FOODINTEGRITY
Ensuring the Integrity of the European food chain

613688: Collaborative Project

Seventh Framework Programme
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Deliverables D10.6

Title: Diffusion of industrial guidelines and research/development/innovation results to the food sectors. Dissemination through joined actions among the different stakeholders

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1. Listening the voice of the stakeholders...

**FoodIntegrity EU Workshop: Industrial Applications for Assuring Food Authenticity – FoodIntegrity Conference Prague 2016**

- Food Industry is in front of big challenges that are the result of global market connected with frauds increased risks, together with higher demanding and aware consumers.
- Food companies need constantly updated information and vice versa a lot of information is spread in different projects, old databases, etc. At the same time, reliability of databases is high demanding to be achieved/maintained.
- New portable analytical solutions placed on the market must demonstrate “measurable improvements” with respect to previous ones. Exploration capabilities without opening packaging, easy to use/cost-effectiveness are desired but they are in part in contrast with correspondent satisfying sensitivity.
- Significant percentage of raw materials that come to EU is still not constantly controlled. From “tree to the bottle”, the legislation can change.
- Complexity of several food matrices hinder concretely analytical reliable solutions
- There is a mainstream trend towards regional food. At the same time, we can say that “Nature ignores borders”!
- Sometimes it remains a real challenge to correctly interpret industry priorities to become a correspondent solutions provider
- Image protection is a key issue in companies. Third “super-parties” external partners that work in order to provide audits & official certifications can act “like a referee in a football match”. In this field, the World is moving more and more into the direction of “no paper” solutions: smart devices, tablets, web platforms,...
- Reputation is at high risk due to frauds & adulteration issues for many different companies but industrial partnership along the chain still not enough strengthen.

![Food Integrity Diagram](image-url)
(Key)statements

- There is the need to develop a Global Food Control System (without borders...)
- A real difficulty is the effective way to obtain data integration/fusion/handling from different sources (not necessary analytical) and within different analytical strategies
- A relevant challenge is the integration/continuous update of supply chain mapping/assessment/management (highly fragmented situations in some cases)
- Another big challenge is the sustainability and quality of databases
- Complexity is present in terms of analytical methods on some food matrixes, validation of the methods is a key point in this sense
- There is the continuous search for cost effective solutions with particular focus/request on reliability of “in-line”/“on-site”/“on-field” technologies
- A lesson learning direction is the continuous improvement of audits effectiveness
- There is a lack of reliable predictive modelling solutions for making possible assumptions about future scenarios
- A stronger effort is stated as necessary in terms of industrial self-control strategies

(Key)solutions

- Develop an “International Umbrella Organization” devoted to standardize and harmonize protocols, audits, certifications, monitoring, data collection,...
- Stimulate the production of many new reference standard materials/matrixes
- Enforce a stable network to set international “commodity based” methods & procedures
- Look for extrapolating the good aspects of successful developed databases
- Take responsibility for an overall integration of the food chains, “more” than the so-called “one step after/one step before” concept
- Set at least a basic legally obliged level of information sharing among the different stakeholders; define also the rules & timing on how progressively expand it
- Establish precise guidelines for international validation of methods and data collection/registration
- Promote the development of new confirmatory technologies (e.g. HRMS, NGS,...) specifically targeting complex food matrixes/issues
- Support the development of new chemometrics strategies
- Promote the development of new portable/screening solutions which demonstrate a sufficient quality of the produced results to meet the task they are devoted
- “Highlight” main raised scandals as driver for acting “zero tolerance” direction
- Activate constant non-announced audit actions (each step/stakeholder along the involved chain have to provide audit actions for the previous one)
- Speed up as much as possible the scale up of new analytical solutions
- Favour interlaboratory data & methods & performance criteria comparisons
- Combine screening & confirmatory approaches in each food chains prevention protocol
2. FoodIntegrity Network / Information Hub

FI Network is an online tool to indicate which organizations or authorities in a specific country can help with a specific field of competences into integrity issues.

The FoodIntegrity Network

Food Integrity Information Hub has been established with the present inclusion of more than 350 key interlocutors contacts (organisation and industry - classified by food category according to the WP2-knowledge base) at the regional, national, European level involved in the food sector.

3. FoodIntegrity Knowledge Base

The FoodIntegrity Knowledge Base

- Mapping of analytical methods for the detection of fraud and/or verification of integrity onto specific commodities or food authenticity issues
- Open source for industry and control bodies

Service for the industry

Direct to Food industry:
> In the case where a company is facing an adulteration, it can identify an analytical solution for testing samples;
> For preparing a control plan tailored to its needs and relevant for the food matrices.

Industry to Laboratories and academia:
> FI_KB will be used for implementing new methods in organisations & will disseminate knowledge against food fraud;
> To access authentic and standardised datasets of analytical methods lead to future development of new methods
4. FoodIntegrity Scientific Opinions

The FoodIntegrity project has produced a set of 7 scientific opinions on topics chosen by the stakeholders themselves. These papers address key technical issues that stakeholders have identified as problematic, e.g. the future of new technologies such as Next Generation Sequencing, Best practice for producing databases, the role of non-targeted analysis. Several of the opinions have already been published in Trends in Food Science and Technology. They can become very useful also in a future legal framework. All of the FoodIntegrity published papers along with the Scientific Opinions can be found into the FI website. The FoodIntegrity Scientific opinions are also soon be accompanied by Info-Graphic videos available on the FI YouTube Channel.

