Welcome to the eighth FoodIntegrity Newsletter, a conference special edition. The 5th FoodIntegrity conference, Assuring the integrity of the food chain, Delivering real world solutions, took place in Nantes on 14-15 November and showcased the latest research and state of the art solutions for tackling food fraud. With ~300 attendees from over 40 countries, this multidisciplinary conference provided the participants with 57 presentations, 70 posters, a demo corner, 2 workshops and 1 debate. Looking at diverging techniques from blockchain to non targeted analysis, gene editing to international trade there was something for everyone during the 1.5 day conference. The event was also the perfect setting to launch a free handbook of analytical methods HANDBOOK.

Many thanks to hosts Eurofins and their conference team for an excellently organised conference and special thanks to their lead Jean-Francois Morin for the smooth running of the excellent event and for looking so calm throughout! You can find lots more information about the conference at www.foodintegrity2018-nantes.eu/.

Although FoodIntegrity, the project comes to a close soon, the conferences have been such a success that we hope to shortly announce FoodIntegrity 2020 in conjunction with a partner - watch this space!

Hope you enjoy the Newsletter and best wishes for the festive season.

Guest Editor, Professor Paul Brereton - Queen’s University Belfast

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**Strategic Look from the Big Players and Hot Topics Session**

**Verda Fazlic – Fera Science Ltd.**

The 2018 FoodIntegrity conference commenced with two plenary sessions looking at the perspective of key stakeholders as well as introducing key areas of importance for the future.

Peter Whelan (Food Safety Authority of Ireland), spoke of the investigations of food fraud that lead to court cases and of the complications that sometimes arise. Thousands of Euros spent on investigations for a few hundred Euros fine, the invisible players in the food industry with the most opportunities to commit crimes and the need for science to be consistent, as the lawyers will always attack any weaknesses in the process.

Elke Anklam of the JRC talked about their role in countering food fraud and briefed the audience on the EC Knowledge Centre on Food Fraud & Food Quality that they host.

After the break we commenced with a presentation from Antoine Kastler, the president of the European Flavour Association on the strategy of the flavour industry on vanilla and vanilla extracts. He gave an overview on the state of the world’s favourite flavour, and the challenges faced due to the fact that 80% of the beans come from one island, Madagascar. The other complexities that lie in the interpretation of the “natural vanilla flavour” labels and the industry’s commitment to secure sustainable sourcing of the beans, when resources are strained.
Clare Menezes offered the McCormick perspective on the herb and spice trade and its challenges, while also offering ways that the organisation have worked towards protecting the integrity of their supply chains and how use short supply chains in order to ensure authenticity of their products.

Michael Haverty of Andersons Centre discussed trade barriers and global agri-food trade, with soya bean as an example. He highlighted that trade barriers that can open gaps and provide motivations for fraud to occur and referenced Brexit and its potential impact on trade.

Finally, the complex topic of new breeding techniques, their regulation and analytical challenges was described by Mathieu Rolland of Anses, Plant health Laboratory. Mathieu managed to keep the audience’s attention by explaining such a complex process of genome editing with such ease and simplicity, that even the non-scientists in the audience were fascinated.

From Left: Paul Brereton (QUB), Elke Anklam (JRC), Razvan Anistoroaei (DG Research), Peter Whelan (FSAI), some of the key speakers in the plenary sessions

**FoodIntegrity Conference – Nantes 2018**

**Complex foods: tools for food authenticity assessment**

*Michele Suman – Barilla Group (Work Package 10 Lead)*

The topic of complex foods and how to deal with them through tools for food authenticity assessment was surely one of the main arguments within FoodIntegrity project and final conference as well.

Three lessons learned in this sense are:

1. Proteomics strategies have emerged recently as novel and powerful tools to address different aspects of food authenticity (e.g. differentiate mozzarella from cow and buffalo, differentiate tomato varieties,
identify animal species in processed meat, etc...): the identification and evaluation of specific marker peptides is key for the subsequent development of targeted mass spectrometry-based detection methods.

- 2. High-resolution 'H-NMR spectroscopy and Mass Spectrometry, combined with multivariate statistical chemometrics, provide unique capabilities for food authenticity control, yielding targeted quantification of selected compounds as well as untargeted fingerprinting.

- 3. Multi-disciplinary approaches are growing in order to identify and trace reliable markers (chemical and DNA-based) for: (i) authenticating specific added-value products such as for instance Manuka honey, (ii) constructing a tool-kit from different methods to verify integrity/stability from raw to processed complex foods such as multi-functional-ingredient biscuits.

