FOODINTEGRITY
Ensuring the Integrity of the European food chain

613688: Collaborative Project

Seventh Framework Programme
KBBE.2013.2.4-01: Assuring quality and authenticity in the food chain

Deliverable: D11.4
Title: Completion of 5 planned international conferences

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Beneficiary(s): VSCHT, Prague, Czech Republic; FERA, York, UK; AZTI, Bilbao, Spain; Barilla, Parma, Italy; Eurofins, Nantes, France

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Disclaimer: The information expressed in this deliverable reflects the authors’ views; the European Commission is not liable for the information contained therein.
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1  Description of Deliverable

An important goal of the FoodIntegrity project is to facilitate transfer of knowledge among the partner organisations and also outside the project consortium, in order to stimulate collaboration and overall scientific excellence in the European Union and worldwide and establish a European basis for permanent education in the field of food integrity. To support this objective, the Deliverable D11.4 was focused on knowledge transfer of the FoodIntegrity results through series of FoodIntegrity conferences.

2  Approach

International conferences on the topics of Food Safety/Quality/Authenticity/Integrity were held annually with the aim to disseminate information about the project progress and outcomes to all interested stakeholders. The VSCHT team, experts in the conference organisation, organised one of the events and helped and supervised organisation of other FoodIntegrity conferences.

3  Achievement of Deliverable

During 5 years of the FoodIntegrity project duration 5 closed consortium meetings followed by food integrity stakeholder events were organized:

- Food Fraud – The Analytical Tools Conference, 24-28 February 2014, by FERA, York, UK
- Assuring the integrity of the food chain: Food authenticity research priorities and funding opportunities, 24-27 March 2015, by AZTI, Bilbao, Spain
- Assuring the integrity of the food chain: Fighting food fraud, 6-7 April 2016, by VSCHT, Prague, Czech Republic
- Assuring the integrity of the food chain: Turning science into solutions, 10-11 May 2017, by Barilla, Parma, Italy
- Assuring the integrity of the food chain: Delivering real-world solutions, 14-15 November 2018, by Eurofins, Nantes, France

Following chapters provide summary on individual conferences.

Information on all FoodIntegrity conference is available from the project website www.foodintegrity.eu, subpage Dissemination (see Figure 1).
Figure 1 Screenshot of webpage with the information on all FoodIntegrity conferences
3.1 1st FoodIntegrity conference

The 1st international week-long series of events on the food authenticity „Assuring the Integrity of the food chain: food fraud – the analytical tools“ made the start of the FoodIntegrity project. It was held at the Food and Environment Research Agency (FERA) on 24-28 February 2014 and included following events:

- **Workshop: Detecting the Unexpected**
  24 February 2014
  This scientific workshop explored the use of state-of-the-art non-targeted methods for chemical analysis and molecular biology through a number of short presentations. Structured discussions have been then used to articulate the new challenges this technology offers and help bring focus to the needs of this developing technology.

- **FoodIntegrity Consortium Meeting (invitation only)**
  24–26 February 2014
  Although this event was for the project partners only, the consortium members were participating in the other day’s events where there were excellent opportunities to network and discuss potential collaborations.

- **Conference: ‘Food Fraud - the Analytical Tools’**
  27 February 2014
  The Defra sponsored conference aimed to report the development and use of state-of-the-art methods to assure food authenticity. The event brought together government, academia, industrial scientists and stakeholders to identify research and survey needs that should help to protect consumers by addressing food fraud and misleading food labelling.

- **Workshop: Determining the Geographical Origin**
  28 February 2014
  The workshop was valuable for technical experts, manufacturers, end-users, policy makers, regulators and anyone wishing to understand more about techniques and methods used to assure the integrity of the food chain.

In general, presentations given during these events looked at existing and potential methods to combat food fraud. It also gave participants the opportunity to highlight emerging issues and gaps in analytical technology.

More than 200 delegates from 28 countries, representing a range of stakeholders from food control authorities and laboratories, trade organisations, researchers and the food industry, registered for this event.

For program of the conference see Annex I.
For more information and presentations visit: https://secure.fera.defra.gov.uk/foodintegrity/index.cfm?pageid=11
3.2 2nd FoodIntegrity conference

The 2nd closed consortium meeting followed by a food integrity stakeholder event “Assuring the integrity of the food chain: food authenticity research priorities and funding opportunities”, organised by AZTI-Tecnalia, was held in Bilbao, Spain, on 24-27 March 2015.

Nearly 170 delegates from 24 countries representing a range of stakeholders from food control authorities and laboratories, trade organisations, researchers and the food industry, attended this event.

The meeting included the following events:

- 2nd meeting of the FoodIntegrity consortium (24–25 March 2015)
- 2nd FoodIntegrity conference “Assuring the integrity of the food chain: food authenticity research priorities and funding opportunities” (26 March 2015)

This conference presented the latest research outputs in the field of food integrity from the FoodIntegrity project and outside, and details of funding opportunities for research on food authenticity; 20 lectures were given by FoodIntegrity and invited experts and 33 posters were presented (for agenda see Annex II).

