

Government Chemist Review 2020



Department for
Business, Energy
& Industrial Strategy

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"...despite the pandemic-related restrictions on “normal” life, the Government Chemist team continued to deliver [...] to the standards we had come to expect."

Professor Paul Berryman,
Chair of the Government Chemist
Programme Expert Group

Foreword from the Government Chemist



It is hard to introduce this review without mentioning COVID-19 and EU Exit. Both have dominated the political landscape this past year; the former in terms of the increased recognition of the important role of measurement in diagnosis and treatment, and the latter in driving consideration of independent national regulation and processes. Both have had a significant effect on shaping the response of the Government Chemist throughout 2020.

The pandemic, perhaps unsurprisingly given the government restrictions, led to a reduced call upon the statutory function of the Government Chemist. The nature of some of the referee cases was though quite different and correspondingly, challenging in their nature. It was not as reduced as might have been the case as EU Exit seemed to provide a more international focus and, with it, further referee cases relating to genetic modification of certain product types. This prompted the need for provision of analytical and interpretive guidance around the topic area.

It is testament to the experience and dedication of all the scientists supporting the Government Chemist roles that they were able to maintain the level of output and expected impact appreciated by our stakeholders throughout this period. Of course, this has meant prioritisation within the underpinning measurement research projects, one which balanced a shift-style laboratory operation with desk-based working from home to meet government guidance on social distancing and minimising potential exposure to the virus.

Beyond the Government Chemist statutory function, I have welcomed working closely with our sponsoring government departments, our governance group, Devolved Administrations, Non Governmental Organisations and industry, albeit largely virtually, to address

strategic cross-department issues such as cannabidiol (CBD) and to provide independent scientific opinion on honey authenticity and SARS-CoV-2 viral detection.

These activities represent just part of the achieved implementation of the Government Chemist Strategy 2020, helping to protect consumers in tomorrow's world.

The Government Chemist has continued to help secure national and international compliance by influencing sound policy and regulatory decision-making. Further to the numerous dispute resolutions relating to detection of genetically modified rice products, it became clear that a reduction in the capacity and analytical capability within enforcement laboratories had the potential to erode the UK enforcement system. The Government Chemist quickly published guidance detailing the necessary analytical testing strategy and reporting approach to support both enforcement laboratories and food business operators (FBOs).

Recently too, the Government Chemist has been working in association with the Chief Scientific Advisors for both Food Standards Agency (FSA) and Department for Environmental Food & Rural Affairs (Defra), and their expert scientists within the Departments, to provide leadership for the UK in international documentary standardisation activities relating to harmonised terminology for genome editing.

However, the pandemic has equally shaped the advisory response of the Government Chemist during the year.

The need to better realise the benefits from an innovative and growing UK economy requires continued close engagement with both Government and wider stakeholder communities. I have spent the latter part

of the year supporting the Department of Health and Social Care (DHSC) in their evaluation of diagnostic technologies for COVID-19; particularly through provision of independent scientific opinion, as part of the Project Oversight Group, evaluating the clinical potential for mass spectrometry (COVID-MS). The uniqueness of the project has drawn international interest, laying out a basis for academic-clinical laboratory collaboration with the measurement community for future integration projects of this nature.

Growing collaborative national skills initiatives was an identified priority within the Government Chemist Strategy 2020, one which has been impossible to deliver as first envisioned due to the circumstances of the past year. However, they have challenged the need for provision of innovative solutions. The Government Chemist team has completed key groundwork around e-learning delivery mechanisms and these are soon to be trialled, using CBD as a pilot project. This will extend the value of the Government Chemist function beyond first-line stakeholders to wider sector benefit and builds on practical support given to reshaping the formal qualification for UK Public Analysts and the continued growth in the joint cross-government Knowledge Transfer Framework.

I am confident therefore that, despite the challenges of this year, the visible outcomes highlighted in this year's Annual Review clearly shows the trajectory for the Government Chemist is already reaping reward and its future has never been brighter.

A handwritten signature in black ink, appearing to read 'Julian Braybrook', written over a light blue background.

Professor Julian Braybrook
BSc, PhD, Hon DPhil, CChemFRSC
Government Chemist

Note from the Chair of the Government Chemist Programme Expert Group

In 2021, it would be a cliché to say that 2020 was extraordinary. However, it is impossible to look at the year left behind and not reflect on the unprecedented challenges presented by the COVID-19 pandemic.

