



# Food Authenticity Network

MAY 2024, ISSUE 17

# NEWS

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FAN NEW CONTENT

GUEST ARTICLES

CENTRES OF EXPERTISE



## Welcome to our Seventeenth Newsletter

John Points - Network Secretary | [Secretary@foodauthenticity.uk](mailto:Secretary@foodauthenticity.uk)

This packed issue is a testament to how busy the FAN Team has been since our last newsletter in November. This issue contains information on the latest content we've added to the FAN website including a protocol for the sampling of reference honey samples, our new page for the Global Alliance on Food Crime and the 2023 report on global food fraud reports to name a few. We have three exciting guest articles covering food fraud vulnerability risk assessments, the UK Food Safety Research Network and automating detection of dangerous issues in food data, plus updates regarding our Food Authenticity Centres of Expertise. Finally, I have created the world's first (to the best of our knowledge) food authenticity themed crossword for your enjoyment!

## Global Alliance on Food Crime

We are delighted to host a new dedicated page for the [Global Alliance on Food Crime](https://www.foodauthenticity.global/global-alliance-on-food-crime). This space will offer the ability to share information and updates on the work of the Global Alliance.

<https://www.foodauthenticity.global/global-alliance-on-food-crime>

The Global Alliance (GA) is a coalition of international leaders who have agreed to work together on the prevention, detection and disruption of food crime. The GA initially agreed to have a small number of founder participants, consisting of food regulatory and enforcement organisations from Australia, Canada, New Zealand, the UK and the USA, but are looking to involve any country that is willing and able to contribute to the aims and objectives of the GA moving forward.

Members of the GA aim to collaborate as enforcement bodies to protect consumers from intentional acts of fraud or misrepresentation, wherever they take place within global food supply chains. Protection can best be afforded through coordinated international action and the sharing of information and good practice across borders. The work of the GA is intended to complement but not duplicate work already underway in the regulatory/law enforcement, scientific and academic communities.

For further information on the Global Alliance you can contact [ron.mcnaughton@fss.scot](mailto:ron.mcnaughton@fss.scot).

### GA STRATEGIC OBJECTIVES

Prevent food rendered unsafe or inauthentic through intentional acts of fraud or misrepresentation from entering or remaining in food supply chains;

Increase enforcement action in relation to food fraud, through collaborative activity, in accordance with relevant national food or criminal law

Support global prevention, detection and enforcement capability and capacity in this area;

Facilitate and build a global information sharing network amongst the global alliance members to prepare and respond to food fraud.

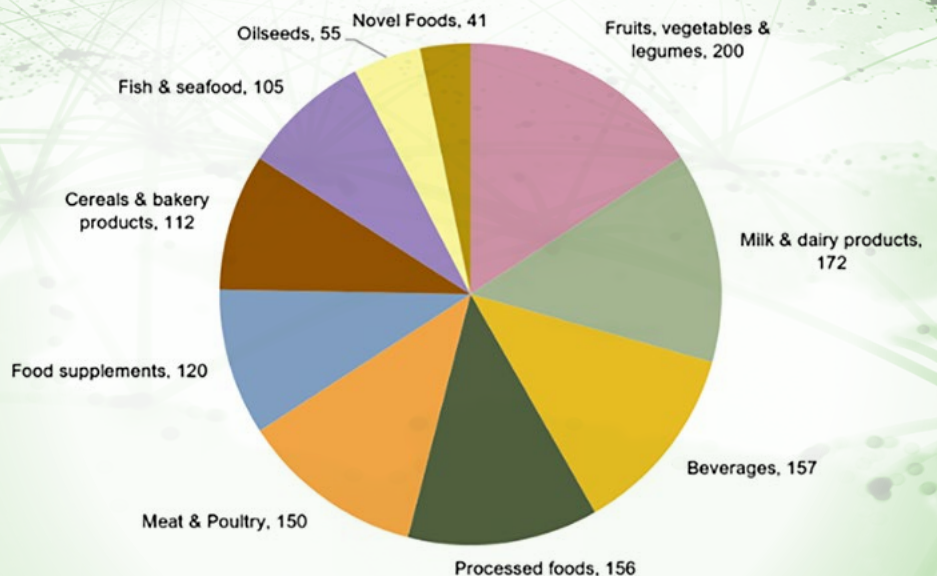
### UPDATE: MAY 2024

Members of the GA met last April 2024, with a view to develop actions around the GA's four strategic objectives, consider emerging food crime risks and how the GA can work together to mitigate impact, look at sharing good practice and discuss increasing group membership, amongst other things. A progress update will be available soon in the GA page of the Food Authenticity Network.

## Global Food Fraud Report

The [report](#) provides a summary of global food fraud reports in 2023 from three of the world's leading commercial food fraud incident collation tools: [FoodChain ID Food Fraud Database](#), [HorizonScan](#) and [Safety HUD](#). The collaboration with all three organisations, has enabled FAN to provide a more robust and representative view on global food fraud reports. The report is the first annual report to be produced for this FAN Partner project

Top 10 commodities with most official reports in 2023





## Food (Fraud) for Thought Series

by Dr John Spink, of Michigan State University

### FOOD FRAUD PREVENTION – TYPES OF PRODUCTS

Welcome! In support of the Food Authenticity Network (FAN) activity, this new blog series reviews key topics related to food fraud prevention.