The FoodIntegrity Scientific Opinions

- Role of analytical testing for food fraud risk mitigation — how much is enough.
- The scientific challenges in moving from targeted to non-targeted methods for food fraud testing.
- Multivariate statistics for food authenticity.
- Database development, use and curation.
- NMR applications to tackle future food fraud issues.
- The future of NGS (Next Generation Sequencing) analysis in testing food authenticity.

Whether Industry need to defend the quality of food products against frauds by legal means: we managed to provide scientific opinions that can be used as a point of reference by forensic scientists.
5. **FoodIntegrity Handbook / Dissemination Activities**

A simple searchable guide to food fraud / food authenticity issues organised by product type.

Designed for food business operators, students, researchers – with little prior knowledge of the area.

Concise and easy-to-read tool for small and medium companies setting up food fraud mitigation plans.

Linked into the Food Integrity Knowledge Base.
A number of dissemination activities at international scientific conferences (specific effort for the 4th Annual FI Conference organized by Barilla in Parma on May 2017) and other events, lectures, posters, series of press releases and news on the project, interviews, organisation of meetings, open days & workshops, has been explicated by WP10 partners and particularly by Barilla in strict collaboration with WP11 (please refer to correspondent precise work package WP11 deliverables of the project) with the aim to emphasize and maximize the industrial impact and aspects.

Food Integrity Annual Conference 2017 was organized by Barilla in cooperation with Siteia.UniPr in Parma in May 2017. FoodIntegrity2017 was a unique occasion for hosting in Parma many representatives of funding bodies, retailers, processing industries, quality brands, public administration, control laboratories, authorities, NGOs and the research community who work in food authentication.

This conference, integrated within activities of FoodIntegrity project, 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: in particular, in this 2017 edition we will give emphasis to direct and indirect impacts on the industrial sector: that is why the event’s subtitle was “Turning science into solutions”!

Beside all reported above and with a similar „industrial emphasis perspective”, there has been a constant collaboration for developing webpage results such as the following ones (see image-screenshot here below):
6. FoodIntegrity Short Term Trainings

95 applications for participation in the FoodIntegrity training programme coming from 24 countries of EU, Asia, Australia and Oceania, and South America have been received, 55 applicants have been selected and successfully completed trainings during 2018 in the training concepts they have applied for. Training program has been delivered in cooperation with well-established EU organisations in 13 short-term training activities;
some examples directly related to Industrial Integration partners and that can be considered relevant within stakeholders are:

- Vibrational spectroscopy and chemometrics (CRA-W, Gembloux, Belgium)
- IRMS – Theory and lab fruit juice and wine (Fera Science Ltd, York, UK)
- Profiling with applications to honey (Fera Science Ltd, York, UK)
- Foodomics: Untargeted Analysis of Foods (QUB, Belfast, UK)
- Metabolomics for verifying authenticity of food (IAEA/FAO, Vienna, Austria)
- Stable isotopes for verifying authenticity of food (IAEA/FAO, Vienna, Austria)
- Analytical tools for authenticity of raw materials in pasta, sauces & bakery production (Barilla, Parma, Italy)
- ‘REGULATORY & RISK ASSESSMENT CONCEPT’ Frauds & adulterations management in strategic raw materials for pasta, sauces & bakery products & ‘SENSORY & MANAGEMENT CONCEPTS’ Consumers science & Industrial management skills useful to assure food integrity (Barilla, Parma, Italy)
- Data collection and analysis methods in consumer research (FiBL, Frick, Switzerland)
- Vibrational spectroscopic methods applied on cereals (CRA-W, Gembloux, Belgium)
- Rapid tools for food integrity: testing on the field (Barilla, Parma, Italy)
- Food fraud vulnerability assessments (RIKILT Wageningen UR, Wageningen, The Netherlands)
7. FoodIntegrity New Normative outcomes
Recognition by normalisation/standardisation bodies of isotopic limits for the authenticity of tomato sauce, citrus juices and PDO hard cheeses.
The performance data obtained in this study had in 2017 official recognition by the Italian standardisation agency UNI (Italian Organization for Standardization): UNI1602956. Necessary when this method is used to verify the mislabelling of PDO cheese in commercial disputes or legal debates (UNI11692:2017).

8. FoodIntegrity Industrial Integration Infographics, APP & Video tutorials
A complete set of infographics in different European languages concerning foods, risks, analyses and specific case studies has been developed by Work Package 10 and is available online through FI channel. They give an insight on how to work in both rapid screening and confirmatory analysis directions, exploring the potential/performance/effectiveness of a number of profiling/fingerprinting/targeted or non-targeted methods & rapid screening high-throughput technologies, also combined with multivariate approaches. FoodIntegrity-APP has been presented at the Parma FoodIntegrity May2017 Conference and is now available on both Android and IOS platforms for mobile devices; this APP has been developed beside an Industrial Integration video-tutorial (and other parallel educational video-cartoons): 12 minutes to give a look into our work, what we have done, and how our project can help food industries to protect their business from frauds, hence strengthening the European food supply chain and assuring the circulation of authentic and reliable products. Industry guidelines & toolboxes relevant for the different stakeholders/food chains are indicated for further evaluations through the links and documents present into the FI website.
An APP and a complete set of infographics concerning foods, risks, analyses and specific case studies is also available online.
8. Acknowledgements
A final acknowledgement has to be strongly reported for all the Industrial Integration Work Package 10 FoodIntegrity partners and also to the entire Consortium and particularly to all the WorkPackage Leaders for their contributions.