3 posters were awarded by the FoodIntegrity poster awards:

(i) Non-destructive determination of chicken filet adulteration by near-infrared spectroscopy
Yannick Weesepoel¹, Eleftheria Tzoumeleka¹, Rita Boerrigter-Ennling², Saskia Van Ruth¹,²
¹RIKILT Wageningen University and Research Centre, The Netherlands
²Food Quality and Design Group, Wageningen University, The Netherlands

(ii) A non-targeted fingerprinting approach for authenticity testing of spices and herbs using spectroscopy and chemometrics
Janet Riedl, Carsten Fauhl-Hassek, Susanne Esslinger
Federal Institute of Risks Assessment, Berlin

(iii) High efficient DNA extraction from oil samples through microscale solid phase extraction (μSPE) on functionalized micropillars
Marta Prado, Karola Böhme, Lorena Diéguez
INL – International Iberian Nanotechnology Laboratory, Braga, Portugal

Summary of topics presented at conference is listed below:

- Stakeholder perspectives from regulatory, industry and consumer sectors
- Latest research from FoodIntegrity
  - Development of an Early warning system for predicting food fraud
  - European expert network on food authenticity
  - European knowledgebase on analytical methodology and databases for food authenticity
  - Chinese consumer attitudes to European products
- Research priorities and calls
  - Establish how researchers can apply to access the 2015 FoodIntegrity research calls
  - Horizon 2020 strategic requirements in the food sector
  - Future research on food authenticity

Topics of a series of the workshops (27 March 2015) (see Annex II for programs of individual workshops):

- Keeping safety and integrity in the food chain: A view from many sides
Food integrity and food authenticity are new buzz words, defined in part as undiminished foods that are in perfect condition. The SAFE consortium message is that food safety is an integral part of food integrity: a food whose origin is unknown cannot be assured to be safe. At this workshop, leading research scientists, industry representatives, consumer groups and regulators addressed the intersection of food safety and food integrity.

- **Formation of a Network of Excellence for Food Authenticity Analysis: The Key Challenges**

  The aim of this workshop was to formulate the rationale for a Network of Excellence (NoE) for Food Authenticity. The key objective of the proposed NoE will be to help solve the large number of challenges associated with Food Authenticity including (i) the development and standardisation of sampling and detection methodology for a wide range of foodstuff, (ii) information and technology transfer, (iii) formation of working groups and (iv) staff exchanges between participating laboratories.

- **Early Warning System**

  The eventual goal was to identify food products and ingredients most susceptible to food fraud and rank these according to industry experts’ beliefs about levels of fraud risks with these products and ingredients, considering a number of relevant key factors including the characteristics of products and ingredients and supply chains, the existing industry and regulatory capacity to detect fraud and level penalties faced by fraudsters operating in these chains. The information gathered at the workshop will feed into the development of an early food fraud warning system designed to help industry and regulators to better anticipate possible fraud incidents across main food supply chains.

For more information and presentations visit:

- Conference website on [http://www.azti.es/foodintegrity/](http://www.azti.es/foodintegrity/)

- Agenda of the conference and workshops on [http://www.azti.es/foodintegrity/programme-2/](http://www.azti.es/foodintegrity/programme-2/) (see also Annex II)


**Figure 2** Screenshot of the 2nd FoodIntegrity conference website
Figure 3 Photos taken during the 2nd FoodIntegrity conference (examples)

John O’Brien, Nestle, Key note speaker

Peter Whelan, FSAI, Key note speaker

Paul Brereton, FERA, FoodIntegrity coordinator
Begoña Perez Villarreal, AZTI, conference organizer

Michele Lees and Miles Thomas, representatives of WP Knowledge base

Nearly 170 delegates from 24 countries attended the 2nd FoodIntegrity conference “Assuring the integrity of the food chain: food authenticity research priorities and funding opportunities”

Discussion groups
3.3 3rd FoodIntegrity conference

The 3rd closed consortium meeting followed by a food integrity stakeholder event “Assuring the integrity of the food chain: fighting food fraud”, organised by the University of Chemistry and Technology, Prague, was held in Prague, Czech Republic, on 4-7 April 2016.

260 delegates from 37 countries representing a range of stakeholders from food control authorities and laboratories, trade organisations, scientific community, food industry, media and producers of analytical instrumentation and consumables, attended this event.

To compare with previous FoodIntegrity conferences, growing interest in food integrity topic has been evidenced by growing number of attendees, growing number of applications for oral presentations and also number of high quality posters presented during the poster session.

Program of the conference included 43 lectures given by FoodIntegrity and invited experts and 111 posters (for agenda see Annex III).

**Figure 4** Program of the FOODINTEGRITY 2016 conference at a glance

<table>
<thead>
<tr>
<th>Time / Date</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
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<tbody>
<tr>
<td>8:00-9:00</td>
<td>Registration for the FOODINTEGRITY 2016 conference</td>
<td>Registration for the FOODINTEGRITY 2016 workshops</td>
</tr>
<tr>
<td>9:00-10:00</td>
<td>Welcome</td>
<td>Session 6: Workshop: Food Crime, occurrence, motivations and mitigations (part 1)</td>
</tr>
<tr>
<td>9:20-10:20</td>
<td>Primary Session: Integrity along the food chain: Setting the scene</td>
<td>Session 8: Workshop: Industrial perspective for strategies applied for assuring food authenticity (part 2)</td>
</tr>
<tr>
<td>10:20-10:50</td>
<td>Coffee break / Poster session / Exhibition</td>
<td>10:30-10:00 Coffee break / Poster session / Exhibition</td>
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<tr>
<td>10:50-12:45</td>
<td>Session 7: Gaps in current research on food authenticity: New projects funded by the FoodIntegrity on topics: Non targeted analysis Complex foods Transparency along the food chain Rapid methods</td>
<td>11:00-12:00 Session 7: Workshop: Food Crime, occurrence, motivations and mitigations (part 1)</td>
</tr>
<tr>
<td>12:45-14:30</td>
<td>Lunch / Poster session / Exhibition / Vendor seminars / Demonstration of the approaches for food authentication developed by FoodIntegrity project</td>
<td>13:00-14:00 Session 9: Workshop: Industrial perspective for strategies applied for assuring food authenticity (part 2)</td>
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<tr>
<td>14:30-16:00</td>
<td>Session 2: Citizen and consumer science approaches to food integrity</td>
<td>Session 4: Analytical tools for food authentication</td>
</tr>
<tr>
<td>16:00-16:30</td>
<td>Coffee break / Poster session / Exhibition</td>
<td>Session 5: Authenticity of herbs and spices</td>
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<td>16:30-18:00</td>
<td>Session 3: Tools for food integrity assessment</td>
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<tr>
<td>18:00-21:00</td>
<td>Conference dinner</td>
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<tr>
<td>20:00-23:00</td>
<td>Poster award ceremony</td>
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The meeting included the following events:

- **3rd meeting of the FoodIntegrity consortium** (4-5 April 2016)
- **3rd FoodIntegrity conference “Assuring the integrity of the food chain: fighting food fraud” (FOODINTEGRITY 2016)** (6-7 April 2016)

The 3rd conference was focused on the latest research outputs on developments and strategies in the field of food integrity - safety, quality, authenticity and traceability, from the project and beyond, including:

- **Gaps in current research on food authenticity: Introduction of new projects funded by the FoodIntegrity on topics**
  - Non targeted analysis
  - Complex foods
- Transparency along the food chain
- Rapid methods

- Analytical tools for food authentication
- Tools for food integrity assessment
- Demonstration how a European knowledgebase on analytical methodology and databases for food authenticity can be exploited by stakeholders

In addition, series of workshops & oral sessions have been organized on:

- Citizen and consumer science approaches to food integrity
- Authenticity of herbs and spices
- Food Crime, occurrence, motivations and mitigations
- Industrial perspective for strategies applied for assuring food authenticity

Topics of a series of the workshops (7 April 2016) (see Annex III for programs of individual workshops):

- Workshop: Food Crime, occurrence, motivations and mitigations

  There has been a significant increase in the social science research into Food Crime over the past four or five years and it brings together diverse disciplines. The science of fraud detection has relied on new methods of testing and increased levels of audit. This scientific work has a social dimension and the development of a theoretical criminological approach to understanding food crime is innovative and exciting. However, the detection food fraud happens ‘after the event’ of fraud or adulteration, testing identifies the adulterated product.

  The aim of this workshop was to bring together criminologists and social scientists working in the area of food crime with those working in the food industry to explore the activity of food crime from different perspectives.

  The objectives of the workshop were to:

  i. Provide a number of different papers that discuss the issue of food crime from a range of perspectives and contribute to the developing theoretical framework to aid our understanding of food crime

  ii. To explore the different perspectives of the Social Sciences and how they enhance our understanding of food crime

  iii. Encourage and aid discussion and identify the emerging issues in the area

- Workshop: Industrial Applications for Assuring Food Authenticity (HOW TO IMPROVE PROTECTION FROM FOOD FRAUDS AND ADULTERATIONS)

European food is of prime importance to the European Agri-food economy.

The authenticity of European food and the integrity of supply chains is under constant threat from fraudulent activities.

The topic of assuring the integrity of the food chain brings together producers, distributors, processors, retailers, regulators, researchers, enforcers and consumers.

This workshop has been an opportunity for all these stakeholders to raise their awareness of food authenticity issues and get together in order to achieve the following objectives:
i. Share common relevant issues combined with best practices, enlarging the existing network and boosting exchange and collaboration

ii. Allow open and constructive discussions on how current research is expected to develop practical mitigation solutions for companies to use to protect themselves from food fraud

iii. Review all the relevant activities and tools that FoodIntegrity project has already made available and/or is developing for the industry (e.g. FI Network, FI Knowledge Base, ...)

3 posters were awarded by the FoodIntegrity poster awards:

- **1st Poster Award**
  
  Simon Hird, Waters, Wilmslow, United Kingdom: RAPID EVAPORATIVE IONISATION MASS SPECTROMETRY (REIMS) FOR FOOD AUTHENTICITY TESTING

- **2nd Poster Award**
  
  Angela Marseglia, University of Parma, Parma, Italy: GC-MS DETERMINATION OF CYCLOPROPANE FATTY ACIDS: A NEW TOOL AGAINST PARMIGIANO REGGIANO COUNTERFEIT

- **3rd Poster Award**
  
  Michal Stupak, University of Chemistry and Technology, Prague, Czech Republic: THE CRITICAL COMPARISON OF GC–HRMS AND DART–HRMS POTENTIAL FOR THE WHISKY AUTHENTICATION

Experience obtained within organization of the 1st OPEN DAY at RAFA 2015 (see D11.3) has been exploited during the FOODINTEGRITY 2016 conference. **Live demonstrations** of the approaches for food authentication developed by the FoodIntegrity project provided also to FOODINTEGRITY 2016 participants unique opportunity to discuss with FoodIntegrity experts the latest developments and strategies in the field of food integrity - safety, quality, authenticity and traceability. Collection of posters, slide shows and video has been presented in the demonstration hall; leaflets, newsletters, invitations to join FoodIntegrity network were distributed to attendees (see D11.3). In addition, specific olive oil tasting session has been organised to present the differences in the aroma of samples of virgin olive oils and their relation to quality and authenticity. It was great opportunity to learn more about one of the most appreciated food products in the Mediterranean diet and put some authenticity and integrity issues in practice. For program of the demo-cornes see Figure 5.

FoodIntegrity conference also hosted New Food (media partner of the conference) a **live roundtable event** about the gaps in current research in regards to food authenticity and its impact on the supply chain. Keynote speakers from the conference acted as participants, and many interesting points were raised, such as application of testing, food fraud, database development and emerging technologies.