This blog post builds on our previous review of the definition and scope of food [fraud](#) and the subsequent blog post on the [types of fraud](#). We will continue the discussion by examining the types of fraud. The next blog post will review the application of quality management and risk management to expand the focus from detection to prevention and risk to vulnerability.

Early food fraud research and publications focused on what food fraud is or how big the problem is. The research evolved into several paths: incident reviews, detection or authentication development, criminology, and strategic management. Some of the strategic management research included our peer-reviewed, scholarly, SCOPUS-listed publication on Defining the Public Health Threat of Food Fraud, Introducing the Food Fraud Initial Screening model (FFIS), Introducing the Food Fraud Prevention Cycle (FFPC), and Defining the types of counterfeiters, counterfeiting, and offender organizations. Together, the research projects revealed that criminals will attack in just about any way imaginable and most quickly and easily. Together, the research projects emphasized that criminals will attack by ANY fraud act against ANY product.

Thus, to holistically reduce food fraud, we need to focus on ALL types of fraud and for ALL products. We can either complain about this very broad scope or be practical and expand our collective focus on all types of fraud and for all products.

Here, the 'products' are not individual commodities such as olive oil, seafood, or spices, but are supply chain inventory types of products such as raw materials, ingredients, work-in-process, or finished goods (see MSU Introduction to Supply Chain Management/ SCM303).

The broad focus on 'all hazards' – or for food fraud prevention, for 'all vulnerabilities' – is consistent with food safety and HACCP. For example (emphasis added): "HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement, and handling, to manufacturing, distribution, and consumption of the finished product" (FDA 2017)."

A food fraud incident can occur in any type of product, so all are within the scope of a food fraud prevention strategy.

While a manufacturer or producer has the most control of THEIR raw materials and incoming goods, their customers are worried about fraud at any point along THEIR entire supply chain – or all products.

This blog post will review the food fraud types of products.

#### Food Fraud & Definition (From various sources including GFSI and SSAFE with definitions from adapted from Supply Chain Management textbooks):

- Raw Materials/ Commodities: A component of a food, feed or packaging that has not undergone processing (GFSI).
- Incoming Goods/ Ingredients: A component that is being received including food, or feed that has undergone processing (GFSI).
- Incoming Goods/ Packaging: A component that is being received including packaging that

has undergone processing (GFSI).

- Work-in-process-manufacturing: product that is actively being transformed from ingredients to finished goods.
- Work-In-process-inventory: product that is actively being transformed but is being held idle while waiting for an additional step to complete the transition finished goods.
- Finished goods in inventory: product that has completed a transformation and is ready to deliver to a customer but it is being held in storage.
- Finished goods in the marketplace: product that has completed a transformation

and is being held in a location or format that is ready for a customer to procure.

- Distributors, Wholesalers, and Resellers: firms that sell or deliver merchandise to retail stores or other types of customers.
- Returned goods and reverse logistics: the process of moving finished goods that have been distributed to the marketplace back to the origin or a location to receive, dispose, or rework product.
- Waste disposed, used packaging, and off-specification products: products that have been partially consumed or otherwise determined to be

used or unacceptable for further use.

- The types of food products are intentionally broad – holistic and all-encompassing-to frustrate the criminal against action of any kind.

**Watch out for the next blog, on the FAN website, which will review the application of quality management and risk management to expand the focus from detection to prevention and risk to vulnerability,**

# Toolkit to Support Weight of Evidence Approaches for Food Authenticity Investigations



Department for Environment Food & Rural Affairs



**A TOOLKIT TO SUPPORT WEIGHT OF EVIDENCE APPROACHES FOR FOOD AUTHENTICITY INVESTIGATIONS HAS BEEN PUBLISHED BY THE UK DEPARTMENT FOR THE ENVIRONMENT, FOOD AND RURAL AFFAIRS**