The meetings of the Government Chemist Programme Expert Group take place biannually to review progress against the agreed programme objectives. The first meeting of 2020 had been scheduled to take place in May, in London, but it was run smoothly as an online virtual gathering instead. The meeting felt strange at the time but became commonplace as the year progressed.

During these virtual meetings it became transparent that despite the pandemic-related restrictions on “normal” life, the Government Chemist team continued to deliver on both the statutory function (referee cases) and the advisory function to the standards we had come to expect.

Inevitably, some of the programme outputs were delayed, most notably the 2020 Government conference, which had to be postponed to 2021. At the time of writing, the conference will take place online and includes

an exciting line-up. It brings together scientists, regulators, enforcement agencies, industry and policy makers to discuss future challenges in the manufacturing, packaging, retailing and testing of food.

As Julian noted in his foreword, the statutory function saw a decline in overall case numbers, owing to the pandemic, but simultaneously, a rise in the proportion of cases prompted by changes in regulations brought by the EU Exit. Despite the changes in work patterns, the Government Chemist team deployed the same excellent levels of analytical rigour and expertise as it would under normal circumstances.

Meanwhile the advisory function has continued to flourish. The building of effective cross-government and external engagement has always underpinned the success of the Government Chemist function. But never before has there been such an opportunity to maximise this and to ensure alignment and sharing of intelligence based on sound measurement science to underpin a robust and innovative official food and feed control system.

It is still unknown how the COVID-19 situation will develop in the future, or how the statutory function workload and demand on the advisory function will be affected by regulatory changes. But the adaptability and resilience shown by all involved gives me confidence that the Government Chemist and his team will undoubtedly rise to the challenge.



Professor Paul Berryman
*BSc, MSc, MChemA, MBA, PhD,
CBiol FRSB, CSci FIFST,
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What we do

The Government Chemist role was originally created to help in the protection of the public from fraud, malpractice and harm. In 1875, the laboratory was appointed as “referee analyst”, a role linked to the Sale of Food and Drugs Act of that year.

The role continues to this day, fulfilling statutory and advisory functions, which are funded by the Department for Business, Energy and Industrial Strategy (BEIS).

The Government Chemist uses up-to-date and authoritative measurement procedures coupled with experienced interpretative skills to act as a fair and independent arbiter to resolve disputes. In doing so we protect consumers, provide a route of technical appeal for businesses and contribute to regulatory enforcement in sectors where chemical and bio-measurements are important.





Our statutory function

The Government Chemist's statutory function comprises science-based duties prescribed in several acts of Parliament. These duties (see Box 1 on page 7) cover public protection, safety and health, value for money, and consumer choice. Our most important responsibility is to act as a "referee analyst" resolving disputes between regulators and businesses, using our own independent measurements, interpretations and expert opinions. Thus, we reduce the burden on public finances as successful resolution often avoids recourse to legal processes. Our credibility as the referee, and our ability to develop new capability for future challenges, rest on first-class science which is underpinned by the designation of our home laboratory, LGC, as the UK National Measurement Laboratory and Designated Institute for chemical and bio-measurement.

► **Section 2 looks at the year's completed referee cases.**

Our advisory function

The long history of the Government Chemist function and its involvement in regular and wide-ranging dispute cases means that the team is well placed to provide advice on analytical science implications for policy, standards and regulations. We mainly deliver this function by responding to government calls for advice or published consultations, where there is a significant or important analytical science content. Selected consultation responses are published on the Government Chemist website; 2020 consultation responses have been listed on page 14.

► **See Section 3 for more about the wider advisory function.**

Our capability building

Referee analysis is often most challenging when measurements are difficult, where disputed results may span a regulatory limit, where novel products are being introduced into the market, or where there is high public and media interest, for example allergen detection. The Government Chemist Programme carries out capability-building projects to be prepared for demand for referee analysis in these areas.

► **Section 4 provides an overview of our current capability-building activities.**

Our governance

The Government Chemist programme is funded by BEIS. Within that department, responsibility for the Government Chemist lies with the International Research and Innovation Directorate.

BEIS has put into place arrangements to ensure that the Government Chemist programme is delivered competently, and that scientific standards, impartiality, transparency and integrity are maintained. The Government Chemist Programme Expert Group (GCPEG) provides independent scrutiny, overseeing the delivery, planning and quality of the programme and offering advice to BEIS regarding future priorities and strategic direction of the programme.

The GCPEG comprises representatives of regulatory and enforcement bodies, industry, trade associations and academia, with a broad range of backgrounds, skills and interests.

