



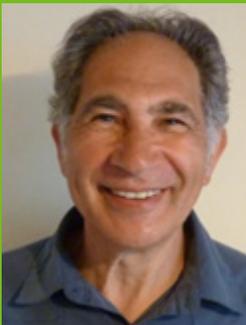
# FoodAuthenticity

A Virtual Network for Food Authenticity Analysis

## WELCOME TO THE SIXTH NETWORK NEWSLETTER

## Newsletter

July 2017 / ISSUE 6



This is a special edition of our Newsletter as it marks the second anniversary of the Food Authenticity Network. As our membership is growing all the time (now over 600 members signed up to the [website](#) and over 700 followers on our [Twitter](#) page), we thought it would be useful to inform our members about what has been achieved in

the past two years and what is available on the website.

As well as this recap, in this Newsletter, there is an article on the use of peptide analysis to determine meat species from the new Quadram Institute (formerly IFR, Norwich), which is one of our Centres of Expertise. There is news about two initiatives in CEN, one looking at definitions and terms for food authenticity and fraud, and a coordinating group to look at food authenticity methods in CEN Technical Committees. The work of SGF global standards of running a voluntary control system for the fruit juice industry is also described.

Since our last Newsletter, we have been busy publicising the Network; the Network had stands at the IFST Spring Conference on 7 April and at the FoodIntegrity Conference on 10-11 May. Selvarani Elahi gave a presentation on the Network to the European Commission's Joint Research Centre in Geel, Belgium in March and joined an expert panel discussing food chain resilience at the BRC Food Safety Americas conference in April. A leaflet on the Network was distributed to representatives of 47 Member countries that attended the Codex Committee on Methods of Analysis and Sampling (CCMAS) in May.

Mark Woolfe

Network Secretary  
Secretary@foodauthenticity.uk

A 'Report Food Crime' button has been added to the homepage:



### Achievements of the Network

The Network now has 608 members signed up to its website who are not just from the UK but also from 37 other countries. There is good mix of member interests in food authenticity with the three main groups being food industry, analysts and regulators (shown overleaf).

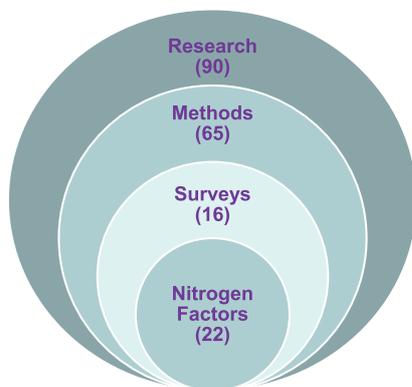
The key features of the Network are given in the adjacent figure which highlights the wealth of information on authenticity available to members in one place. We have carefully selected and posted 226 relevant news items and 35 events. There have also been >60 posts on the discussion boards asking questions on authenticity methods related to a variety of topics including cocoa butter, fish, honey, spices, fruit juices and fats in potato processing. As one of the aims of the Network was to provide a platform for the authenticity community to discuss issues as they arise, we encourage members to continue to use this facility and tap into the wealth of knowledge that resides in our member community.



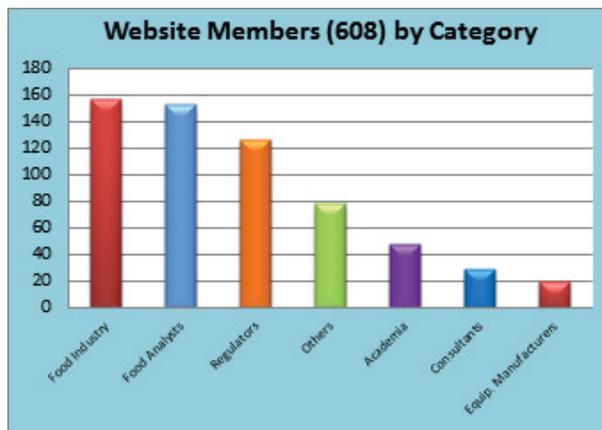
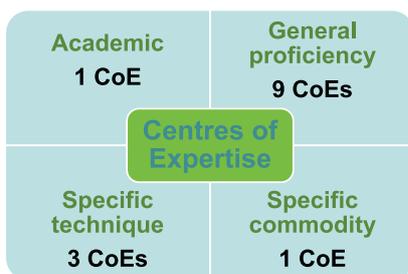
Remember you must go to the bottom of the 'News, Events & Discussions' pages & press 'Follow' if you want to be notified when the latest information on food authenticity is added:

Email me when there are new items – [Follow](#)

The Network hosts, in its Research and Methods tab, 90 final research reports and 65 peer reviewed methods. It is planned to link this resource to the [‘EU Food Integrity Project Knowledge Base’](#), which will make many more European projects and methods available to members.



