



Photonics for the Dairy Industry

Application Case Study

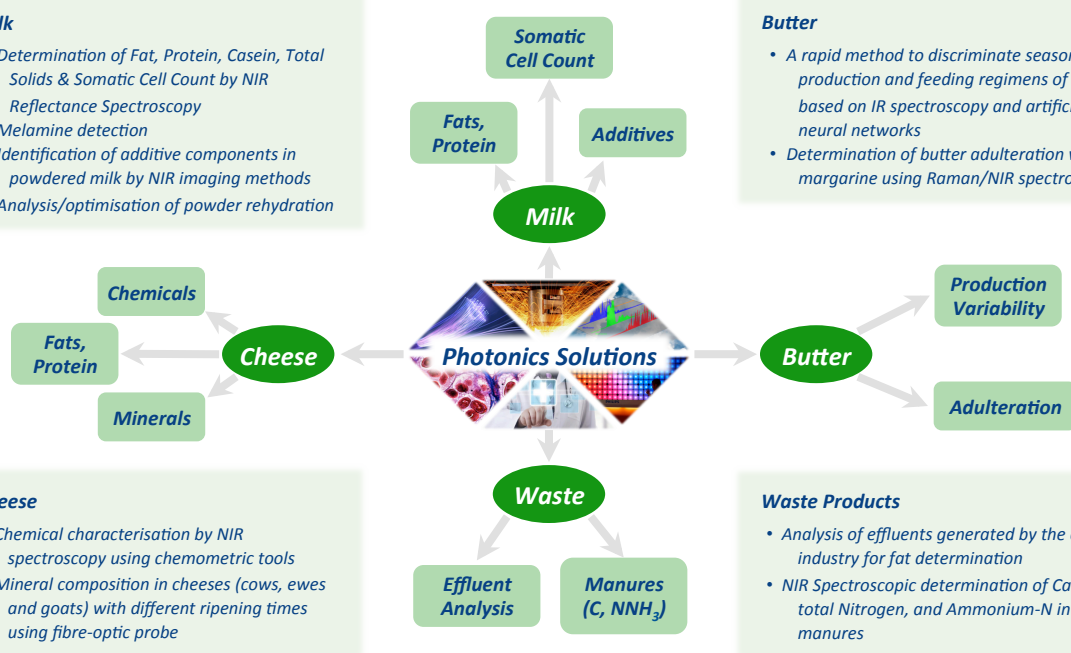
Global milk production is expected to exceed 1000 million tonnes by 2025 and is an important part of Ireland's Agri-Food sector; the Irish dairy industry exports 90% of its production to over 140 countries, valued at €3.1 billion. Photonics can, and does, provide a range of invaluable solutions to the dairy industry:

Milk

- Determination of Fat, Protein, Casein, Total Solids & Somatic Cell Count by NIR Reflectance Spectroscopy
- Melamine detection
- Identification of additive components in powdered milk by NIR imaging methods
- Analysis/optimisation of powder rehydration

Butter

- A rapid method to discriminate season of production and feeding regimens of butters based on IR spectroscopy and artificial neural networks
- Determination of butter adulteration with margarine using Raman/NIR spectroscopy



Cheese

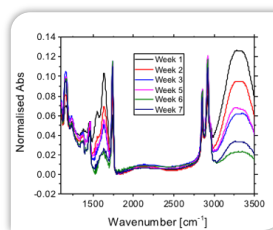
- Chemical characterisation by NIR spectroscopy using chemometric tools
- Mineral composition in cheeses (cows, ewes and goats) with different ripening times using fibre-optic probe

Waste Products

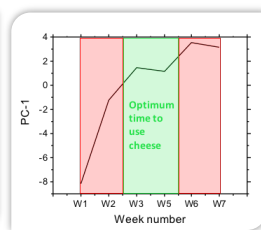
- Analysis of effluents generated by the dairy industry for fat determination
- NIR Spectroscopic determination of Carbon, total Nitrogen, and Ammonium-N in manures

Innovation Voucher Case Study: Maturity Cycle of Processed Mozzarella Cheese

A pizza company approached CAPPA to develop a quality control test for mozzarella cheese, availing of a €5,000 Enterprise Ireland Innovation Voucher. The problem was an issue with the cheese burning during pizza preparation depending on the maturity of the cheese. CAPPA gathered 8000 NIR spectra over 7 weeks, and used **Chemometrics** (Principle Component Analysis) to develop a model to identify the current maturity of the cheese, and hence determine the optimum cheese maturity point.



NIR spectra of mozzarella cheese



PCA model of maturity cycle