As an important event concerned with food safety, quality and authenticity, FOODINTEGRITY 2016 conference also received **auspices of the minister of agriculture of the Czech Republic Marian Jurecka.**
**Figure 5** Program of Demo-corner activities at the 3rd FoodIntegrity conference
For more information and conference outcomes visit:

- Agenda of the conference and workshops on http://www.foodintegrity2016.eu/pdf/Program_FI_2016_04-04-2016_FINAL.pdf (see also Annex III)
- Roundtable discussion roundup (record) on http://www.newfoodmagazine.com/24155/blogs/foodintegrity-roundup-roundtable/?utm_medium=email&utm_campaign=NF%20-%20Contra%20Deal%20-%20Food%20Integrity&utm_content=NF%20-%20Contra%20Deal%20-%20Food%20Integrity+CID_bf15324e539fcee2fb9437a64aacbf7db&utm_source=Email%20marketing&utm_term=a%20live%20round%20table

Figure 6 Screenshot of the 3rd FoodIntegrity conference website
Figure 7 Photos taken during the 3rd FoodIntegrity conference (examples)

Opening session – FoodIntegrity coordinator and chair of the FOODINTEGRITY 2016 conference Paul Brereton (FERA)

Opening session – FOODINTEGRITY 2016 conference co-chair prof. Jana Hajslova (UCT Prague)

Audience of the FOODINTEGRITY 2016 conference

Keynote speaker Prof. Yongning Wu from China National Center of Food Safety Risk Assessment, Beijing, Chin

Keynote speaker Dr. Jeffrey C. Moore from US Pharmacopeial Convention, USA

FoodIntegrity coordinator Paul Brereton and WP3 leader Saskia van Ruth chairing session on Gaps in current research on food authenticity: New projects funded by FoodIntegrity
“Hands on” demonstration of authentication of spirit drinks
Preparations for olive oil tasting session
Evaluation of posters by poster award committee
Discussion during breaks
Workshop: Food Crime, occurrence, motivations and mitigations
Debate during the second part of the Workshop: Industrial Applications for Assuring Food Authenticity
3.4 4th FoodIntegrity conference

The 4th closed consortium meeting followed by a food integrity stakeholder event “Assuring the integrity of the food chain: turning science into solutions”, organised by Barilla and University of Parma, was held in Parma, Italy, on 10-11 May 2017.

350 delegates from 37 countries representing a range of stakeholders from food control authorities, EC representatives, governmental bodies, trade organisations, scientific community, food industry, control labs, media and producers of analytical instrumentation and consumables, attended this event.

Growing number of delegates for series of the FoodIntegrity conferences (150 / 170 / 260 / 350, for the 1st, 2nd, 3rd and 4th conference, respectively) evidenced interest in the food integrity topic and in outcomes of the FoodIntegrity project. The conference grew impressively compared to the event in 2016 in Prague confirming the growing importance of food integrity for protecting consumers from food fraud.

Conference offered well balanced programme advancing discussion and providing practical applications on food integrity, including 40 lectures given by the FoodIntegrity and invited experts and 100 posters. For the Program & Book of Abstracts of the 4th FoodIntegrity conference see the link http://foodintegrity2017-parma.eu/wp-content/uploads/2017/05/FoodIntegrity.book_of_abstract.Conference.2017.pdf (see also Annex V), for the final flyer on the conference see the link http://foodintegrity2017-parma.eu/wp-content/uploads/2017/04/FOOD-INTEGRITY-final-flyer.pdf (see also Annex VI).

Figure 8 Flyer with the FOODINTEGRITY 2017 conference statistics
The meeting included following events:

- **4th meeting of the FoodIntegrity consortium** (9 May 2017)
- **4th FoodIntegrity conference “Assuring the integrity of the food chain: turning science into solutions” (FOODINTEGRITY 2017)** (10-11 May 2017)

  In general, the conference was again focused on progress in research on developments and strategies in the field of food integrity - safety, quality, authenticity and traceability, from the project and beyond, including in this edition sessions on:

  - Food Fraud – Stakeholder Implications and Mitigations
  - New Solutions for Identifying Emerging Risks
  - Rapid & Confirmatory Analytical Solutions
  - “Fast” Science (8’ speed presentations), including (i) First outcomes from new FoodIntegrity Work Packages projects launched in 2016, and (ii) Inspiring presentations from 6 young FoodIntegrity scientists (Young Researchers Award)
  - Consumer Issues: Quality vs Convenience – Satisfying Consumer Needs
  - Food Authenticity - Forward Look

**Two workshops** had been also organised (see **Annex V** for the Program and **Annex VII** for the outcomes):

- Workshop: Good risk management requirements, trust in labels-claims & best practices
This Workshop aimed at deepening the themes of economic significance and importance of label claims, and giving to stakeholders and official bodies guidelines for promoting trust in premium products

- Workshop: FoodIntegrity 2020 Challenges - Unresolved and Emerging gaps

This Workshop was based on an interactive debate and online voting to identify the major unresolved and emerging gaps in assuring the integrity of the food chain.

Procedure of the first FoodIntegrity gap analysis, gaps covered in the FoodIntegrity & other EU projects, continuing/unresolved gaps had been dicussed.

In addition, guided visit of Barilla plant had been also offered to all interested conference participants on 11 May 2017.

Social program, Conference dinner followed by Disco FoodIntegrity, provided to conference delegates many opportunities for networking.

3 Poster Awards were given to three research teams:

- A.M. Naaum, R. Hanner, S. Newmaster: One-site DNA testing for species authenticity in food and natural health products
- J.A. Kleboth, P.A. Luning, V. Fogliano: Gaming simulation as rapid method for risk based foodintegrity knowledge engineering and evidence based decision making – a case study

The Poster Awards winners will be entitled to a free registration for the conference FOODINTEGRITY 2018.