by Paul Hancock

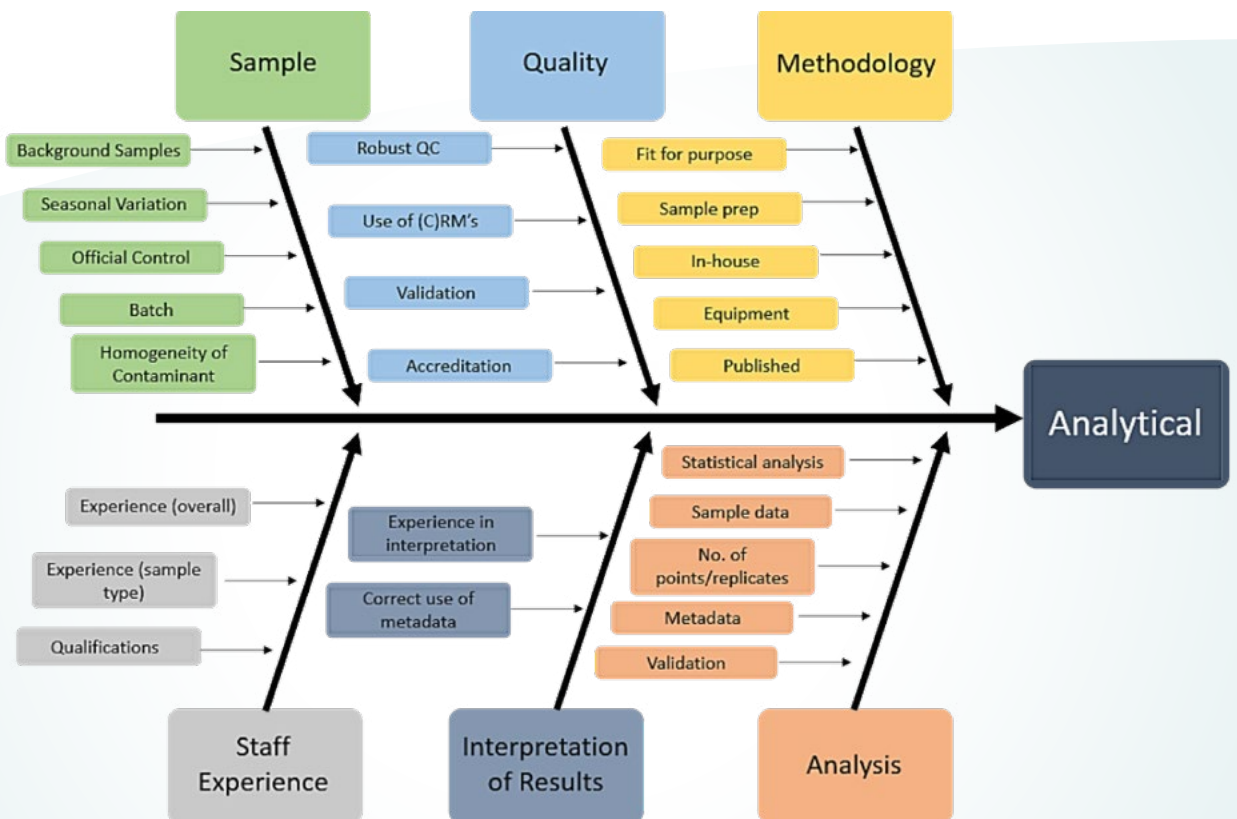
Applying a weight of evidence approach for food authenticity investigation is relevant in situations where screening tests which do not give a definitive answer are used, for example with non-targeted fingerprinting approaches for food authenticity testing which rely on probability-based interpretation of the data. In these situations, gathering and assessing the weight of evidence can help in drawing a conclusion on the authenticity of a sample/product.

This document provides a structured outline on how to approach a weight of evidence assessment to verify the authenticity of food and drink samples where there is no single confirmatory test result available.

Paul Hancock, Head of the office of the Government Chemist, chaired a working group, which was a sub-group of Defra's Authenticity Methods Working Group (AMWG), drawing on analytical testing, enforcement, and food industry expertise to produce this document.

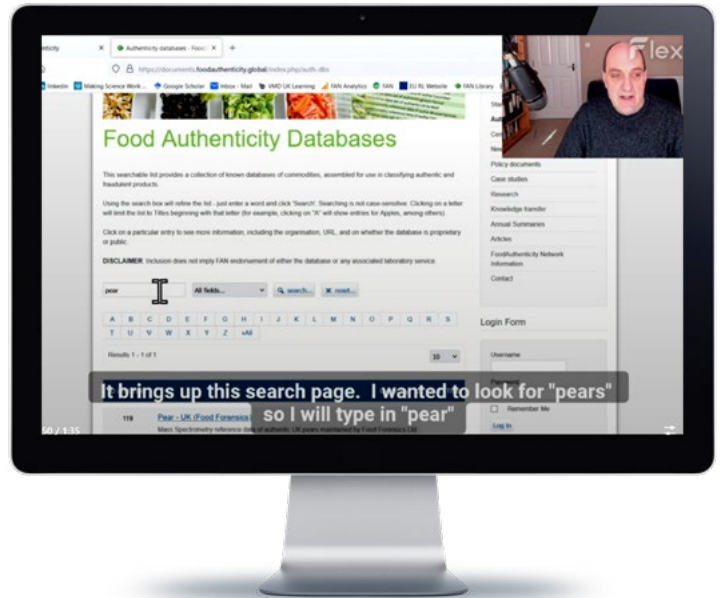
Access the [Weight of Evidence Toolkit](#).

This report has also been added to the "Guides" tab of the "[Tools Guides reports](#)" part of our Food Fraud Prevention section.



## Food Authenticity Network – Explainer Video

How to find a food authenticity testing database



## DECEMBER 2023 ISSUE OF IFST MAGAZINE DEVOTED TO FOOD AUTHENTICITY

Food Science and Technology is the quarterly magazine of the Institute of Food Science and Technology. Members receive a printed copy with online copies free to non-members. The December 2023 issue was devoted to food safety and authenticity, including an article from FAN on fraud mitigation in the food manufacturing sector.



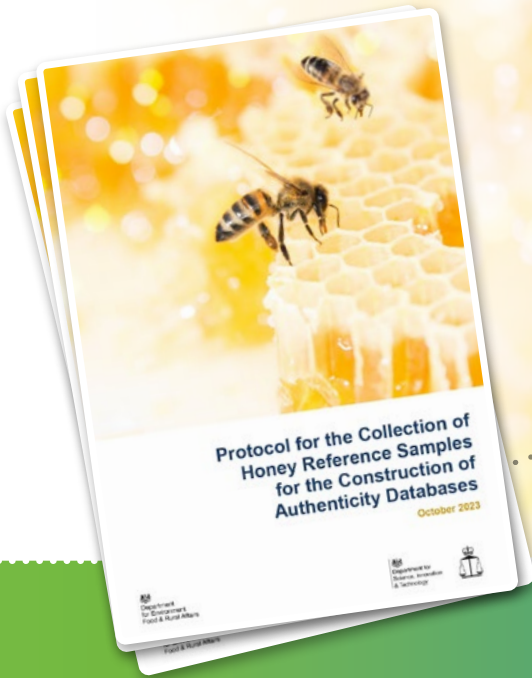
## EU REPORT – FIGHTING FRAUD IN THE AGRI-FOOD CHAIN

In January, the European Commission launched a monthly report on EU Agri-Food Fraud. The intent of this free list of incident collations is to help both regulatory authorities and food businesses target their fraud defence activities to the highest risk areas.

