Validation of Multispectral Imaging (MSI) technology for food and feed analysis

Introduction

The current testing environment for food and feed samples is complex and uses a wide variety of analytical technologies that range from chemical to PCR-based. Whilst these approaches can be deemed fit for purpose in terms of their final analytical result, they tend to be highly specialised and require considerable frontend processing to ensure that the target analyte can be reliably detected and quantified. These combined sample processing and analytical requirements typically impact on testing times and have associated cost implications that must be factored into routine testing and monitoring applications.

MSI uses multiple discrete and informative wavelengths covering regions such as the UV and near infra-red spectrum to quickly determine surface colour, texture and possible chemical composition. Compared to traditional molecular biology approaches utilising DNA extraction followed by PCR-based analyses, MSI can simplify and reduce the time/costs associated with sample analysis. It is rapid and non-destructive.

Objectives

The objectives of the study:

- Full validation of important food and feed samples - Full validation study evaluating a panel of priority sampling scenarios selected in consultation with the FSA and other appropriate stakeholders
- Provision of written guidance to support general MSI validating activities - Written guidance was provided to help facilitate the validation of any generic food sample in an analytical laboratory using the detailed MSI technology
- Recommendations on transfer of MSI protocols and technology - A scoping exercise was successfully undertaken to explore the transferability of MSI technologies and associated food application protocols to UK analytical laboratories
- Feasibility of developing an MSI database - A feasibility study was successfully conducted to investigate the development and maintenance of an MSI-based database/repository of food sample classification and discrimination models
- Provision of a final report - the final report was successfully submitted to the FSA

Main findings

The outputs of this project contribute towards promoting and protecting public health by providing a multi-faceted screening test for food to help ensure it is safe to eat and is what it says it is. This will aid in the traceability of food along the supply chain, ultimately helping empower consumers to make informed choices in relation to food.

In order to capitalise further upon the opportunities provided by MSI approaches for food testing, six areas of further work were identified. These included:

- A knowledge dissemination event to broaden the impact of this new technology
- Evaluation of the transferability and performance compared with alternative imaging technologies
- Recommendations for the production of appropriate reference materials and associated imaging profiles on databases
- Establishment of online resources to support an accessible and harmonised UK based imaging community
- Validation of MSI methods for quantitative determination of food adulterants
- Further development of the fish speciation method which demonstrated excellent potential for discrimination

Research report
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