Young Researchers Awards have been given to 6 young FoodIntegrity scientists who presented inspiring short lectures and posters:

- Sara Erasmus (Stellenbosch University, South Africa): Volatile fingerprinting using PTR-MS paves the way for South African lamb to acquire PGI status
- Telmo Fernandes (Universidade do Porto, Portugal): COIBar-HRM as a novel approach for the discrimination of hake species
- Barbara Prandi (University of Parma, Italy): Food fraud detection through species-specific marker peptide
- Laura Righetti (University of Parma, Italy): A novel approach to authenticate whole and refined grain durum wheat (Triticum durum Desf.) based on untargeted lipidomics
- Michal Stupak (University of Chemistry and Technology Prague, Czech Republic): Non-target screening strategy based on GC-Q-TOF for Scotch whisky authentication
- Kenny Xie (United States Pharmacopeia, USA): Non-targeted Methods guidance – overview of draft USP guidance

The winners were granted the opportunity to give a talk during a specific session of the Conference and received a symbolic contribution from the project partner, Thermo Fisher Scientific Inc.
Tradition of Demo-corner established during Prague conference in 2016 continued also in Parma in 2017. Live demonstrations of the approaches for food authentication developed by the FoodIntegrity project provided to FOODINTEGRITY 2017 participants unique opportunity to discuss with the FoodIntegrity experts the latest project results.

The activities included the following demonstrations and interactive events (for the program see Figure 11):

- FoodIntegrity Knowledge base, an information resource on food authenticity and fraud detection: description of the database and demonstration of the resource’s functionality.
- Infographics for mobile devices about food chain vulnerabilities, fraud identification technologies and analytical methods: demonstration of use.
- “Do you really think you know the fish you eat?”: interactive demonstration.
- “Sensory analysis of olive oils: do you recognize adulterated products?”: tasting session and demonstration of the relation between oils’ organoleptic properties and their quality and authenticity.
- Demonstration of authentication of spirit drinks and sensory analysis of whisky; investigation of available and potential future methods for spirit drinks authentication: “hands on” demonstration

In addition, collection of the FoodIntegrity posters had been presented and series of flyers on the FoodIntegrity distributed to the conference delegates (see D11.3).

FoodIntegrity conference also hosted New Food (media partner of the conference) roundtable event about the food integrity and industry position on this topic.
Figure 11 Program of Demo-corner activities at the 4th FoodIntegrity conference

Ensuring the Integrity of the European food chain

INVITATION to DEMO CORNER
Demonstration of approaches developed by the FoodIntegrity for food authentication

10 & 11 May, 2017 • 13:30-14:30

WHAT CAN YOU LEARN?

- FoodIntegrity Knowledge base: An information resource on food authenticity, description of the database and demonstration of its functionality on several case studies.
- Sensory analysis of olive oils: Do you recognise adulterated product?
- Specific Virgin olive oil tasting session: the nose - the most advanced analytical instrument will be organised on 10th May, 1245-1415. In this session, the differences in the aroma of samples of virgin olive oils and their relation to quality and authenticity will be presented. It will be your opportunity to learn more about one of the most appreciated food products in the Mediterranean diet and put some authenticity and integrity issues in practice.
- Industrial perspective of relevant food chains vulnerabilities vs Current analytical methods and technologies that can be applied.
- Investigation of available and potential future technologies for authentication of branded spirits and/or categories.
- Sensory analysis of whisky
- Infographics in your mobile devices to bring together available data on industrially exploited analytical tools for detection of food fraud, and identify reliable indicators/markers.
- Chinese consumer attitudes to food fraud, short description of the survey and its outcomes.
- "Hands on" demonstration of authentication of spirit drinks
- Do you wish to participate in the FoodIntegrity events?
- Do you wish to be trained in food authentication strategies?
- Join us at the Demo Corner and learn more on opportunities we offer!

FISH: Do you know appearance of species you consume?

HOW TO GET INVOLVED?

Do you wish to receive information about news, progress and events related to the FoodIntegrity project?

You may register on-site for the project COMMUNICATION or on www.foodintegrity.eu/page Contact us

FoodIntegrity is a European five-year project, which will draw from a well of experience consisting of 38 partners in the EU, China and Iceland to tackle issues around the authenticity of food. The project will provide a focal point for the sharing and exploitation of European research aimed at protecting the integrity of food production in Europe.

The aim of the FoodIntegrity demonstration is to provide you with a brief update on some of the progress on this multi-faceted project and let you know how you can get involved. We hope you find it useful.

You can join us and discuss with FoodIntegrity experts the latest developments and strategies in the field of food integrity - safety, quality, authenticity and traceability.
For more information and conference outcomes visit:

- Program of the conference on [http://foodintegrity2017-parma.eu/programme/](http://foodintegrity2017-parma.eu/programme/) (see also Annex V)
- Program of the satellite workshops on [http://foodintegrity2017-parma.eu/programme/workshops/](http://foodintegrity2017-parma.eu/programme/workshops/) (see also Annex V)
  - 2x different TV interview and short video on RAI National Channel
  - 2x different TV interview and short video on Local Regional Channels
  - 2x Paper on FoodQualityNews journal
  - 1x Paper on Corriere della Sera National newspaper
  - 1x Paper on New Food journal

Figure 12 Screenshot of the website of the 4th FoodIntegrity conference
Figure 13 Photos taken during the 4th FoodIntegrity conference (examples)

Opening session

Audience of the FOODINTEGRITY 2017 conference

Workshop on Good risk management requirements, trust in labels-claims & best practices

Olive oil tasting session

Demo-corner

Exhibition & demo-activities on spirit drinks analysis

FoodIntegrity posters collection

Poster session
Nice overview on the 4th FoodIntegrity conference, prepared by editor of the 5th FoodIntegrity e-Newsletter, Gerald A. Herrmann from Organic Services, is copied below:

The opening and morning sessions invited participants to broaden the view from their particular research and work topics to presentations about food authenticity (EFSA, Parma), QM-systems against food fraud (IFS, Berlin) and intellectual property aspects (IPO, Newport) and economic aspects (MIPAFF, Rome) setting the stage for ‘New Solutions for Identifying Emerging Risks’ presented by FoodIntegrity Project Work Package participants.