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**The lab comes to the factory**

*Diego Luis García Gonzalez – CSIC Insituto de la Grasa (Work Package 4 Lead)*

The speakers of this session dealt with the latest advances in the innovative methods for the analysis of foods with authentication or control purposes. Dr. Acutis presented a mobile app called F.I.S.HUB to verify fish species. The software associated with this app is able to identify the species of a fish from its picture by means of a photo database and a machine-learning server for image analysis and classification. The app is now ready to be downloaded and it is available on iTunes. At this time, there are 26 species identifiable in the database. Dr. Goodall explained the place of portable technologies based on UV-Vis, NIR and Raman spectrosopies, pH and conductivity analysis pens, and handheld density meters in detecting spirit drinks fraud. In the line of portable instruments, Dr. Weesepoel explained the objectives and first results of PhasmaFOOD project. This project aims at delivering a miniaturized multi-sensor optical sensing device for the detection of food safety threats (food spoilage, food fraud and aflatoxins). The system is based on heterogeneous fluorescence, visible and near infrared spectroscopy technologies. Finally, Dr. Garrido-Varo described the on-site analysis of individual pork carcasses for the predictions of quality parameters in Iberian ham by using NIRS portable devices. In particular, these devices were used for on-site quantitative (fatty acid profile) and qualitative (Premium, Non-premium) analysis of individual Iberian pork carcasses at the slaughterhouse.
Transparency and trust in the food chain
Shefalee Loth · WHICH? Principal Food Investigator/Writer

We had an interesting session on the afternoon of the first day of the conference titled ‘Transparency and trust in the food chain’. Firstly Neils Lucas Luijckx (TNO, Netherlands) presented on how data sharing can be a solution to identify food issues early, followed by Gerald A. Herrmann (Organic Services, Germany) who presented on how in the case of organic fraud, production volumes can be compared with trade volumes to detect fraud. Organic Services has created a cloud-based audit tool which can track movement of goods along the supply chain to ensure integrity.

This was followed by Fiens Minnens (Ghent University, Belgium) who talked to the attendees about stakeholder concerns and what’s needed for information sharing systems to be successful, and Carla Alegria (CFiencias.ID) describing the methodologies the group is using to authenticate high value foods from the Mediterranean such as the Black Iberian pig. There was an interesting discussion about how the Organic Services and REALMed approaches could be extended to other food and drink products and what we need to do going forward to encourage stakeholders to share information and intelligence openly.

Standardisation: new initiatives
Paul Brereton · QUB (FI Scientific Coordinator)

Petter Olsen (Nofima) gave an overview to the packed room on the CEN workshop agreement that has produced a standardised definition of terms. The Agreement provides a very systematic approach with clear definitions and a hierarchy of terms. Diana Banati and Bert Popping (ILSI) provided an overview of the work ILSI are intending to do in this area which included mapping out all the relevant ongoing activities at a global level. Bruno Sechet (IFS) explained the role that food safety play in the food fraud arena. Finally Joanne Carter (on behalf of IFAAO) gave a transatlantic view and demonstrated that there is still a lot of work to do globally to harmonise in this area.

Molecular biology approaches to food integrity
Elena Maestri · SITEIA Parma

On Wednesday 14th November, the Parallel Session 7 “Molecular biology approaches to food integrity” was chaired by Elena Maestri and Thomas Charrier, with Claire Sykes as support.

Five speakers presented the results of their work on novel approaches based on Next Generation Sequencing, metabarcoding and techniques for DNA analysis. It was a welcome occasion, after 5 years of FOODINTEGRITY, to hear about this aspect of food integrity assessment.
The discussion focused on the possibility for developing methods for online analysis, optimisation of methods for different animal or plant species, and comparisons with other methods for identification of origin. The possibility of using NGS as a tool for geographical authenticity assessment was also discussed.

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Available IT resources for food authentication
James Donarski – Fera Science Ltd. (Project Coordinator)

The session covered a wide variety of IT tools that have been developed within the food authenticity arena: from detecting where it might (Early Warning System, James Donarski, Fera Science Ltd) or has (website monitoring for reported incidences, Hans Marvin, RIKILT Wageningen) occurred; what to look for in an ever changing environment (Food authenticity risk assessment, Eric Jamin, Eurofins); what analytical methods are available (Food Authenticity Knowledge Base, Alain Maquet JRC, European Commission) or are being developed by regulators (FARNHub, Philippe Vermeulen, CRA-W, Belgium) to detect it; what can be done to prevent it (Industrial Integration Tools, Michele Suman, Barilla SpA); and how to develop a network and community where those that require authenticity solutions can interact (The Food Authenticity Network, Selvarani Elahi, LGC, UK).

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Organic food authentication
Jean-François Morin – Eurofins (Work Package 2 Lead)

Organic food authentication is a challenge from an analytical and traceability point of view. However, the need for tools and methods to ensure integrity in this sector has never been so big, because of high prices, a demand exceeding largely the offer and perfectible controlling tools. A review of the state of the art of analytical methods showed that tools are already available for food manufacturers who want to secure their supply chain. Cloud-based tools to verify real-time organic certificates, cross-checking with data from acreage and yields, and mass-balance analysis help to ensure reliability of the traceability chain. Finally, new research approaches for improving confidence in authenticity tests are also explored by researchers. Thus the discussion ended on optimistic note from all the speakers: it will be possible to guarantee genuine organic products in the future.

