## Abstract

# Correct sampling strategies make near infrared spectroscopy and near infrared imaging techniques the tool for safety control of food and feed products

Vincent Baeten*, Philippe Vermeulen, Juan Antonio Fernández Pierna and Pierre Dardenne

Food and Feed Quality Unit, Department of Valorisation of Agricultural Products, Walloon Agricultural Research Centre, Chaussée de Namur 24, 5030 Gembloux, Belgium
*Corresponding author: baeten@cra.wallonie.be

## Introduction

The major goal of the European research project CON*ff*IDENCE (www.conffidence.eu) is to control the safety of food through rapid and cost-efficient tests for chemical contaminants in the food and feed chains. Most of the current tests are laborious, time-consuming, not compatible with the requirements and specificities of the food chain and do not allow intervention or corrective action during the food production process. There is therefore an urgent need for validated screening tools, which should be simple, inexpensive, rapid and able to detect as many contaminants in parallel as possible. NIR and NIR imaging have decisive advantages for use as screening tools. However a critical point is the use of the correct sampling strategies in order to reach the limit of detection and the repeatability criteria required by food and feed safety analytical methods.

## Materials and Methods

A comparison of different sample strategies has been done in the framework of the development of a method for the detection and quantification of ergot bodies in cereals. The regulation (EEC) No 689/92 restricted to 0.05% the concentration of ergot bodies in cereals for humans. The directive 2002/32/EC on undesirable substances in animal feed fixed a limit of 0.1% for ergot bodies in all feeding-stuffs containing unground cereals. For this study, ergot bodies issued from different sources have been used to spike cereal samples at different concentrations. The spiked samples were analysed with a MPA NIR spectrometer (Bruker) and two NIR hyperspectral imaging systems namely a line scan system (Burgermetrics) and a plane scan system (Malvern Instruments Ltd) instruments. The obtained spectra have been analysed using chemometric tools such as PLSDA. Data treatment was carried out with the PLS toolbox under Matlab 7.5.0.

## Results and Discussion

Different sampling strategies have been tested and adapted to the analysis of spiked samples by NIR and NIR imaging instruments. The results using PLSDA have shown that the number of false positives and false negative results are lower than 5%. The LOD has been determined to be less than 0.5g/kg and the LOQ less than 1g/kg for the detection of ergot in cereals. These criteria fully comply with the regulation requirements for feed and food safety control. The studies undertaken have demonstrated that according to the sampling strategy used the quantity analysed by hour ranges from 250 g to more than 50 kg. This result is a decisive advantage of the NIR methods in comparison to the alternative official methods based on microscopy and chromatography which work on a fraction of samples ranging from hundred grams to few grams and are very sampling dependent.

## Conclusion

Sampling strategy is a key issue in the assessment of NIR techniques for the control of food and feed products at the industrial level as well as at the laboratory level.

Reference paper as:
V. Baeten, P. Vermeulen, J.A. Fernández Pierna and P. Dardenne (2012).Correct sampling strategies make near infrared spectroscopy and near infrared imaging techniques the tool for safety control of food and feed products (abstract), in: Proceedings of the 15th International Conference on Near Infrared Spectroscopy, Edited by M. Manley,C.M. McGoverin, D.B. Thomas and G. Downey, Cape Town, South Africa, p. 201.