the project  
→ showing importance of internal communication!
- Sharing and joint development of
  - **Expertise**  
→ even simple things as “How do I get access to MIR data?”
  - **Practical joint developments**  
→ “IT functional specifications” → implementations





**OptiMIR → very successful**

→ follow-up project with similar partnership:

**INTERREG NWE HappyMoo Project**



- 12 partners
- 7 countries
- 8 milk recording organizations
- 3 research centres
- 1 IT center



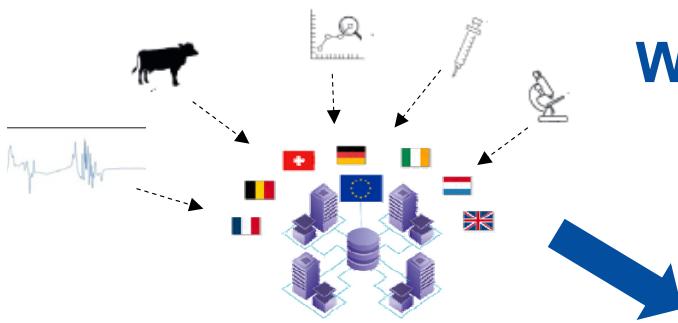
Precision milk analysis, an innovative tool to improve cows' welfare



Project budget: 4.1 M €

Project duration: 50 months ( >24/12/2022)

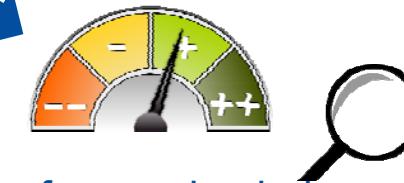
# HappyMoo work plan



**WP T1 – Data acquisition**



**WP T2 – Processing of data through machine learning approaches**



**WP T3 – Production of screening index and dashboard (welfare and €)**

# Work plan



## Transnational database

- Milk recording data
- Phenotypes (lameness, BCS, diseases, trimming animal data etc)

## Lab reference values

- For new molecules prediction
- Large-scale milk/blood sampling throughout the partnership
- Centralized lab analysis

Lead partner



# Work plan



**WP T2** – Processing of data through machine learning approaches

**Prediction models**

Welfare related molecules

Phenotypes

**Super-indicators**

PLS

GLMNET

Neural networks

Random Forest

# Work plan



**WP T3** – Production of screening index and dashboard (welfare and €)

- Implementation of these new equations into milk recording organizations' platforms
  - IT specifications writing
  - APIs production
- Creation of reports by these MROs ➔ creation advisory tools

Lead partner





## Both projects → precursors to ExtraMIR

- Reference data → multi-national data sets
- QA data → standardization
- QA methods → new ideas, e.g. machine-learning
- Communication → INTERREG specialty (internal and external)



# Thank you!

Contact (for both projects):

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Avec le soutien de  
la



<http://www.happymoo.eu>



@HappyMooProject



Qualitas



icbf

NMR

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