Recommendation 4 of the Elliott Review said that the “government should work with interested parties to develop ‘Centres of Excellence’”. 14 Food Authenticity Centres of Expertise are named on the Network with direct access to named experts in each of these organisations.



The Network was funded for two years by Defra. We are pleased to announce that the third year (FY17) of Network operation is being funded jointly by Defra, Food Standards Agency and Food Standards Scotland. It is intended that from April 2018, the Network will move to a funding model that is sustainable in the longer term. Different funding models for the future of the Network are currently being explored.

If you're not already a member of the Food Authenticity Network then please visit [www.foodauthenticity.uk](http://www.foodauthenticity.uk) and sign up today. It's free and takes only a few minutes to join.



## A EUROPEAN STANDARD FOR FOOD AUTHENTICITY TERMS AND CONCEPTS

By Petter Olsen, NOFIMA, Norway



International cooperation is needed to tackle the challenges related to food authenticity, and in particular to food fraud. A significant obstacle has been lack of agreement on what the various terms and concepts mean, and how they should be defined. The EU project [Authent-Net](#) is now tackling this issue by developing a low-level, voluntary European Standard (a CEN Workshop Agreement (CWA)) entitled “Authenticity in feed and food chain - General terms and concepts”. The objective of the standardisation effort is to facilitate a clearer understanding and agreement on what various terms and concepts related to food authenticity mean, so that in the future it will be easier to write coherent scientific articles, reports, and even legislation on these issues. The CWA process has no legal standing as such, but the work, and the standard

produced will serve as input to several ongoing more formal standardisation processes (Codex, ISO, CEN) which have a longer time span.

The kick-off meeting for the Food Authenticity CWA was in Parma, Italy in May 2017, and the final recommendations will be delivered in early 2018, at the Authent-Net final project meeting. The CWA process is open and consensus-based, so it is possible for interested parties to engage in the work either by joining the workshop or by giving feedback on drafts, which will be published during autumn 2017.

For more information on the CWA, contact Petter Olsen at Nofima: [petter.olsen@nofima.no](mailto:petter.olsen@nofima.no), or join the Food Authenticity CWA; request access at: [www.foodauthenticity.pbworks.com](http://www.foodauthenticity.pbworks.com)



## A NEW CEN Food Authenticity Coordination Group - FAGG

The CEN Food Authenticity Coordination Group kick-off meeting was held in Brussels on June 15. The FAGG is a coordination group that has been established to coordinate between the different CEN Technical Committees in the area of Food and Feed Authenticity.

The meeting agreed the scope (to cover not only analytical laboratory methods but also to look at availability and standardisation needs for non-analytical methods for food and feed authenticity) of the committee and its terms of reference. An Action Plan defining deadlines and responsibilities was

drawn up which centred on the collation of methods and identification of those that are suitable for standardisation. The meeting heard a presentation from Mr Petter Olson, Chairman of CEN Workshop 86, on this initiative and agreed that the FAGG would review the output of CEN Workshop 86 when it is published in early 2018. Selvarani Elahi informed the FAGG about the existence of the [Food Authenticity Network](#) and encouraged dissemination to their colleagues. The [CEN webpage](#) dedicated to Food and Feed gives further information on CEN activities in this area.



## Successful Long Term Mitigation of Fraud in the Fruit Juice Industry

The European Fruit Juice Industry has created a voluntary control system (VCS), which is supported by a number of non-profit organisations in different countries to combat food fraud. From the first control system, which was set-up on a small scale in 1974, until today, a system to assure a safe and fair market for fruit and vegetable juices and purees, and their derivatives, has been developed on a global scale in 57 countries with about 600 companies involved along the whole production chain.