The report collates all entries from iRASSF that have been categorised as “suspicious”. It therefore includes official controls, border rejections, whistleblower complaints and media reports (unlike, for example, the JRC monthly food fraud collation which is fed purely by media reports). It does not include “suspicions” which have not been communicated outside of the originating nation.



# FAN new content



The Protocol for the Collection of Honey Reference Samples developed by the Government Chemist and DEFRA has been added to our “Guides” section.”



## FAN Annual Summary 2023

Spanish version available now!

Check out the English version!

French and Chinese to follow...

## Unveiling Food Fraud: Insights, Tools and Strategies

It is a requirement by all GFSI (Global Food Safety Initiative) benchmarked food safety standards and many retailer supplier requirements, to carry out a fraud vulnerability assessment of a food manufacturers entire supply chain with a very strong emphasis on ranking raw materials for potential vulnerability. It is also been a regulatory requirement to identify "intentional adulteration of food with the purpose of economic gain".

The expected outcome is the implementation of mitigation strategies/control measures to reduce the risk of fraud.

Classic food safety risk assessment matrices are not directly applicable to vulnerability assessments. "Severity" (toxicity) is not a relevant criteria because adulterants may, or may not, be a safety hazard.

This "evidence" created by Food Fraud Scorecard, during the risk assessment process, includes:

- **Ranking of all food fraud scores**, to easily identify those raw materials at higher risk of potential food fraud.
- **Risk assessment report for each of the raw materials** that your company uses.
- **List of reference material** used to create the risk assessment report.

The ranking method been used on over 800 raw materials. One example was a small food manufacturing company with 30 raw materials. Their assessment has been reviewed annually. Regular review is important to reflect changed suppliers, availability, pricing and country of origin.

As a result, the company reviewed their cinnamon supply chain then implemented mitigation measures that helped in reducing risk and a revised score of 18/125. By 2022 that same ingredient was supplied by wholesaler who supplied full documentation on:

- Country of origin.
- Name of the source manufacturer.
- Current GFSI certificate of the source manufacturer.
- Current GFSI certificate of the wholesaler.
- Batch specific lab results from the source manufacturer.

These mitigation measures reduced both the "likelihood" score (driven by traceability improvements) and the "detectability". The revised risk score was a much lower 18/125..



In 2016, Integrity Compliance Solutions (ICS), developed a fraud vulnerability risk assessment and ranking method based on three independent variables: **likelihood X detectability X profitability**. This has been incorporated into an online tool <https://foodfraudscore.com>

Food Fraud Scorecard:

In their first assessment, in 2018, cinnamon scored the highest vulnerability risk at 60/125. The ingredient was supplied by a broker who gave two different countries of origin, no source manufacturer, no certifications, no certificate of assurance or batch specific lab results. Not only did the supplier not undertake any control measures, the company purchasing the product also did not take any samples, carry out any testing or even basic sensory assessment. This is the perfect scenario for a crisis involving a recall, like the one undertaken recently by the US FDA for cinnamon in apple sauce.



**Every company, no matter how small, can implement inexpensive changes that will make a significant difference to the vulnerability of food fraud in their raw materials.**

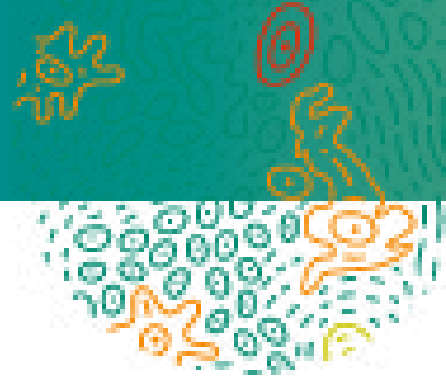


Written by: Clare Winkel

*Clare Winkel BSc, MBA, has been working with risk assessments for food fraud since 2008. This method has been used by companies in Australia, New Zealand, Canada, USA, Trinidad, Jamaica and a number of South Pacific countries across many industry sectors.*

*Clare has used this method to successfully undertake approximately 800 raw material food fraud assessments across the following industry sectors: bakery, spices, dry goods, seafood, fresh produce, beverages, nuts and confectionary.*

## Food Safety Research Network



The UK Food Safety Research Network (FSRN) was funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Food Standards Agency (FSA) to connect food industry, food and health policymakers, and researchers. The aim of the FSRN is to broker partnerships and support collaborations amongst these stakeholder groups to pursue shared research priorities that will protect the UK from foodborne hazards.

The FSRN is hosted at the Quadram Institute in Norwich and serves as an innovation hub to coordinate and fund cross-sectoral research and training activities that address current and emerging challenges. The network is led by Quadram Institute group leaders Dr Matthew Gilmour and Dr Maria Traka.