When listening to Federico Pizzarotti, the Mayor of Parma, who opened the conference and praised the long history and today’s food culture of Parma, the excellence of food and its regional artisanal provenience, my mouth watered – the real food offered during the evening underlined his comments. My thoughts drifted to the regular consumers, whom this project is working to protect and who are in the dark about the many frauds ongoing in the world today. On another note, the use of social media for preventing food infection outbreaks and the work on big data algorithms for detecting fraud even before it happens was enlightening. After intense discussions that we had for our Work Package with Food Criminologists, I have some doubts whether the erratic and spontaneous ‘grab the opportunity’ nature of fraud can be detected with such tools, though I do hope to be proven wrong.

The two afternoon parallel sessions of the first day focused on ‘Rapid & Confirmatory analytical solutions’ with presentations of latest scientific and technical solutions and with a ‘Workshop on Good risk management requirements, trust in label claims & best practices’. The Workshop was a very lively and participatory experience – an excellent setting for engaging participants. This Workshop deepened the themes of economic significance and importance of label claims (the examples chosen were PDO/PGI and organic foods), and how to best promote trust in premium products. The two sessions stressed the importance and necessity of looking at food integrity from a systems’ as well as from a testing perspective.

As I was invited to give a short presentation about how the Italian organic sector is building integrity by fighting fraud in cereal supply chains (after having been hit by a number of serious scandals with selling non-organic grain as organic), I could not attend the session on Analytics. My workshop on organic and PDO/PGI, which I was part of the moderation team was inspiring. I am always impressed to see to what extent the still very, very small organic and PDO/PGI food sector has already impacted thinking and strategizing. The attitude by participants of the workshop to analyse and transfer the systematic approach of ‘standard – inspection – certification – transparency’ to the food sector at large and as an anti-fraud tool was motivating.

The afternoon was rounded off with ‘Fast Science’ speed presentations, a challenge for presenters as time was limited for presenting complex topics. The format engaged the audience who saw some impressive innovative presentations, excellent for a speedy overview and later follow-up with presenters. Before closing off the day 6 young food integrity scientists presented their research results and were awarded, fervently applauded by the audience for both, the results of their work but also for their professional, outstanding presentations.

The second day started off with two parallel sessions on ‘Food Integrity 2020 Challenges – Unresolved and Emerging gaps’ and ‘Consumer issues: quality vs convenience – satisfying consumer needs’. With these two topics, the FoodIntegrity Project and the Organising Committee underlined the strategy of embracing all aspects of food integrity, looking beyond the already known and to addressing the expectations of the target group: the consumer!

Participating in ‘Consumer Issues’ I found yet another time that the special attention the Italian “Carabinieri NAS” is paying to food adulteration and fraud is of special performance across the EU. The balance between the necessary pungency in its activities and the realistic view on what can be achieved were presented well.
The last session of the conference centred on the ‘Forward Look’ and presented inspiring perspectives of more general nature, while at the same time being concrete: “we need a global definition of what is food integrity”, “we need to be realistic about what can be applied in practice and how we can finance the wished actions”.

The closing session was one of my highlights with presentations about the ‘global perspective’, ‘EU challenges’ and ‘how much is enough’ in analytics. When listening to presentations during the conference I was tempted to believe that the paradigm for fighting adulteration and fraud is in testing and analytics; this impression was laudably corrected by the speakers pointing the audience to testing and analytics as important and useful tools, when highlighting the systematic and structural approach as the necessary and most important.

Finally, before being round up by the Chair of the Conference Michele Suman (Barilla), the focus turned to the poster presentations that were displayed parallel to the conference. Three posters were presented with an award.
3.5 5th FoodIntegrity conference

The 5th closed consortium meeting followed by a food integrity stakeholder event “Assuring the integrity of the food chain: delivering real-world solutions”, organised by Eurofins, was held in Nantes, France, on 14-15 November 2018.

300 delegates from 26 countries representing a range of stakeholders from food control authorities, EC representatives, governmental bodies, trade organisations, scientific community, food industry, control labs, media and producers of analytical instrumentation and consumables, attended this event.

Participation to this 5th edition was stable compared to previous years, emphasizing that 62% of the participants were not members of FoodIntegrity, showing that the interest of this event went beyond our organization and continued to attract key players of food integrity to protecting consumers from food fraud.


Figure 14 Group photo of FOODINTEGRITY 2018 delegates
Figure 15 Flyer with the FOODINTEGRITY 2018 conference statistics

300 participants

- From 26 countries (European countries and also USA, China, Australia & New Zealand)
- Profiles: 52% industrials, 36% academics, 12% governmental organization

Satisfaction score: 9/10

60 presentations on various topics:

- Non targeted analysis
- Data driven tools
- Molecular Biology applied to Food Fraud
- Blockchains

More than 100 questions via Slido

- Poster session: 73 abstracts
- 3 interactive events: debate, demo-corner and workshop
- Useful networking during coffee breaks
- Festive experience, original Gala cocktail & tasty dinner

Full program here

FoodIntegrity Hanbook: the reference book

- For food business operators, quality control managers working in food production and actors involved in the food supply chain,
- 22 chapters on main food products, the same structure: identity and standard, authenticity issues and solutions
- Written by nearly 50 experts in food authenticity

Available here

Some participants' testimonies

"I really appreciated the high level of the speakers. And lot of congratulations for the organization of this event!"

"Well organized and enjoyable conference. Good social and technical content."

"Great, friendly spirit!"

