

Expanding the potential of infrared spectroscopy as a tool of precision dairy farming: From on-site infrared milk analysis to spectral data mining for indicators of animal well-being

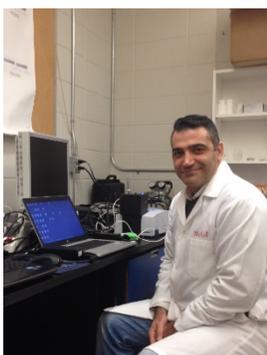
Oral Defence by PhD Candidate Mazen Bahadi

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Abstract

In this thesis, two propositions were presented to expand the capabilities of the milk recording system. The first was to provide Canadian milk producers with suitable cost-effective and easy-to-use instruments for on-site milk analysis based on infrared spectroscopy. Such instruments will help in realizing the proAction initiative of the Canadian Quality Milk Program of the Dairy Farmers of Canada, which aims at enabling Canadian milk producers to self monitor fat and protein content and other milk quality indicators through on-site milk sampling and inspection. Infrared spectroscopy is a simple, rapid and green analytical technology, and it is the basis of official methods for milk analysis that are employed by centralized milk analysis laboratories to determine producer payment and to support dairy herd management decision-making. The second proposition was the exploitation of milk Fourier transform infrared (FTIR) spectra beyond the paradigm of quantitating specific milk components to provide data that will be used in the decision-making process on dairy farms. Combining multivariate analysis techniques and mixed modeling proved to be a successful strategy to detect trends of subtle changes in milk FTIR spectra in animal trials aimed at studying the effect of housing treatments whose level of welfare is characterized by a given level of movement restriction at the stall. This approach will open the door to study animal welfare from a novel angle, which will eventually help dairy herd improvement agencies provide new services for dairy farmers in the field of animal welfare based on milk FTIR spectra that are routinely recorded.



About the Candidate

Mazen holds a bachelor of agricultural engineering (Food Science and Technology) from the University of Aleppo in Syria and a MSc (Food Science) from McGill University. In 2016, he started his PhD thesis research under the supervision of Dr. Ashraf Ismail (Dept. of Food Science and Agricultural Chemistry) and Dr. Elsa Vasseur (Dept. of Animal Science).