### The FSRN's objectives are to:

- Assemble a community of UK food producers, food policy makers and scientific researchers who collectively can take robust actions toward improving food safety (300 members spanning small businesses to major global brands, microbiologist to social scientists, UK food regulators, other related networks)
- Identify areas of research need and opportunity that, in the view of food stakeholders and network members, will have meaningful impacts on UK food safety (e.g. current project on developing safety guidance for controlled environment agriculture)
- Coordinate new collaborative research activities that will promote the application of science towards the food safety challenges identified by our food system community (FSRN has awarded £1.62M to 35 collaborative projects)
- Host training to promote skills development, interoperability and relationship-building between our food system community (FSRN awarded 12 training and placement awards in 2023 and hosted the first community event in February 2024)
- Translate the knowledge generated within the network to food safety stakeholders, and to upcycle existing information and technologies relevant to food safety that have not yet been applied more broadly.



## OUR PRIORITY AREAS

Based on feedback from partners across the food chain, we have identified priority areas to focus on for collaborative projects within the FSRN. Three priority areas that shaped the first two years of FSRN activities, with a new fourth priority area:

- Reducing microbial risk of known pathogens
- Understanding risk of alternative proteins and new plant based foods
- Applying food safety knowledge and new tools to ready-to-eat foods
- NEW: Food safety in the home

Read more on [current projects](#) funded by FSRN.

### FSRN & FAN

Food authenticity and food safety are closely linked with common stakeholders, methodologies and platforms. For example, sequencing a sample can reveal the identity of the sampled product, as well as the microbial makeup. The FSRN and the Food Authenticity Network (FAN) want to work together to benefit our members. Please [join FSRN](#) to hear about our latest news and events, or contact [foodsafetynetwork@quadram.ac.uk](mailto:foodsafetynetwork@quadram.ac.uk) with any ideas or questions.

### MOVING FORWARD

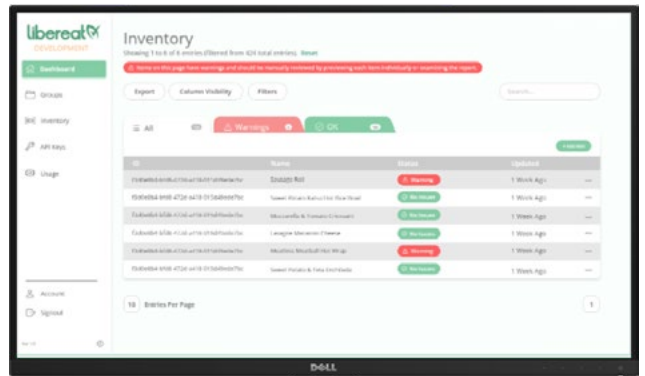
Two years on, FSRN has been awarded a 12-month extension to April 2025. We held a stakeholder survey to gather feedback from our members on the

FSRN's work so far. A summary of the results of the survey include:

- Extremely positive feedback about all aspects of FSRN - in particular the culture and operations of the network, approach to collaboration and scope of the work funded
- Current Priority Areas remain relevant, with suggestions made for new Big Wins and Quick Wins, potential new network members and minor amendments to the Priority Area descriptors as drafted
- The potential new Priority Area – **Safety In-Home** – attracted significant enthusiasm and comment – with some very interesting and novel suggestions and a number of potential new network members



## LiberEat - Automating detection of dangerous issues in food data + new application to Food Fraud



**Barry Leaper,**  
CEO at  
LiberEat

### Who we are

LiberEat is a unique machine learning technology application that prevents customer injuries and recalls for food businesses, by automatically detecting dangerous errors, such as undeclared allergens, in supplier, labelling, menu and other food data.

### Outperforming conventional allergen safety processes

The first application of the technology was focused on preventing allergen errors in food information reaching consumers. It has been significantly outperforming conventional QA processes and manual checks.

Since launching during 2023 it has caught 800+ allergen errors that were missed by the existing QA processes of a small group of large international businesses in food service, retail and manufacturing. It has also identified hundreds of incorrect vegan & vegetarian classifications.

### How it works

The technology automatically identifies errors in allergen declarations, by interrogating product and supplier information. LiberEat's technology scans data at different stages of the information chain from supplier data, to product, menu or labelling data, and websites or consumer facing digital platforms, to ensure errors introduced at each stage are prevented from reaching consumers.

The LiberEat systems scan continuously so alerts are sent as soon as an error occurs, with the results managed in a simple dashboard.

### New application focused on food Fraud

The capabilities and learnings we've gained to date, provide an unique opportunity to adapt the automatic error detection technology to address other priority food-supply chain safety issues.

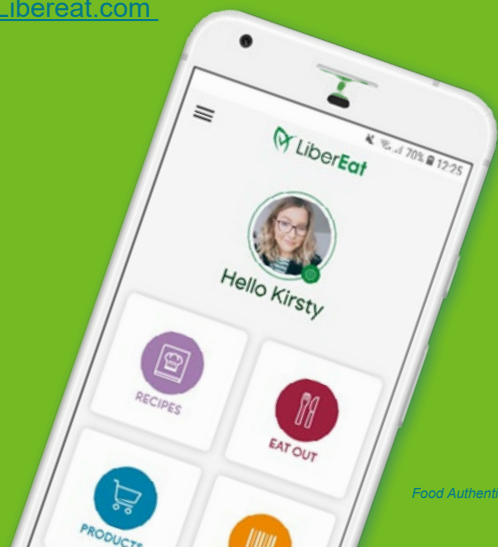
We are now focused on exploring how technology can be adapted to improve identification and predict of instances of food fraud in the supply-chain from patterns and 'red flags' in food data.

