RPA technology for tuna authentication on the canning product line

Organisations

• *Food Research Division, AZTI, Parque Tecnológico de Bizkaia*

Authors

Miguel Angel Pardo

Product

Frozen yellowfin tuna

Aim

Assessment of the use of portable fluorimeter in the reception line at the facility of a local canning industry

Method

RPA (Recombinase Polymerase Amplification)

Outcomes

The technology is suitable to discriminate between tuna species within 15 minutes (excluding DNA isolation) with an inexpensive, portable and easily usable equipment; it could be used at different locations of the supply chain.

Prevents

Substitution of yellowfin tuna with different species

Read the entire abstract: **www.foodintegrity.eu**

Visible-Near Infrared Spectroscopy (Vis-NIRS) application for the differentiation of fresh and frozen/thawed tuna

Organisations

• Food Research Division, AZTI, Parque Tecnológico de Bizkaia

Authors

Miguel Angel Pardo
Idoia Olabarrieta

Product

Fresh and frozen/thawed tuna

Aim

Investigation of the ability of Vis-NIRS to discriminate between fresh and frozen/thawed tuna samples

Method

Vis-NIRS
(Ultraviolet Visible Near Infrared Spectroscopy)

Outcomes

Method able to detect the difference between fresh and frozen/thawed tuna samples.

Prevents

Substitution of fresh tuna with frozen/thawed material

Read the entire abstract: **www.foodintegrity.eu**

Elemental fingerprinting for authenticity testing of tomatoes using Laser Induced Breakdown Spectroscopy (LIBS)

Organisations

• Plant and Soil Science Section and Copenhagen Plant Science Centre, Department of Environmental Science, University of Copenhagen

Authors

Kristian Holst Laursen, Jens Frydenvang, Andreas Carstensen, Thomas Hesseløj Hansen, Søren Husted

Product

Italian tomatoes

Aim

Evaluation of LIBS as a high-throughput method for the determination of the geographical and agricultural origin of tomato samples

Method

LIBS, Q ICP-MS
(Laser Induced Breakdown Spectroscopy, Inductively Coupled Plasma Mass Spectrometry)

Outcomes

The geographical origin and agricultural production method is reflected in the multi-elemental composition of tomatoes. Elemental fingerprinting obtained by either Q ICP MS or LIBS have the potential to determine where a plant has been grown, when combined with chemometrics.

Prevents

Adulteration and mislabelling of tomato-based products

Read the entire abstract: **www.foodintegrity.eu**

Assessment of NIR Hyperspectral imaging to determine fraudulent adulteration of durum wheat

Organisations

- *Centre wallon de Recherches agronomiques*
- *Advanced Laboratory Research, Barilla SPA*

Authors

Philippe Vermeulen, Nicaise Kayoka, Vincent Baeten, Michele Suman

Product

Raw durum wheat

Aim

Development of a fast method for the at-line and on-line detection of common wheat grains in large samples of durum wheat lots

Method

NIR, PLS-DA
(Near Infrared Spectroscopy, Partial Least Square Discriminant Analysis)

Outcomes

The study showed the potential of NIR hyperspectral imaging combined with chemometrics to propose solutions for sorting grains at the entrance of the production chain, according to the species (morphological and spectral profile), the protein content and the vitreousness.

Prevents

Adulteration of durum wheat by lower quality species (common wheat)

Read the entire abstract: **www.foodintegrity.eu**

FTIR and Mass Spectrometry to determine fraudulent adulteration of oregano

Organisations

• *Institute for Global Food Security, Advances ASSET Centre, School of Biological Sciences, Queen's University (Belfast)*

Authors

Connor Black, Simon Haughey, Olivier Chevallier, Pamela Galvin-King, Chris Elliott

Product

Oregano

Aim

Developing and validating a method to screen and confirm oregano adulteration

Method

FTIR, LC-HRMS
(Fourier Transform Infrared Spectroscopy, Liquid Chromatography - High Resolution Mass Spectrometry)

Outcomes

The two tier system validated provides a cost effective and reliable testing method.
It could be expanded to cover all herbs sold on the market.

Prevents

Adulteration of oregano with different herbs

Read the entire abstract: **www.foodintegrity.eu**

Detection of emulsifiers used as unlabelled ingredients in finished products (Pasta) through both direct (e.g. LC-MS/MS) and indirect (e.g. XRF, enzymatic kits, free fatty acids GC-FID ratio) strategies

Organisations

• *Advanced Laboratory Research, Barilla SPA*

Authors

Elena Bergamini
Ugo Bersellini

Product

Pasta

Aim

Development of a method able to detect unlabelled emulsifiers in pasta

Method

LC-MS/MS, XRF, GC-FID (Liquid Chromatography - Tandem Mass Spectrometry, X-Ray Fluorescence), **enzymatic kits**

Outcomes

Analytical method for the detection of E481/82 emulsifiers. Thanks to the combined information collected by the smart application of different analytical techniques, the addition of unlabelled ingredients can be detected. The method could be applied to several steps of the production chain.

Prevents

Adulteration of pasta by exogenous materials (e.g. emulsifying agents)

Read the entire abstract: **www.foodintegrity.eu**

Quantification of beef and pork meat species in highly processed food: application on *Bolognese* sauce

Organisations

• *Advanced Laboratory Research, Barilla SPA*
• *Siteia - Università di Parma*

Authors

Francesca Lambertini, Andrea Leporati, Michele Suman, Barbara Prandi, Stefano Sforza

Product

Bolognese sauce
(Highly processed meat-based food matrices)

Aim

Detection and quantification of beef and pork meat species

Method

HPLC/ESI-MS/MS
(High Performance Liquid Chromatography / Electrospray Ionisation Tandem Mass Spectrometry)

Outcomes

The method, successfully developed and validated, could be implemented in food industries to check the meat composition of raw materials, intermediate and final products. It involves the use of relatively low cost instruments and does not require highly specialised technicians.

