Developing Innovative Health and Welfare Management Tools for Dairy Cows from Optimized Use of Milk Mid-Infrared Spectra (OptiMIR)

A. Lainé[1], C. Bastin[1], C. Grelet[2], F. Dehareng[2], X. Massart[3], C. Bertozzi[3], and N. Gengler[1]

[1] University of Liege, Gembloux Agro-Bio Tech, Department of Agricultural Science – Gembloux, Belgium
[2] Walloon Agricultural Research Center (CRA-W), Valorisation of Agricultural Products Department – Gembloux, Belgium
[3] Walloon Breeding Association (AWE) - Ciney, Belgium
Contact: aurelie.laine@ulg.ac.be

The OptiMIR project

European collaboration between 5 research institutions, 11 milk recordings organisation and 1 milk lab

Classical use of the mid-infrared (MIR) spectra of milk :

✓ Fat, protein and urea contents
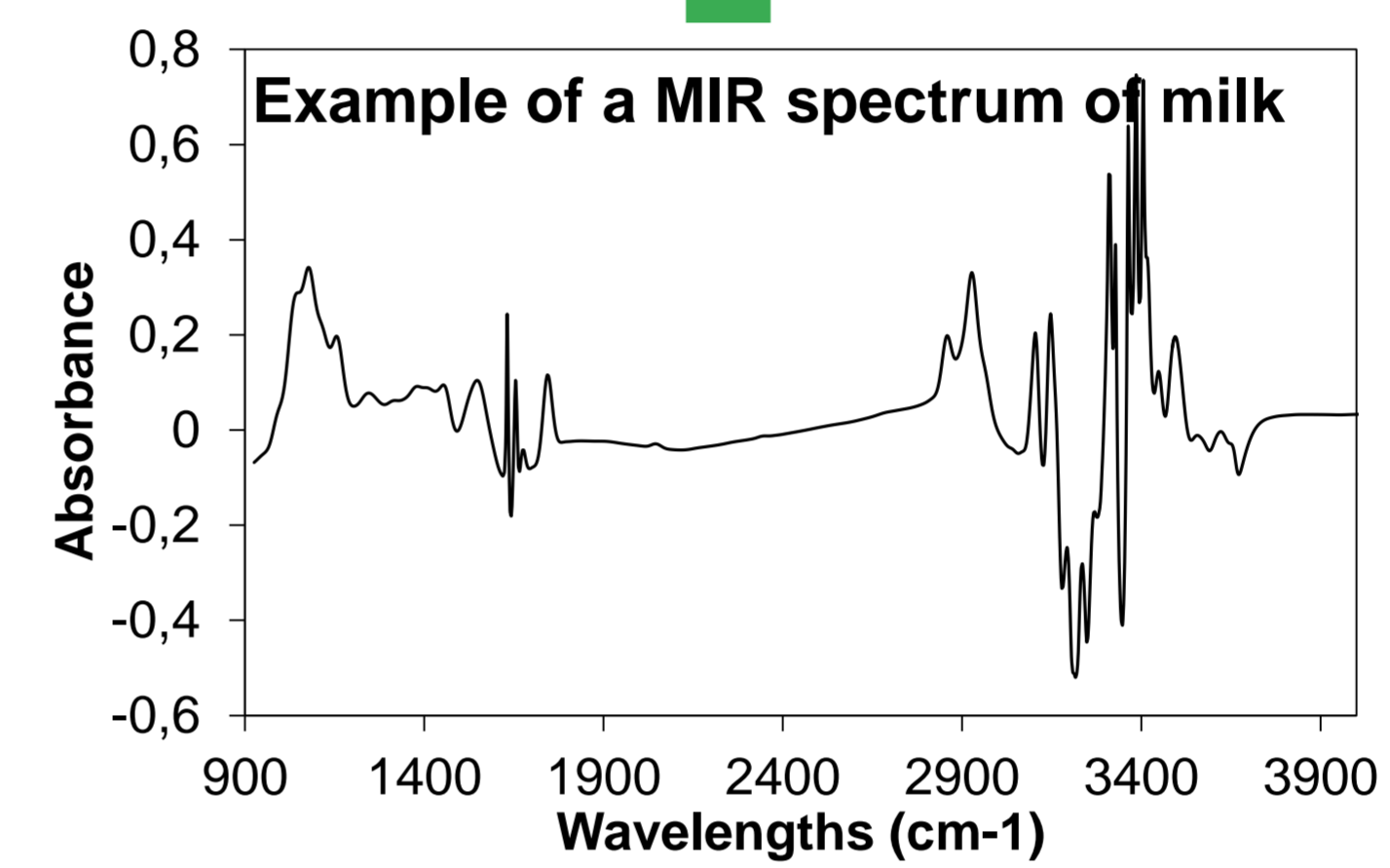✓ Fatty Acids profile prediction
✓ Minerals, lactoferrin prediction

➜ *MIR spectrum of milk is a fingerprint of the milk composition*

Milk recording programs

Milk analysis - Spectroscopy

Example of a MIR spectrum of milk

Going further in the use of the MIR spectra ?
➜ Development of management tools using (directly) MIR

Fertility
Pregnancy
AI success rate
Embryo losses

Feeding
Feed efficiency
Fat/Protein ratio

Health & Welfare
Lameness
Ketosis
Acidosis
Mastitis

Milk quality
Cheese making quality
PDO-PDI
Protein fraction

Environnement
CH4 emissions
Heat stress

Developing management tools for dairy farmers

From the individual to the population level, through the herd level

Large scale sampling for large-scale health and welfare monitoring of dairy cattle

Constraints, needs and outcomes

✓ **Common database combining reference data and MIR spectra enabling access of partners to relevant data**

✓ **Need of MIR spectra standardization to overcome variation during time and differences between MIR instruments used** (Grelet, C. et al., 2015. Standardization of milk mid-infrared spectra from a European dairy network. *J. Dairy Sci. (in press)*)

✓ **Development of innovative methods to deal with high dimensional and longitudinal data in order to extract animal status, product quality, environmental footprint ...** (Lainé, A., et al., 2014. How to use mid-infrared spectral information from milk recording system to detect the pregnancy status of dairy cows. *In 19th National Symposium on Applied Biological Sciences*)

GEMBLOUX AGRO-BIO TECH