Since it was founded, the task of the SGF, Sure-Global-Fair, has been to monitor the products of the fruit juice industry that are found on the market. In fulfilling its statutory task, SGF carries out targeted market observations and plant audits at the member production plants in the framework of the Voluntary Control System (VCS) to monitor compliance with the food and labelling regulations. The supply chain of semi-finished goods is managed by IRMA (International Raw Material Assurance), which is part of SGF International e.V. Along with food authenticity and quality controls, SGF also covers safety controls, CSR (corporate social responsibility) activities, pesticide risk management or other pre-competitive points. The main drivers for companies to support this type of self-regulation are cost savings, fair competition and better protection against food fraud.

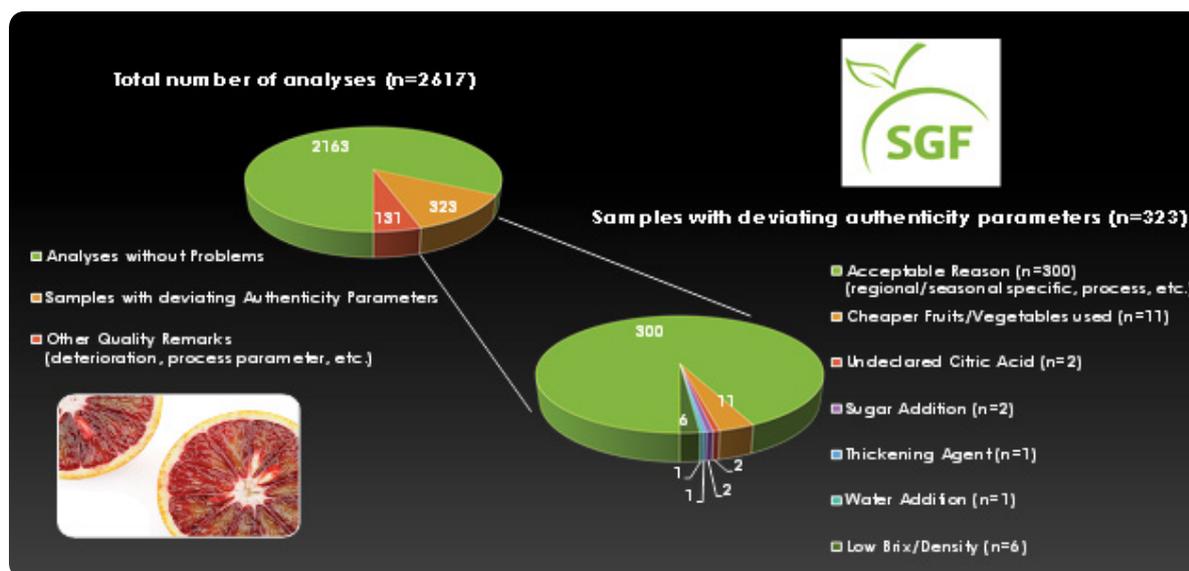
Combating food fraud requires a good knowledge about the market situation, mechanism and activity pattern for illegal activities. Continual horizon scanning and collection of intelligence contribute to the success of SGF and the VCS in preventing incidents affecting the whole industry. Thus SGF aims at detecting and eliminating any remaining source of adulterated fruit-product, which harms fair competition, and the image of the whole market.

The development of suitable analytical control tools is central to VCS and on a level not achievable by individual companies. SGF has developed new approaches against food fraud activities, for example, SGF-Profilings®, the first non-targeted analysis and high-throughput method, invented and launched together with Bruker Biospin. This method is a 400 MHz proton-NMR Food screening, which is also successfully applied to wine, honey and other foodstuffs.

Since authenticity checks need authentic reference samples, SGF combines audits with the sampling and analysis of authenticated reference material from the production lines. The collected data becomes a regional specific database of representative product accessible to all SGF members, and is used for control purposes.

Through the combination of product controls and system audits, the VCS has a highly positive impact on the European fruit and vegetable processing industry in decreasing the risk of adulteration. VCS helps to detect illegal practices and stop them at an early stage by taking advantage of the independence of SGF's efficient controls and tools to implement corrective actions. By purchasing products from SGF-certified suppliers, companies benefit from an important financial advantage because they can rely on specialised competencies and efficient controls to fulfil their due diligence of supplier assessment.