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Tools and needs for the future: gap analysis, interactive workshop
Saskia van Ruth - RIKILT (Work Package 3 Lead)

In the workshop on tools and needs for the future in the final FoodIntegrity conference in Nantes (Session 10), the various steps towards the identification of food integrity research needs over the past five years were discussed. Three main themes identified are: (A) fraud prevention, (B)
within each theme 5 topics were presented. Each participant indicated his/her perceived priority for the 5 topics of each theme. This resulted in an overall ranking of the topics which was presented in the plenary session 15 ‘Forward look’ on November 15.

FoodIntegrity Conference – Nantes 2018

Young science: POSTER AWARD WINNERS

**Gold**: Application of GC-IMS to discriminate virgin olive oils according to their sensory grades

Enrico Casadei, Filippo Panni, Enrico Valli, Alessandra Bendini, Cesare Rossini, Chiara Cevoli, Diego Luis García Gonzalez, Tullia Gallina Toschi
1-Alma Mater Studiorum - Università di Bologna, Bologna, Italy
2-LabService Analytica, Bologna, Italy
3-Instituto de la Grasa, Sevilla, Spain

**Silver**: Development of a Next Generation Sequencing (NGS) workflow for food DNA analysis: How to identify meat and fish species in complex food products

Nogueira, S. 1, Manolis, A. 2, Gadanho, M. 1, Chaves, S. 1
1-SGS Molecular, Lisbon, Portugal
2-Thermo Fisher Scientific, Austin, USA

**Bronze**: NGS un-targeted approach for herbs and species identification

Pellesi Roberta, Zanardi, S. 1, Mourinha Chaves, S. 2, Nogueira, S. 2, Gadanho, M. 2, Leporati, A. 1, Suman, M. 1
1-Advanced Laboratory Research, Barilla, Parma, Italy
2-SGS Molecular, Lisbon, Portugal

Industry are the main victims of food fraud? A debate on a new paradigm

Paul Brereton – QUB (FI Scientific Coordinator)

The conference held an innovative debate “The food industry is the main victim of food fraud?” Myself (Queen’s University Belfast) Beate Kettlitz (Food & Drink Europe), Shefalee Loth (Which?) and Eric Marin (DG Sante) took part in a 90 minute session excellently facilitated by Lucy Foster (Defra) and which culminated in an audience vote. I put forward the motion that although the consumer was sometimes affected they were rarely the target of the fraud with the vast majority of transactions being business to business. In addition the current sole focus on the consumer was unproductive as it was not addressing the cause of the problem, i.e. the complete lack of protection for the small businesses in the food chain. Beate reinforced the point that industry wanted rigorous standards and penalties in order to remove malevolent actors from the supply chain. However Shefalee and Eric won the vote, successfully arguing that consumers interests had to be paramount and that in many respects industry were victims of their own design. We did all agree however,
through another vote, that we should perhaps be moving the focus from protecting the consumer, to protecting society, from food fraud. Perhaps the subject of our next debate...

**FoodIntegrity Conference – Nantes 2018**

**Targeted versus non-targeted: problems and solutions**

*James Donarski – Fera Science Ltd. (Fi Coordinator)*

It has been demonstrated that those that commit food fraud are adaptable in their methods, and that they’re able to innovate to beat authenticity tests that rely on markers of fraud. The paradigm of non-targeted methods has evolved, where many analytes are measured simultaneously to define the foodstuff. Normality is measured and therefore frauds detected when foodstuffs are manipulated outside these normal parameters. This session gave guidance and examples of non-targeted analysis. As with newly emerging topics there are no standards and this session covered what the challenges and the solutions are. Kristian Holst Laursen (University of Copenhagen, Denmark) gave an overview of his manuscript on naming conventions, whereas Michele Suman (Barilla SpA, Italy), Carolin Lörchner (German Federal Institute for Risk Assessment, Germany) and Vito Gallo (Politecnico di Bari, Italy) gave examples of the use of non-targeted analysis for mass spectrometry, FT-IR and NMR spectroscopy respectively. Marco Arlorio (Università degli Studi del Piemonte Orientale “A. Avogadro”, Italy) wrapped up the session with guidance on the thorny issue of validation of non-targeted methods.