Prevents

Adulteration of meat based products by the introduction of undeclared species

Read the entire abstract: **www.foodintegrity.eu**

UHPLC/ESI-MS/MS detection of technical enzymes in wheat flour

Organisations

• *Advanced Laboratory Research, Barilla SPA*
• *Siteia - Università di Parma*

Authors

Francesca Lambertini, Barbara Prandi, Michele Suman, Andrea Leporati, Giovanni Tribuzio, Guido Arlotti, Stefano Sforza

Product

Soft wheat flour

Aim

Detection of commercial enzymes in wheat based bakery products

Method

UHPLC/ESI-MS/MS
(Ultra High Performance Liquid Chromatography / Electrospray Ionisation Tandem Mass Spectrometry)

Outcomes

The method is suitable to detect the addition of commercial enzymes used in bakery productions as technological adjuvants to soft wheat flour.

Prevents

Undeclared addition of exogenous enzymes to bakery products

Read the entire abstract: **www.foodintegrity.eu**

Intelligent Quality Assurance - non-targeted analysis to determine biomarkers associated with meat discolouration

Organisations

• Fera Science Ltd
• National Agri-Food Innovation Campus (York)

Authors

James Donarski, Mark Harrison, Mike Dickinson

Product

Fresh raw beef

Aim

Identification of the cause of meat discolouration during packing processing.

Method

NMR, LC-HRMS
(Nuclear Magnetic Resonance, Liquid Chromatography - High Resolution Mass Spectrometry)

Outcomes

The identification of protein metabolites and the observation of the processing methods adopted by the industry led to the conclusion that the heat from the processing facilities was inducing discolouration.

Prevents

Production of discoloured beef

Read the entire abstract: **www.foodintegrity.eu**

Detection of the fraudulent adulteration of vinegar and balsamic vinegar using Isotope Ratio Mass Spectrometry Analysis

Organisations

• *Food Quality and Nutrition Department (Research and Innovation Centre, Edmund Mach Foundation)*

Authors

Luana Bontempo, Federica Camin

Product

Vinegar, *Aceto Balsamico di Modena IGP* (ABM)

Aim

Identification of adulterant substances into vinegar

Method

IRMS (Isotopic Ratio Mass Spectrometry)

Outcomes

The EU official methods currently used to detect the fraudulent addition of water and exogenous sugars to grape must and wine can also be applied to wine vinegar and ABM.

Prevents

Fraudulent adulteration of vinegar or ABM not in compliance with law and/or PDO protocol requirements

Read the entire abstract: **www.foodintegrity.eu**

Protecting PDO, PGI and TSG cheeses against mislabelling frauds using Isotope Ratio Mass Spectrometry analysis

Organisations

• *Food Quality and Nutrition Department (Research and Innovation Centre, Edmund Mach Foundation)*

Authors

Luana Bontempo, Federica Camin

Product

PDO cheeses *(Grana Padano, Parmigiano Reggiano)*

Aim

Validation of the use of isotopic and elemental composition methods to detect the origin of cheeses used to prepare pre-packed products, when the usual check on the PDO logo on the rind is not possible

Method

IRMS (Isotopic Ratio Mass Spectrometry)

Outcomes

The approach proved to be suitable to verify PDO cheeses mislabelling. The performance data obtained were submitted to the Italian standardisationagency UNI (Italian Organisation for Standardisation) to obtain the official recognition of the method.

Prevents

Mislabelling of PDO dairy products

Read the entire abstract: **www.foodintegrity.eu**

Detection of the fraudulent adulteration of Italian citrus juices using Isotope Ratio Mass Spectrometry analysis

Organisations

• *Food Quality and Nutrition Department (Research and Innovation Centre, Edmund Mach Foundation)*

Authors

Luana Bontempo, Federica Camin

Product

Citrus juices

Aim

Determination of characteristic variability ranges for stable isotope ratios in several fractions of Italian citrus juices and assessment of their compliance with those established by the European Fruit Juices Association

Method

IRMS, SNIF-NMR
(Isotopic Ratio Mass Spectrometry, Site specific Natural Isotopic Fractionation - Nuclear Magnetic Resonance)

Outcomes

AIJN thresholds are not always fully applicable to samples of Italian fruit juices.
In light of the results obtained, a commentary note updated on the Italian data will be added to the AIJN Code of Practice.

Prevents

Addition of sugar/water to fruit juices; substitution of raw materials

Read the entire abstract: **www.foodintegrity.eu**

Detection of the fraudulent adulteration of Italian tomato *passata* using Isotope Ratio Mass Spectrometry analysis

Organisations

• *Food Quality and Nutrition Department (Research and Innovation Centre, Edmund Mach Foundation)*

Authors

Luana Bontempo, Federica Camin

Product

Tomato *passata*

Aim

Definition of a characteristic range of $\delta^{18}O$ values for the natural Italian tomato *passata* in order to establish a threshold limit that could eventually become official and be adopted to implement the Ministerial Decree (D.M. 23rd September 2005)

Method

IRMS, SNIF-NMR
(Isotopic Ratio Mass Spectrometry, Site specific Natural Isotopic Fractionation - Nuclear Magnetic Resonance)

Outcomes

AIJN thresholds are not always fully applicable to samples of Italian tomato juices. In light of the results obtained, a commentary note updated with data on the authentic samples of tomato sauce 'passata' (Brix degree from 7.5 to 11.9) will be added to the AIJN Code of Practice. Moreover, the introduction of this kind of product in the AIJN guidelines has been asked.

Prevents

Addition of water; dilution of tomato *passata*

Read the entire abstract: **www.foodintegrity.eu**