### Join Us

We're excited to talk to potential partners including food service, retailer and manufacturing businesses, that would be interested in collaborating with us on building a solution to address this challenge.

### Contact

Barry Leaper, LiberEat CEO  
[barry@Libereat.com](mailto:barry@Libereat.com)



# Centres of Expertise

## CoE Annual Meeting

The annual meeting of the Food Authenticity Centres of Expertise (CoEs) was organised by FAN on 6 March 2024 and was attended by representatives from twelve of the fourteen existing CoEs plus two organisations who have submitted applications to become CoEs. In addition, representatives from Defra, FSA & FSS (and their crime units) also attended. Saskia Van Ruth, Professor of Food Supply Chain Integrity at University College Dublin was the invited external speaker and she presented “the perspective of two international food authenticity projects of importance“

- [Trustfood](#)
- [Amazonian](#)

A government update from representatives from DEFRA and FSA and a discussion on current and emerging issues wrapped up the morning session.

In the afternoon, participants took part in a simulated incident. The aim of the exercise was to test the ability of CoEs to work together to provide collective food authenticity related technical advice in response to a specific ask from UK Government against a background of many other non-authenticity issues that were negatively impacting the situation using the [Framework for a coordinated response](#) from FAN CoEs to food and feed fraud incidents and [investigations](#).

Feedback received from participants was overwhelmingly positive with attendees enjoying the meeting and simulated exercise and finding it useful to test the agreed Framework



Attendees communicated that the agreed Framework provided a clear structure and prompts that helped guide discussions to ensure that key points were addressed and so, felt that it was effective but suggested some additions that could further improve its robustness:

- What is the analytical question(s) that needs to be answered – needs to be very specific.
- Are there any ongoing surveillance/monitoring recommendations?
- What are the other identified risks that should be considered?



# Centres of Expertise

Currently, sixteen organisations have been acknowledged as [Call for Centres of Expertise \(CoE\)](#).

like to invite applications from suitably qualified laboratories to become a Food Authenticity Centres of Expertise. In recognition of the fact that food authenticity testing is conducted globally, we welcome applications from **laboratories both in the UK and outside the UK.**

The acknowledgement of Centre of Expertise status is performed jointly by the UK Government and the Food Authenticity Network Executive Management Team.

If you think your laboratory can fulfil the [AMWG criteria](#) for CoEs then please complete a self-assessment evidence proforma, providing evidence of your capabilities, and return to [CoE@foodauthenticity.uk](mailto:CoE@foodauthenticity.uk) by 31 August 2024.

You will be notified of the outcome by the end of 30th September

## NEW CENTRES OF EXPERTISE

The annual call was launched via the March 2023 issue of the FAN Newsletter. The application deadline was 31 December. Applications were received from two laboratories:

Applicant Brand / Group	Site	Specialism
University of East Anglia (UEA)	Norwich, UK	General Proficiency
Chelab	Hannover, Germany	Fruit Juice, Herbs & Spices

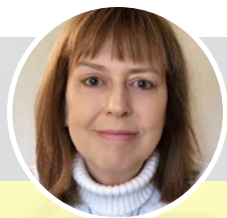
The University of East Anglia (UEA) has had a longstanding group working on food authenticity testing methods and is now undertaking authenticity testing and research after they took on contracts from QIB. Chelab is part of the TCF2 (Tentamus Centre for Food Fraud – a virtual network of specialist laboratories within the Tentamus group



# Centres of Expertise



## CoE Profile: University of East Anglia Centre of Expertise in Food Authenticity



**Kate Kemsley**  
(Centre Lead & Professor of  
AI in Chemistry)

The University of East Anglia (UEA) and its partner organisations on the Norwich Research Park have a long history of food authenticity research, funded over the years by government, research councils and international organisations. Underpinning the newly recognised Centre of Expertise are UEA's Science Analytical Facilities: a dedicated unit of platform technologies, each with an academic lead and experienced technicians, and a remit of service provision to the scientific and business communities. In the context of authentication, we have relevant expertise in small molecule analysis by high-resolution nuclear magnetic resonance (NMR), and liquid and gas chromatography mass spectrometry (LC- and GC-MS); in inorganic MS for stable isotope and trace element analysis (SITE, IRMS); and in scanning electron microscopy (SEM) including tandem energy dispersive X-ray spectroscopy (-EDS).

In ongoing research, we are employing several of these technologies to address a challenging authenticity issue: identifying contaminants in adulterated saffron. Using benchtop NMR spectroscopy, we screened a large collection of saffron spice obtained from a range of sources\*.