Media coverage

Press articles

Twitter feed
The meeting included following events:

- **5th meeting of the FoodIntegrity consortium** (13 November 2018)
- **5th FoodIntegrity conference “Assuring the integrity of the food chain: delivering real world solutions” (FOODINTEGRITY 2018)** (14-15 November 2017)

In general, the conference focused on progress in research on developments and strategies in the field of food integrity - safety, quality, authenticity and traceability, from the project and beyond, including in this edition sessions on:

- Strategic look from the big players
- "Hot" topics
- Complex foods: tools for food authenticity assessment
- The lab comes to the factory
- Transparency and trust in the food chain
- Standardisation: new initiatives
- Molecular biology approaches to food integrity
- Available IT resources for food authentication
- Organic food authentication
- Targeted versus non-targeted: problems and solutions
- Will Blockchain really solve our food fraud problems?
- Forward look: future research and innovation needs for the food sector

**Three workshops** were also organised:

**The role of modern analytical approaches in fighting with food fraud**

The workshop was intended to scientists and representatives of industry who are interested in modern analytical approaches used in fighting with food fraud that have been advanced by the FoodIntegrity partners and successfully implemented into practice. It aimed to deepen knowledge in applications of modern analytical techniques, employing profiling, fingerprinting, metabolomics strategies, and data mining by chemometrics, for food authentication.


**Tools and needs for the future: gap analysis, interactive workshop**

Analysis of the gap between the current situation and what is the future in 3 steps: initial gap analysis, certain gaps bridged, and continuing and emerging gaps. Three categories were discussed: fraud prevention, methods, communication to consumer. Hacker-proof voting between geographic origin tests, blockchain, rapid fraud detection, methods of harmonisation, and authentication of complex food; and which get the highest scores by industry, scientists, authorities, and others.

**Isotope Fingerprints Interactive Room**

Thermo Fisher was featured as the main sponsor with an interactive experience called “Isotope Hunter” were participants had a chance to understand food and beverages samples stories to confirm their identities by investigating their isotope fingerprints. Their own description of the invitation reads: “Tracking origins, tracing identity: the Isotope Hunter follows the clues that history leaves in
foods or fibers, liquids or stone. Capture your samples’ stories with the Thermo Scientific Isotope Ratio Mass Spectrometry portfolio.”

One debate was organised: Industry are the main victims of food fraud? A debate on a new paradigm

It has been commonly acknowledged that the first and main victims of food frauds are consumers. They are certainly the high profile victims and obviously need to be protected, but are they the most affected? What about the honest industry whose livelihood is being threatened by unfair competition from malevolent actors in the food chain? Who protects supports or even acknowledges their plight? Have we produced a system that, due to this lack of protection, actually encourages food fraud as the only means of survival? Do we need a paradigm shift in our thinking in terms of cause and solutions? Speakers will debate this emerging idea which has the potential to radically modify the approach to food fraud from both a political and regulation point of view.

In addition, guided visit of to the Eurofins Nantes laboratory had been also offered to all interested conference participants on 15 November 2018.

Figure 16 Eurofins labs in Nantes, France

3 Poster Awards were given to three research teams:

- Enrico Casadei, Filippo Panni, Enrico Valli, Alessandra Bendini, Cesare Rossini, Chiara Cevoli, Diego Luis Garcia Gonzalez, Tullia Gallina Toschi: Application of GC-IMS to discriminate virgin olive oils according to their sensory grades
- Nogueira, S., Manolis, A., Gadanho, M., Chaves, S.: Development of a Next Generation Sequencing (NGS) workflow for food DNA analysis: How to identify meat and fish species in complex food products

The Poster Awards winners received a souvenir of Nantes in the form of sweets and treats as well as tech gadgets.
Figure 17 Winners of the Poster Session Awards 2018

Young Science Session gave 7 young FoodIntegrity scientists the opportunity to present inspiring short lectures and posters:

- Ilona Kłosowska-Chomiczewska (Gdansk University of Technology, Poland): MRM-MS of marker peptides distribution as a tool for authentication of single-cut meat products
- Michal Stupak (University of Chemistry and Technology Prague, Czech Republic): New rapid GC-MS method versus conventional pycnometry: what is a real alcoholic strength of these spirits and liqueurs?
- Nicholas James Birse (Queen’s University Belfast, UK): Using ambient mass spectrometry and chemometrics to rapidly determine poultry production system authenticity.
- Daniele Cavanna (Barilla, Italy): A novel multi-platform high resolution mass spectrometry non-targeted approach facing extra virgin olive oil adulteration.
Figure 18 Some of young FoodIntegrity scientists presenting at the Young Science Session

The traditional Demo-corner, established during the Prague conference in 2016, continued also in Nantes in 2018, providing participants with live demonstrations of the approaches for food authentication developed by the FoodIntegrity project (for program see Figure 19).

The activities included the following demonstrations and interactive events:

- FoodIntegrity Knowledge base, an information resource on food authenticity and fraud detection: description of the database and demonstration of the resource’s functionality.

- Industrial perspective of relevant food supply chains vulnerabilities vs Current analytical methods and technologies that can be applied “Chinese consumer attitudes to food fraud”, a study of Chinese consumers’ attitudes towards the safety and integrity of imported European foods: short description of the survey and its outcomes: video presentation.

- Chinese consumer attitudes to food fraud, short description of the survey and its outcomes

- Improving Supply Chain Integrity through Data Sharing: Video on integrity management solution Check X.

- Providing assurance in the spirit drinks sector: “Hands on” demonstration of authentication of spirit drinks.

- Scientific Opinions on issues that concern food fraud.

- FoodIntegrity Handbook: A guide to food authenticity issues and analytical solutions
Figure 19 Program of Demo-corner activities at the 5th FoodIntegrity conference

INVITATION to DEMO CORNER
Demonstration of approaches developed by the FoodIntegrity for assuring the integrity of the food chain

14 November, 2018 • Nantes, France
La Cité – Nantes Congress Centre, Foyer, 9:00 – 17:00
Exhibition hours during coffee and lunch breaks, all oral explanations on-site from 13:30 to 14:30

WHAT CAN YOU LEARN?