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**Will Blockchain really solve our food fraud problems?**

*Niels Lucas Luijckx – TNO (Work Package 17 Lead)*

Did the session answer the question? Well, yes and no. Most attendees that I talked to afterwards were clear on two things, they had learned a lot on what blockchain actually is and they concluded that it may be part of a solution on certain problems in the food chain. However, not a complete solution nor will it solve food fraud problems in general. After a short introduction by the chair people were set to listen to the three speakers. Petter Olsen (Nofima, Norway) was the first and he gave a very good overview of the blockchain technology and its potential application in a part of tracking and tracing. Blockchain is in fact a database with some specific characteristics (it is Distributed Ledger technology). Blockchain is hyped these days because of two distinct
characteristics: once data is entered it is unchangeable (and verified) and it is transparent for all users. If you put in false data, it may haunt you “forever”.

Fiona Delaney (Original Chain, Ireland) spoke about authenticity in the agri-food chain, specifically organic, and the systems to guarantee that. Such systems must have multiple perspectives on the chain, the individual producers and the produce itself. Central in these systems is information, stored in databases. One of these could be and is blockchain only in the core to have a firm basis of unchangeable and transparent information.

Finally, Christoph Jansen (Mettler-Toledo, Switzerland) put blockchain in a perspective of several ways to safeguard information and prevent fraud, with a focus on laboratory analytics. He also warned for the general and implicit unsafety of all kinds of hardware and software and implicitly predicted that blockchain will be ‘hacked’ in some future time.

Although the session question was not specifically answered, it was addressed well and all three speakers sounded critical to the hype that blockchain will solve problems. We had a good session and a good discussion afterwards.

**FoodIntegrity Conference – Nantes 2018**

**Forward look: future research and innovation needs for the food sector**

*Paul Brereton – QUB (FI Scientific Coordinator)*

This final plenary session focused on the key research needs for the future and had presentations from Razvan Anistoroaei (DGRTD), EIT Food Mercedes Groba (EIT Food), Lucy Foster (DEFRA, UK), presenting on behalf of Authent-Net www.authent-net.eu/) and Saskia van Ruth (RIKILT/Wageningen), presenting on behalf of FoodIntegrity.

Razvan Anistoroaei provided the audience into current thinking for Horizon Europe. He emphasised the key place Food Systems will have in delivering Food 2030 goals and that food safety and authenticity are important components of such systems.

Mercedes presented EIT Food’s strategic research agenda and it key role in “delivering an innovative sector that produces healthy and sustainable food, trusted by society”.

Lucy presented the latest thinking on how Member States funding bodies are hoping to work together in the future, collaboration initiated through the H2020 project Authent-Net.

Saskia presented the latest results from a series of iterative workshops that have taken place throughout the lifetime of the project. Key areas that were highlighted were:

- Food fraud risk analysis
- Non-analytical (food fraud) prevention tools
- Food fraud prevention integration into Food Safety Management Systems
- Rapid fraud detection tools
- Methods harmonisation
- Authentication of complex foods
- Increasing consumer confidence
- Accurate information to consumers
Where to find more information? How to Get Involved?

The **FoodIntegrity Website** is the best place to find all the information about the project and its activities.

- To learn more about the project: **ABOUT FI**
- To download the Infographics: **INFOGRAPHICS**
- To see the current project results: **FI RESULTS**
- To download the FI Handbook: **HANDBOOK**
- To access the FI YouTube Channel: **YouTube**
- To access the information for the past FI conferences: **DISSEMINATION**

The website also offers a look into the news articles about food fraud as well as many food fraud events around the world.

- Register for project communications.
- Please click here to register to be a part of the FoodIntegrity Network.
- Follow FoodIntegrity on **Twitter** or join the Network Group on **LinkedIn**.

Dates for Diary:

**FoodIntegrity Associated events:**

**Food Fraud Conference** 28 February 2019, London, UK

**External events:**

**GFSI Conference**
25-28 February 2019, Nice, France

**Global Food Summit**
20-21 March 2019, Munich, Germany

**1st GHI World Congress on Food Safety and Security**
24-28 March 2019, Leiden, The Netherlands

**3rd International Conference on Food and Nutritional Sciences**
5-16 April 2019, Paris, France

**6th International Conference on Food Security and Nutrition (ICFSN 2019)**
8-10 April 2019, Barcelona, Spain

**XX. EUROFOODCHEM**
17-19 June 2019, Porto, Portugal

**133rd AOAC Annual Meeting & Exposition**
8-11 September 2019, Denver, Colorado, USA

**11th World Mycotoxin Forum**
14-16 October 2019, Belfast, UK

**9th International Symposium on Recent Advances in Food Analysis (RAFA 2019)**
5-9 November 2019, Prague, Czech Republic

**33rd EFFoST International Conference 2019**
12-14 November 2019, Rotterdam, The Netherlands

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We hope you have found this e-Newsletter interesting and informative. We would welcome your views on any of the issues covered. Please email foodintegrity@fera.co.uk. Please feel free to distribute this FoodIntegrity e-Newsletter to other interested parties.

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