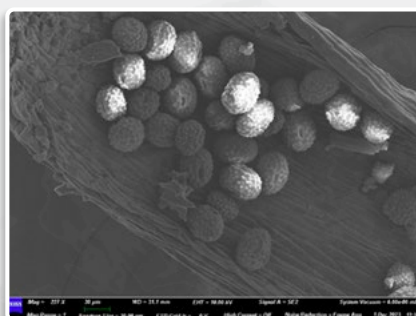
Some of these samples stood out as highly irregular and are now undergoing detailed forensic analysis. Our current hypothesis on the nature of the adulteration is that it involves a different plant material dyed to resemble saffron stigmas. Visual inspection has proved fruitless - fraudsters are adept at disguising their products. However, chemical analysis has uncovered clear anomalies in the suspicious samples' composition. High-resolution NMR shows that these are considerably lacking in the characteristic metabolites (crocins and picrocrocin) normally present in saffron, and additionally that multiple significant spectral peaks are found where there should be none. Further experiments are now underway to discover the source of these unidentified signatures, the prime suspect for the contaminant.

\* Authentication of saffron using 60 MHz 1H NMR spectroscopy. Y Gunning, KS Davies, EK Kemsley. Food Chem. 2023 Mar 15;404(Pt B):134649. doi: 10.1016/j.foodchem.2022.134649.

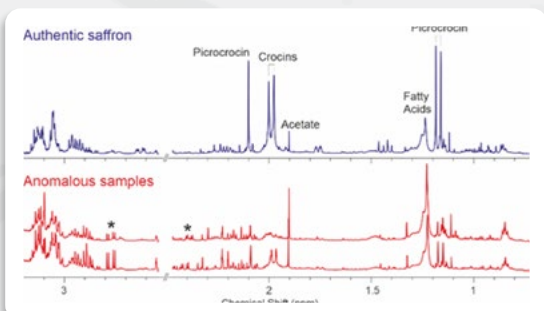


**FIGURES (Not in any particular order)**

A saffron crocus flower. The spice saffron comprises the dried stigmas, just three per bloom.



Scanning Electron Micrograph of pollen grains on a safflower petal, a known adulterant of saffron. Image: B. Lézé, UEA Science Analytical Facility



600 MHz NMR spectra of extracts of 'saffron' (authentic and suspected fraudulent samples)



Visible light image of authentic saffron strands

# Our partners

FAN is funded by a public-private partnership and we continue to be grateful for the support of our Partners. Since our last newsletter, we are very happy to announce BRC Global Standards as a Partner.

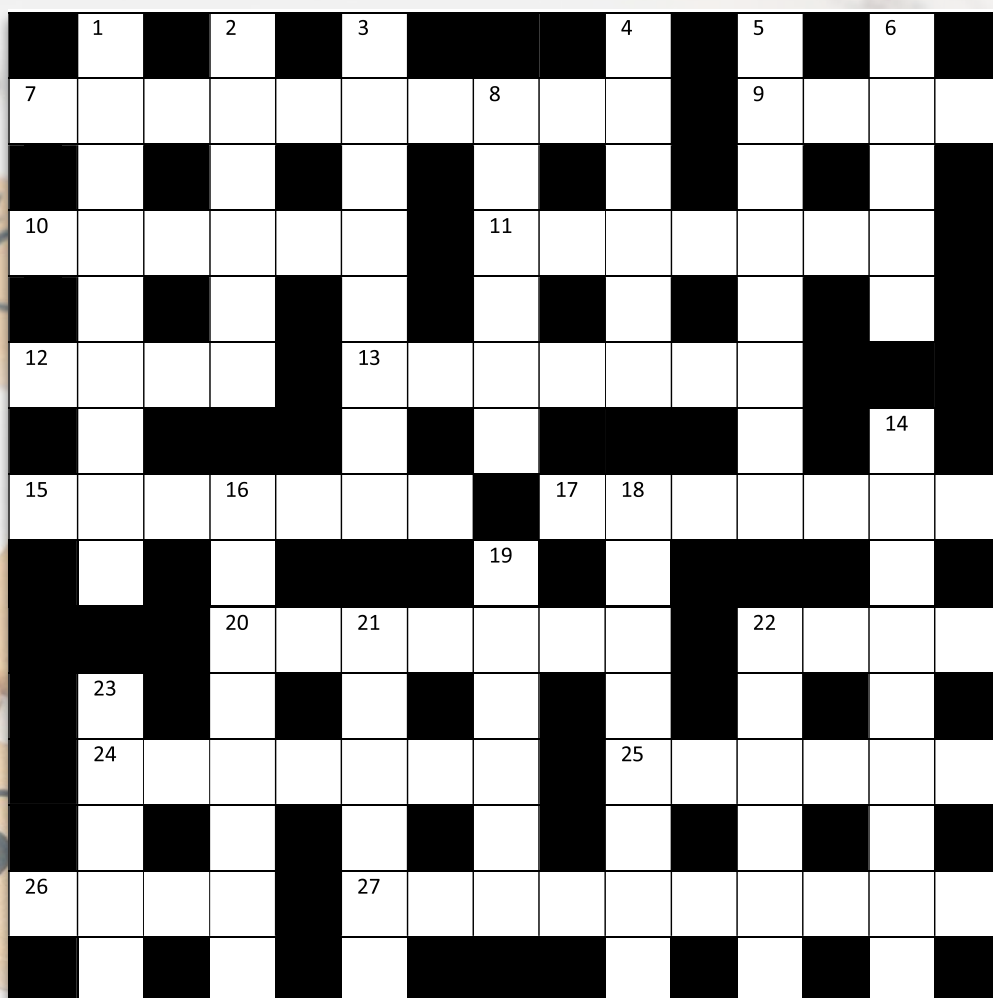
## Partnership categories

Organisations can support the work of the FAN for as little as 1,000 GBP a year. Gold partners receive additional benefits such as early sight of our aggregated data from commercial horizon scanning platforms. The platinum category is for government partners. If you think your organisation would be interested in becoming a FAN Partner, and you would like to learn about the benefits, please contact: [Secretary@foodauthenticity.global](mailto:Secretary@foodauthenticity.global)

