ExtraMIR

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Context related to the creation of ExtraMIR

By Christian Baumgartner
Chair of ICAR Milk Analyses Sub Committee

Infrared spectroscopy is used in milk analysis since decades. With Fourier transform infrared spectra (FTIR) technologies and availability of enhanced computer power, IR data are becoming more and more a source of information about the circumstances under which the milk was produced in a cow – illustrating physiological as well as environmental factors. Within the frame of IDF and ICAR, experts were working independently on the use of FTIR spectral data in a large variety of different fields of application. As communication and discussions about projects and results evolved, it became clear that there would be a need to harmonize definitions, to elaborate standardized and generally accepted quality assurance procedures and to define criteria for anchoring application models to references describing the targeted traits of interest.

Based on and driven by this insight, IDF and ICAR have decided to propose a joint project – ExtraMIR – which is targeted to organize the work on and with FTIR spectra and to offer a platform for all experts to communicate and foster the use of FTIR spectra in the dairy sector. You all are cordially invited to keep track by reading this Newsletter N° 1 and future editions.

By Hélène Soyeurt
ExtraMIR Action Team leader

Milk mid-infrared spectrometry has been used for many years to quantify major milk compounds such as fat and protein contents. In recent years, much research has been conducted to extend the use of this technology to predict new phenotypes relevant to assess the animal welfare, nutritional quality of milk as well as its technological quality and environmental footprint. However, the transition from the research stage to field implementation is not so easy. Intrinsic constraints are those that are generally thought of first: the quality of the prediction itself but also the quality of the spectral information used. Extrinsic constraints, independent of the research phase, are related to the needs of the breeder or to the existence of a financial or administrative incentive but can also be linked to the frequency of information acquisition which can sometimes make certain predictions useless. The existence of many prediction equations for the same trait can also represent a constraint for large scale comparisons or the development of selection tools. However, some developments can be considered to address these issues. More details are mentioned in an accepted article entitled "FTIR milk screening to improve milk production and processing, especially if we join efforts to bridge the gap between research and field" that will be published soon by the Journal Dairy Science communication.

ICAR initiative: Brian Wickham Young Exchange Program (BWYPEX)

BWYPEX would like to promote networking, develop skills, and build confidence among the young people within ICAR organisations.
In October 2022, the BWYPEX Committee (Chaired by Dorian Garrick) selected the BWYPEX Researchers for 2022-23. For Milk Analyses Sub Committee, Michael Whittaker (Cattle Information Systems, UK) was selected. Michael´s tasks will be to draft a complete overview about the state of the art using FTIR spectra for applications along the dairy food chain and to do a survey on existing applications and ongoing projects as well as to summarize potential fields for new applications. Some words from Michael:

I feel honoured to have been selected for the ExtraMIR research project hosted by ICAR and IDF. Although I studied Quantity Surveying at university my heart has always been with the dairy industry. I come from a long line of dairy farmers in the UK and it has always been at the forefront of my mind which gives me an extra passion and drive to aid progress in the dairy sector.

I have been with the Cattle Information Service for 8 years now and I have wholeheartedly enjoyed every moment of it. I started off working as a Laboratory Assistant in the milk lab where I was able to work with the milk

analysers and gain an appreciation for the scientific nature of the testing that we were carrying out on behalf of farmers. I then moved to a position in the field as an Assistant Area Manager where I was in regular contact with both the office staff and our customers. Although my role was more in line with sales, I always felt that I was in more of a consultancy position whereby I worked with farmers to try and establish which services or schemes that CIS offered would benefit the farmer most and help him to achieve his on-farm objectives.

Following this I then took an office-based role of CIS Support Manager as my growing interest in on-farm data and software integrations gave me a better understanding of how our systems communicated with other organisations and how progressions could be made in the industry. This position then evolved into where I am today in the role CIS Processing and Project Manager where I oversee the day to day in house and external communications between lab, field and office to ensure that farmers expectations are not only met but exceeded and our systems remain dynamic and robust to ensure that we are feeding back information to farmers that can be used to make vital on-farm decisions.

