Abstract

Latest developments in a near infrared microscopic method for the detection of meat and bone meal in feedingstuffs

O. Abbas, J.A. Fernández-Pierna, P. Dardenne and V. Baeten*

Food and Feed Quality Unit, Valorisation of Agricultural Products Department, Walloon Agricultural Research Centre, Agricultural Research Centre (CRA-W). Chaussée de Namur 24, B-5030 Gembloux, Belgium. E-mail: baeten@cra.wallonie.be

Introduction

Bovine Spongiform Encephalopathy (BSE) is a transmissible, neurodegenerative, fatal brain disease of cattle. Epidemiological studies have associated BSE to animal contaminated feed. In fact, contaminated ruminant protein has entered the feed chain mainly in the form of meat and bone meals (MBM). The European commission prohibited processed animal proteins from rations destined for farmed animals. It was then necessary to control the composition of feed regarding these illicit compounds. The detection of banned meat and bone meal in feed has already been developed by using the near infrared reflectance microscopy (NIRM) method, applied to the dense sediment and raw fractions. This method works under accreditation ISO 17025 at the Community Reference Laboratory for Animal Proteins coordinated by the CRA-W. The identification of animal particles is based on the evaluation of their near infrared spectra. NIR spectroscopy makes possible to the differentiation of animal particles from vegetal ones. Current researches are more focused on the development of an analytical method allowing the quantification of suspicious materials in animal feed. For this reason, a complete quantification protocol has been developed by taking into account both the gross and the fine fractions ($<250\,\mu m$) of the samples when working on the raw sample.

Materials and methods

The acquisition methodology was optimised according to the size of the particles in order to obtain spectra with high quality. The gross fraction is analysed in the reflectance mode while the fine fraction is analysed in the transmittance mode. The number of analysed particles, detected animal particles, and the contribution of each fraction in the composition of the studied sample
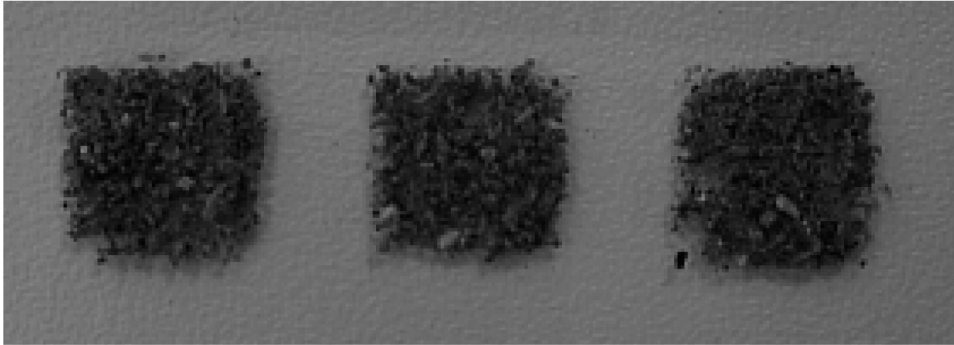
Figure 1. Feed sample presented on a microscopic slide used for NIR microscopy analysis.

were taken into account, in order to propose a protocol to quantify precisely the adulteration of feedingstuffs.

Results and discussion

Spectra were collected using the mapping mode which allowed the analysis of a large number of particles (classically between 1000 and 2000 particles). All the parameters of the acquisition methodology were optimised. The combination of the mapping strategy with high sensitivity, obtained with NIR microscopy transmission mode analysis, should improve MBM detection, and allow a more accurate quantification of animal particles. Works on the repeatability and the reproducibility are still being carried out, in order to prove that NIR microscopy could play a useful role in the quantification of MBM in animal feed in the combat against the fraud in feedstuff.
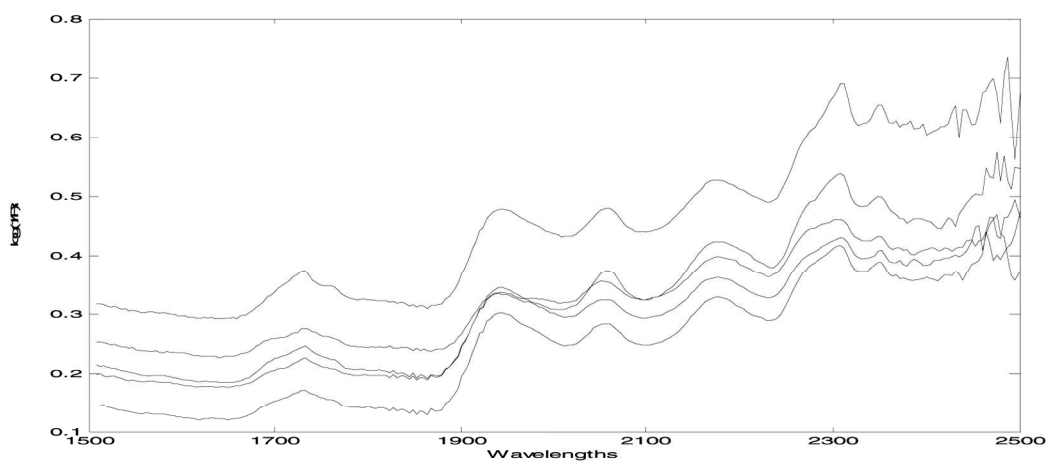

Figure 2. NIR microscopy spectra of a feed sample collected in transmission mode.