### SGF/IRMA Control Analyses of Semi-Finished Goods in the Fruit Juice Industry from VCS Participants and Other Sources in 2016



Tight controls, continuous analytical development and implementation of corrective action, together, helps prevent dishonest market players from applying illegal means and directly minimises the economic motivation of food fraud. This contributes to fair and safe competition. Adulteration is always a safety risk, as well as having an economic impact, because undeclared ingredients could be non-food grade, toxic or have hidden allergens. Therefore, SGF is prepared to offer its experience to other industry sectors in a pre-competitive manner, knowing that any case of avoided fraud also represents effective consumer protection.



## Using Peptides to Detect Meat Fraud

By Dr Andrew Watson,

The Quadram Institute Bioscience,  
Norwich Research Park, NR4 7UA



The Institute of Food Research transitioned into the Quadram Institute (QI) in April 2017. The QI is a new state-of-the-art food and health research and endoscopy centre opening fully in mid-2018.

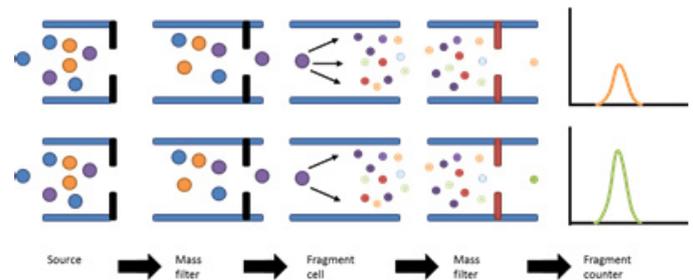
The QI brings together research teams from the Institute of Food Research (IFR), the University of East Anglia, the Norfolk and Norwich University Hospital (NNUH), as well as a new Regional Endoscopy Centre and Clinical Research Facility. The QI engages in fundamental and translational research to become a leading international hub for food and health research.

A couple of weeks ago our testing of a meat product revealed a third, undeclared, meat in addition to the two declared on the label. The third meat species is present in amounts well-above chance contamination: hence it suggests that adulteration has occurred. This is not only fraud, but potentially, it raises issues of food provenance, safety and religious preference. Food fraud has not gone away and probably never will.

We discovered the undeclared meat using a method based on the peptides derived from proteins after trypsin digestion.

Our method uses a type of mass spectrometer (MS) called a 'triple quad', with a liquid chromatography (LC) column feeding a 'peptide soup' sample into the MS itself. The LC provides some level of separation of the many peptides in the system.

There are three stages to peptide analysis in a triple quad (see diagram). The first selects peptides of a previously designated mass, the second breaks those chosen peptides into fragments, and the third selects out several fragments, again looking only for those with a pre-determined mass. These final fragments transit to an ion counter for detection. This means a triple quad offers a highly selective route to picking out specific peptides. And this is the key because proteins are coded by the organism's DNA so peptides derived from those proteins are highly specific species markers (see Table of peptide masses).



### Triple Quad Analysis of Peptides

HP**S**DFGADAQA**A**MSK

Beef Peptide 1531.67, precursor  $m/z = 767$ ,

HP**G**DFGADAQA**G**AMTK

Horse Peptide 1501.66, precursor  $m/z = 752$

Species Mixture	Corresponding Peptides
B + H	B(697) + H(690)
B + H	B(797) + H(804)
B + H	B(767) + H(752)
B + H	B(315) + H(326)

### Comparison of Beef (B) and Horse (H) Peptides

Using myoglobin as the marker protein, which is present in all red meats, we have not only demonstrated species identification down to 1% level in mixtures, but the method permits quantitation. It is achieved by comparing the intensity peak areas arising from peptides from two species, where those peptides are almost the same but differ by perhaps just one amino acid. To illustrate the potential, horse and beef myoglobins differ by 18 amino acids. The outcome is a direct relative quantitation in which ratios of intensity peak areas are proxies for the ratio of the amounts of the two meats in the sample. This approach is free from the several challenges of absolute quantitation, and in fact it is relative quantitation – 5% horse in beef for instance – which is the ultimate goal. As proof of principle we have recently demonstrated that this relative quantitation approach works using mixtures of raw red meats, and have now moved on to mixtures of cooked meats and 'complex foods' in which meat is just one ingredient of a cooked, multi-component food. There is no reason to stop at meats: many food ingredients contain a protein component and can be analysed in a similar way, offering a way of detecting food fraud using a technology which is already common in many laboratories and testing centres.

Extracted from an article originally published in Food Science & Technology, Vol 31 (2) p28, June 2017.

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