- FoodIntegrity Knowledge base: An information resource on food authenticity, description of the database and demonstration of its functionality
  To bring together available information on suitable analytical tools and associated reference data for the detection of food fraud in a Knowledge Base, to facilitate access to this information for industry, regulatory authorities and research organisations

- Industrial perspective of relevant food chains vulnerabilities vs Current analytical methods and technologies that can be applied
  App & Infographics using mobile devices to bring together available data on industrially exploited analytical tools for detection of food fraud, and identify reliable indicators/markers

- Chinese consumer attitudes to food fraud, short description of the survey and its outcomes
  Video on examination of Chinese consumers’ attitudes and perceptions towards the safety and integrity of imported European foods

- Improving Supply Chain Integrity through Data Sharing
  Video on integrity management solution Check X helping to prevent fraud in food supply chains with food fraud vulnerability

- Providing assurance in the spirit drinks sector
  “Hands on” demonstration of authentication of spirit drinks

- Scientific Opinions on issues that concern food fraud

- FoodIntegrity Handbook: A guide to food authenticity issues and analytical solutions

- Do you wish to receive information about the FoodIntegrity results?
  Join us at the Demo Corner and learn more!

BECOME INVOLVED AND SIGN-UP AS A STAKEHOLDER!

You may register on-site for the project COMMUNICATION or on www.foodintegrity.eu • page Contact us

Join us and discuss with FoodIntegrity exports the latest developments and strategies in the field of food integrity: safety, quality, authenticity and traceability!

FoodIntegrity is a European five-year project, which will draw from a wealth of experience consisting of 60 partners in the EU, China and Iceland to tackle issues surrounding the authenticity of food. The project will provide a focal point for the sharing and exploitation of European research aimed at protecting the integrity of food production in Europe.

The aim of the FoodIntegrity demonstration is to provide you with a brief update on some of the progress on this multi-faceted project and let you know how you can get involved. We hope you find it useful.
In addition, a selected **collection of FoodIntegrity posters** (see D11.3) was presented and a **series of flyers** on the FoodIntegrity distributed to the conference delegates.

**Social program:** a visit of the Machines de l’Île where fantastical mechanical creatures were showcased followed by a dinner at the floating restaurant Nantilus.

**Figure 20** Pictures from the FOODINTEGRITY 2018 social event

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**For more information and conference outcomes visit:**

- Programme of the satellite workshops on [https://www.foodintegrity2018-nantes.eu/workshop](https://www.foodintegrity2018-nantes.eu/workshop)
- Photo gallery available on [https://www.foodintegrity2018-nantes.eu/gallery](https://www.foodintegrity2018-nantes.eu/gallery)
- Twitter page of the project: [https://twitter.com/foodintegrityeu](https://twitter.com/foodintegrityeu)


- 4x articles on FoodNavigator website
- 1x interview on FoodNavigator website
- 1x mention on the European Commission’s events page
- 1x paper on New Food magazine.
Figure 21 Screenshot of the website of the 5th FoodIntegrity conference

Figure 22 Photos taken during the 5th FoodIntegrity conference (examples)

Opening session

Audience of the FOODINTEGRITY 2018 conference

Workshop on Isotope Fingerprints Interactive Room

Workshop on future of gap analysis
Nice overview on the 5th FoodIntegrity conference, prepared by editor of the 8th FoodIntegrity e-Newsletter, Professor Paul Brereton, Queen’s University Belfast, is copied below.

**Strategic Look from the Big Players and Hot Topics Session (sessions 1 & 2)**

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.

**Complex foods: tools for food authenticity assessment (session 3)**

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 ¹H-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.

**The lab comes to the factory (session 4)**

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 spectroscopies, 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 (session 5)**

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 Luijjckx (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 Alegría (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 (session 6)**

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 (session 7)**

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.

**Available IT resources for food authentication (session 8)**

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).
Organic food authentication (session 9)

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.

Tools and needs for the future: gap analysis, interactive workshop (session 10)

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) methods, and (C) communication to consumers. 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.

Industry are the main victims of food fraud? A debate on a new paradigm (session 12)

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 rigourous 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....

Targeted versus non-targeted: problems and solutions (session 13)

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.
Will Blockchain really solve our food fraud problems? (session 14)

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.

Forward look: future research and innovation needs for the food sector (session 15)

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
4 ANNEXES

Annex I 1st FoodIntegrity conference “Assuring the Integrity of the Food Chain: Food Fraud – The Analytical Tools” – Program

Annex II 2nd FoodIntegrity conference “Assuring the integrity of the food chain: food authenticity research priorities and funding opportunities” – Booklet with the Program and Abstracts

Annex III 3rd FoodIntegrity conference “Assuring the integrity of the food chain: fighting food fraud” – Booklet with the Program and Abstracts

Annex IV 3rd FoodIntegrity conference “Assuring the integrity of the food chain: fighting food fraud” – Outcomes of the workshop “Industrial Applications for Assuring Food Authenticity”

Annex V 4th FoodIntegrity conference “Assuring the integrity of the food chain: turning science into solutions” – Booklet with the Program and Abstracts

Annex VI 4th FoodIntegrity conference “Assuring the integrity of the food chain: turning science into solutions” – Final flyer

Annex VII 4th FoodIntegrity conference “Assuring the integrity of the food chain: turning science into solutions” – Workshops outcomes

Annex VIII 5th FoodIntegrity conference “Assuring the integrity of the food chain: delivering real-world solutions” – Booklet with the Program and Abstracts

Annex IX 5th FoodIntegrity conference “Assuring the integrity of the food chain: delivering real-world solutions” – Pocket program