I have already spent time working with the fatty acid output results produced by the milk analysers in our lab and figuring out how to best utilise these to give the farmer an insight into the performance of cows in their chosen farming system. The gap in communications between consultants in the field and detailed milk results needs to be addressed as there is no doubt huge benefits waiting to be tapped into as nobody is currently bridging that gap especially on a global scale.

Having only been involved with the project for a few weeks now I am already extremely excited for the future of this research topic and the applications currently seem endless, I hope that I am able to do justice to the Brain Wickham Young Person Exchange Program and further the knowledge chain of the dairy sector as whole.

ExtraMIR project leader

The ICAR Milk Analyses Sub Committee and the IDF Standing Committee on Statistics and Automation are very proud to have Prof. Hélène Soyeurt (BE) as Action Team leader of the ExtraMIR project:

Hélène Soyeurt always wanted to become a researcher. At 14 years old, she has already visited universities to determine her choice of studies. In 2000, she joined Gembloux Agro-Bio to become a bioengineer in animal production. In 2005, she completed her master thesis on the genetic variability of milk fatty acids contents predicted by milk mid-infrared spectrometry. In 2006, she obtained a grant from the National Fund for Scientific Research (FNRS) to carry out a doctoral thesis on the development of new phenotypes, and in particular fatty acids, from milk mid-infrared spectrometry. The work done on fatty acids was awarded by 3 scientific distinctions. In 2008, she obtained her PhD degree and joined a few years later the University of Liège as first research assistant after a post-doc at FNRS. In 2016, she became "Lecturer" and in 2021, she was promoted as "Professor". Her teaching duties in Data Mining and Machine Learning as well as the supervision of PhD students allow her to pass on her passion to students. In conclusion, Hélène Soyeurt has been working in the field of mid-infrared spectrometry in milk for a little over 15 years.

IDF New Work Item proposal

The IDF Standing Committee on Statistics and Automation is proposing the New Work Item proposal, ExtraMIR, under the leadership of Prof. Hélène Soyeurt, to formalize the official collaboration between IDF and ICAR on this project. This acceptance procedure will be up for voting by IDF National Committees in early February. This step will also include a call for nomination of active experts from IDF members to the ICAR/IDF Action Team. The outcome of the IDF approval process will be known in early March 2023. Then a kick-off meeting of the joint Action Team shall be organised.
The joint ICAR/IDF project will then be handled by both organisations to maximize experts' input, resources, and avoid duplication of efforts.
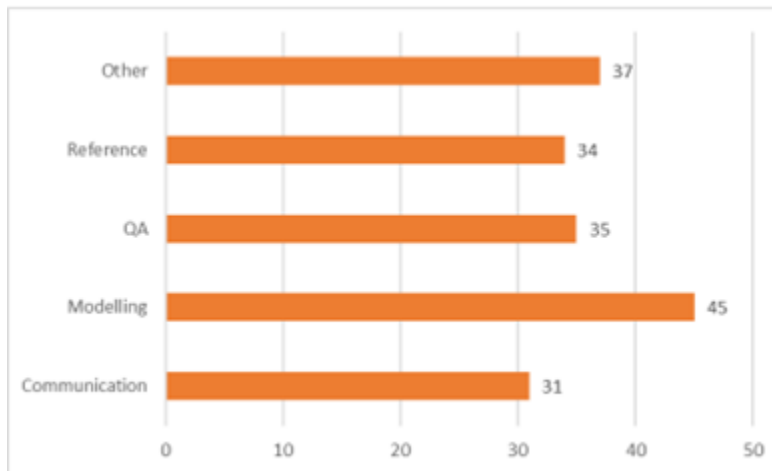
ExtraMIR questionnaire of interest