## Partners by funding level

Platinum	Gold	Silver	Bronze
 Department for Science, Innovation & Technology	 McCormick		
 Department for Environment Food & Rural Affairs	 SSAFE		
 Food Standards Agency food.gov.uk	 DR EHRENSTORFER™	 fiin FOOD INDUSTRY INTELLIGENCE NETWORK	 Institute of Food Science + Technology ifst
 Food Standards Scotland For safe food and healthy eating	 LGC AXIO PROFICIENCY TESTING		 tenet compliance & litigation
	 LGC ASSURE		 TESCO
	 BRCs		

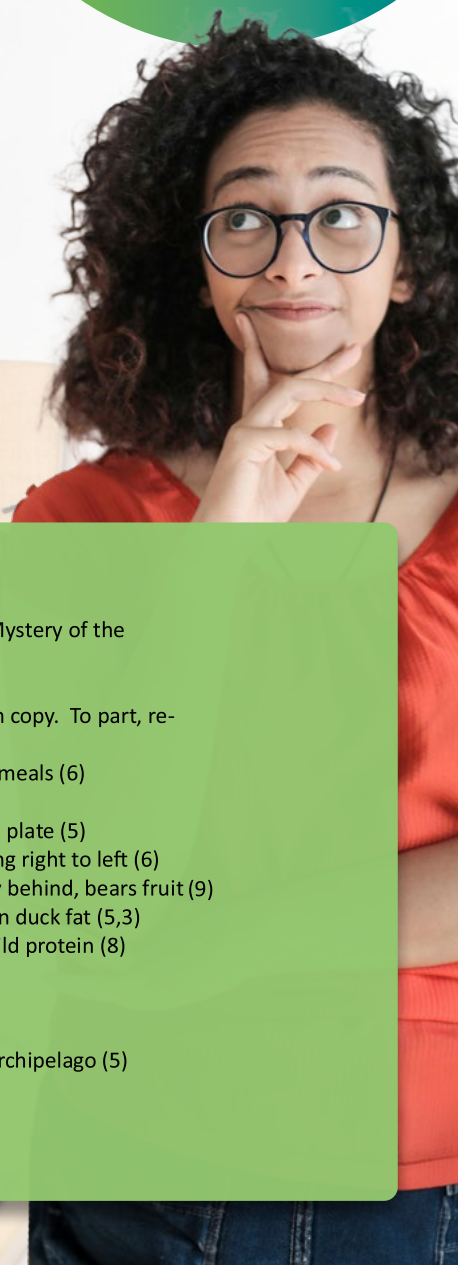
# New FAN Crossword by Zwecklos



Got all the answers?  
Share them with us at

[secretariat@foodauthenticity.global](mailto:secretariat@foodauthenticity.global)

Answers, and names of  
successful entrants, will be  
published on our website  
on 14 June



## Across

7. Stop tea in virtual logbook (10)
9. Wavy line through North-East Africa (4)
10. It is nauseating to cite me wrongly (6)
11. Almost select fewer gherkins (7)
12. Measure powerless squeeze (4)
13. Cuban revolutionary sees kaleidoscopically. Crackers would go nicely (7)
15. "Greetings, Miss Anniston", informally. Sounds like a gas. (7)
17. Master, or master incorrectly without Romeo (7)
20. Floating salad (7)
22. Source of sugar sounds regular (4)
24. Oo – anger management! It is less potent when mixed with myrtle (7)
25. In French, back salary. In Western society, crystals, rainbows and incense (3,3)
26. Go fish in alternate standardisation body (4)
27. Science once got Holly confused, with nothing left out (10)

## Down

- 1 & 5. How Sherlock investigated the Mystery of the Missing Mercury? (9,9)
2. Thwart the spirit (6)
3. Percy left, befuddled, taking carbon copy. To part, re-marry, grow and repeat (3,5)
4. Pole in bags can fill a gap between meals (6)
5. *See 1.*
6. Aisle dancing reveals allergens on a plate (5)
8. Pink ladies shuffled papers, changing right to left (6)
14. Novice measurer, leaving university behind, bears fruit (9)
16. Popeye's companion might reside in duck fat (5,3)
18. Gin mixed in ear? It will help to build protein (8)
19. East choir ensemble is valiant (6)
21. Praises the former salt shaker (6)
22. Elbows savagely in the gut (6)
23. Greek island in Coptic, or further, archipelago (5)

# FAN Membership



**JOIN FOR FREE**  
It only takes a minute  
& you can access:

Latest information  
on food fraud  
prevention,  
tools and guides

New trends and risks  
(horizon scanning)

Free training  
resources





Latest information on  
regulations, standards  
or policy

Information on  
new methods

Members can use  
the “New Services”  
Discussion Page to  
announce any relevant  
new products  
& services  
(Discussion boards are moderated)

If you're not already a member then visit: [www.foodauthenticity.global](http://www.foodauthenticity.global)

Stay connected, share your views and follow us on   @Fauthenticity  
and get in touch if you have any questions via [Secretary@foodauthenticity.uk](mailto:Secretary@foodauthenticity.uk).