A questionnaire of interest in ExtraMIR project was launched in June 2022 in order to gather information on the use of FTIR from different multidisciplinary experts, which has served to direct the first actions in the project.
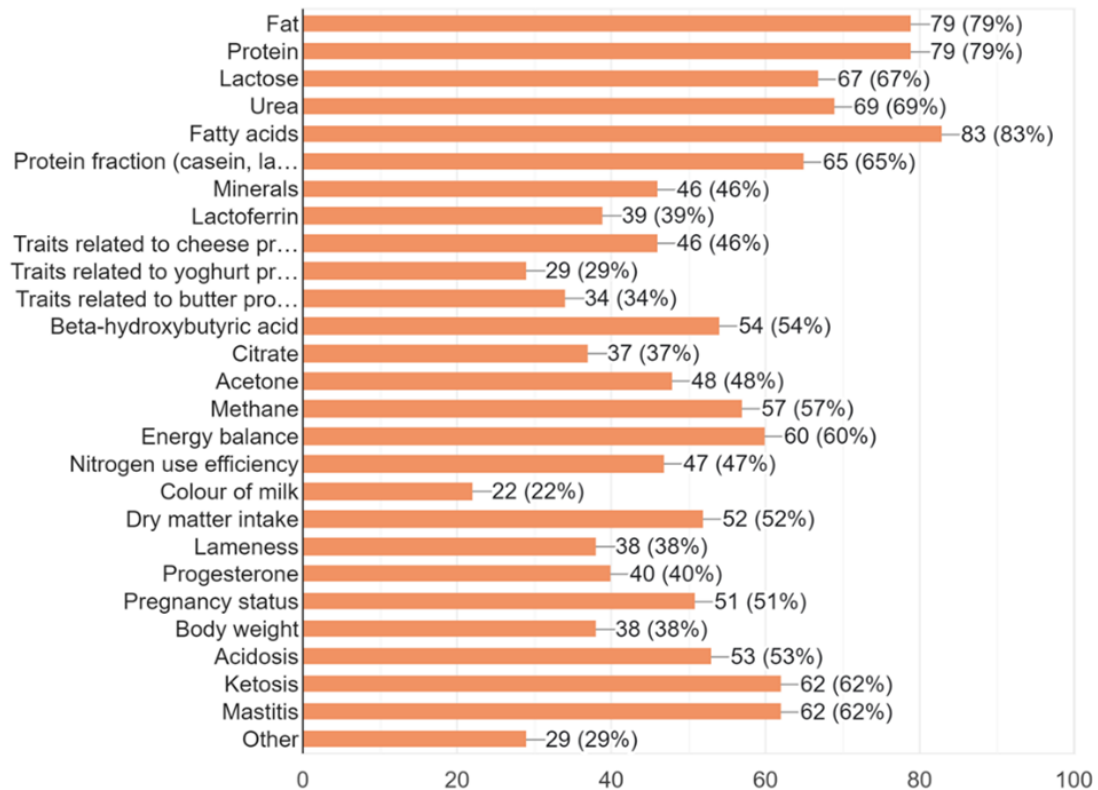We received 106 replies from all continents! 41% of the responders was interested in actively participating. This will bring a lot of life to the project with the inputs of experts from different countries. The interested experts that are

nominated by the IDF or ICAR members will be involved in the 4 working groups organized under 4 project pillars: Reference methods - Quality assurance - Validation - Modelling.

The responders expressed their interest, in the different pillars, according to the figures reported below:

Between the wide panel of parameters that MIR spectra can offer the main interest was expressed for fatty acids profile.

- IDF and ICAR will organize a kick off meeting of the joint Action Team early/mid-March (members only).
- IDF and ICAR will organize later in March 2023 a public webinar to introduce the ExtraMIR project and its organizational aspects.

- The ICAR annual conference will be held in Toledo (Spain), 22-26 May 2023. A half-day workshop and a technical session on milk analyses will focus on ExtraMIR.

ICAR annual conference

- IDF Business meetings and IDF World Dairy Summit, will be held in Chicago (US), 13-17 October 2023. The project ExtraMIR can be discussed during relevant IDF Standing Committees and can be part of the programme of the conferences.

IDF World Dairy Summit 2023

Join the ExtraMIR project

For further information on the ExtraMIR project please visit ICAR or IDF websites.

If you are interested to be actively involved in ExtraMIR and you have not expressed so in the questionnaire, please contact Silvia Orlandini (ICAR) or

Anabel Mulet Cabero (IDF).

Don't forget to spread the word about this exciting project. Interested people can subscribe to our Newsletter here.