Government Chemist Programme Expert Group membership in 2020

Paul Berryman, Chair

Paul is the Director of Berryman Food Science Ltd, which works closely with government and businesses, including the Department for International Trade (DIT), Innovate UK and SGS Ltd. He is also a visiting Professor at the University of Reading.

Robbie Beattie

Robbie is the Public Analyst, Agricultural Analyst and Food Examiner to nine local authorities in Scotland. As a senior manager with The City of Edinburgh Council he manages a portfolio of income generating assets.

Simon Branch

Simon is Director of Research, Development and Scientific Affairs at Herbalife and has sat on a number of committees including the RSC Science and Technology Board.

Andrew Damant

Andrew is an official UK delegate on numerous international committees and an advisor to various UK committees. Andrew retired from the FSA, where he led Surveillance, Methods and Laboratory Policy Team, in 2018.

Lucy Foster

Lucy is the Programme Manager for food chain research at Defra having previously worked at the FSA.

David Franklin

David leads the Scientific Sampling and Laboratory Policy Team in the FSA, which is responsible for policy and scientific advice for Official Control Laboratories, National Reference Laboratories and Sampling.

Jonathan Griffin

Jonathan is a Public Analyst and Technical Manager for Kent Scientific Services and former President of the Association of Public Analysts.

Kasia Kazmierczak

Kasia leads a multidisciplinary team covering marine science and shellfish hygiene, authenticity, allergens, foodborne viruses and surveillance at Food Standards Scotland (FSS).

Chelvi Leonard

Chelvi is Policy Lead for Accreditation at the Office for Product Safety and Standards, BEIS. Chelvi was the UK representative at CEN and Codex meetings in the standardisation of analytical methods for food.

Brenda McRory

Brenda is a Technical Lead Officer at Suffolk Coastal Port Health Authority, based at the port of Felixstowe. Brenda currently leads on imports of fishery products, and is also involved with the import of foodstuffs of non-animal origin.

Andrew Millman

Andrew is the nominated representative for the British Retail Consortium. Andrew chairs the Authenticity and Chemical Contaminants and Emerging Risks Work Groups and is currently employed by Asda Stores Ltd, working within the Compliance team.

Helen Munday

Helen is the Chief Scientific Officer of the Food and Drink Federation (FDF). She has held this role since 2016 having previously worked for the trade association as Director of Food Safety and Science.

Declan Naughton

Declan is currently Professor of Biomolecular Sciences at Kingston University London and Interim Associate Dean for Research for the Faculty of Science, Engineering and Computing at the university.

David Pickering

David is the Trading Standards Manager for the Buckinghamshire and Surrey Trading Standards Service. He has been the Chartered Trading Standards Institute Lead Officer for food for many years and represents the profession on numerous groups including the national Food Standards Focus group.

Sophie Rollinson

Sophie is the food science lead in Defra's Food and Farming Directorate and manages the Department's Food Authenticity Research Programme.

Diane Turner

Diane is the Director and Senior Consultant of Anthias Consulting Ltd, an independent provider of analytical training and consultancy. Diane is also a visiting academic and consultant at the Open University, the President of the Royal Society of Chemistry Analytical Division and Chair of the Analytical Trust Fund.

Roger Wood OBE

Roger is an experienced food analysis specialist, formerly a senior scientist in FSA. Roger has represented the UK at numerous EU methods of analysis and sampling working groups in the food and feed sectors over many years and has been Chair of a number of international food analysis working groups.

Box 1 The Government Chemist in legislation

The duties of the Government Chemist as referee analyst are defined in or under:

Food Safety Act 1990

Food Safety (Sampling and Qualifications) Regulations 2013

Food Safety (Sampling and Qualifications) (Scotland) Regulations 2013

Food (Northern Ireland) Order 1989

Food Safety (Northern Ireland) Order 1991

The Food Safety (Sampling and Qualifications) Regulations (Northern Ireland) 2013

The Food Safety (Sampling and Qualifications) (Wales) Regulations 2013

Rheoliadau Diogelwch Bwyd (Samplu a Chymwysterau) (Cymru) 2013

Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations 2007¹

Materials and Articles in Contact with Food Regulations 2012¹

Agriculture Act 1970

The Animal Feed (Hygiene, Sampling etc. and Enforcement) (England) Regulations 2015¹

Genetically Modified Animal Feed Regulations 2004¹

Human Medicines Regulations 2012

Farm and Garden Chemicals Act 1967

The Government Chemist is named and has other scientific responsibilities under:

Merchant Shipping Act 1995

Hydrocarbon Oil Duties Act 1979

Poisons Act 1972

The status and territorial extent of the Government Chemist are understood with reference to:

Freedom of Information Act 2000

Scotland Act 1998 (Cross-Border Public Authorities) (Specification) Order 1999

Administrative Provisions Act (Northern Ireland) 1928

¹ Enacted as separate legislation in England, Northern Ireland, Scotland and Wales

Our people

LGC staff who directly support the Government Chemist function have clear and independently defined roles (Figure 1). Within this framework, there are particular requirements for the management of statutory casework:

- Nominated officers, one of whom holds the requisite statutory qualification for Public Analysts, have overall responsibility for case supervision. They prepare and sign Government Chemist certificates of analysis.
- Michael Walker, Referee Analyst and Head of the Office of the Government Chemist, announced his intention to retire from the role early in 2021. Paul Hancock joined the team in July 2020 as Michael's replacement.
- John Black took over the Programme Management role from Selvarani Elahi in April 2020.



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Figure 1 Government Chemist Team and contact points



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Dispute resolution

The Government Chemist underpins industry and public confidence in the food and feed official control system by guaranteeing independent impartial technical appeal to the highest standards. We maintain the credibility of this referee role by stringent governance, painstaking analytical rigour and well informed interpretation of the resulting data.



Analytical results must be interpreted in an increasingly global supply chain and often in increasingly complex scientific, legal and policy contexts. Our default analytical strategy practically amounts to a stand-alone method validation, and provides the necessary high level of analytical confidence. Significant analytical steps are witnessed by a second scientist and data transcriptions verified. The entire dataset is independently evaluated by statisticians for bias and outlying results and to yield a case specific measurement uncertainty if required. A certificate is drafted and reviewed by a qualified person and finally the case file is brought to the Government Chemist for peer review. If all steps are satisfactory the Government Chemist will allow the findings to be released.

The analysis of retained portions of samples referred to the Government Chemist (referee analysis) is more complex and resource intensive than the work of an official control or trade laboratory. This is necessary because:

- our results and opinion must be definitive and bear detailed scrutiny, sometimes at national and international level,
- referrals may be on matters close to a legislative limit hence analytical confidence in our data must be of the highest standard, and
- the problems we seek to resolve may occur where the science, the law or both are uncertain or controversial.

Overview of referee cases in 2020

Referee cases – resolving disputes in the UK official control system for food and feed – is a demand led service, which has been at the core of the Government Chemist's function since 1875. Publishing the outcomes in our annual reviews and in more detail in peer reviewed scientific papers contributes to avoiding similar disputes in the future.

The statutory conditions for referral usually begin with the contemplation or commencement of legal proceedings where the prosecution intends to offer analytical evidence. Unsurprisingly, as the COVID-19 pandemic restricted the activities of enforcement officers and laboratories alike, the number of cases referred during 2020 was significantly lower at seven, compared with 14 in 2019.

Four of the cases related to Genetically Modified Organisms in Chinese rice products, two related to honey and a further case concerned labelling of a novel food supplement.



Genetically Modified (GM) food

EU law¹ prohibits the placing on the market of genetically modified (GM) food or feed unless it is officially authorised, and provides for its labelling and supervision. Authorisation is only granted after demonstration that the GM food or feed does not have adverse effects on health or the environment and that it does not mislead the consumer. In addition, the GM food must not differ from the food it is intended to replace to such an extent that its normal consumption would be nutritionally disadvantageous.

Specifically, there are no genetically modified rice products authorised in the European Union. From 2006 onwards some rice products originating in, or consigned from China, were found to be

contaminated with the genetically modified rice Bt-63. The Chinese authorities took steps to control the presence of GM rice, but GM varieties such as Bt-63 and others continued to be found.

As a consequence, the EU requires rice imports from China to be accompanied by an analytical report demonstrating the absence of GM rice.

Since December 2011, all rice imports from China have been subject to inspection, sampling and analysis. Owing to the lack of detail of the full DNA sequences of genetically modified rice varieties available in China, a screening approach is adopted for certain generic genetic elements. GM plants are generally produced by inserting a transgenic sequence that encodes for a desired trait into the host genome. The trait sequence is typically bounded by regulatory promoter and terminator sequences, some of the most common being the 35S promoter (P35S) derived from Cauliflower

Mosaic Virus (CaMV) and the nopaline synthase terminator (TNOS) derived from *Agrobacterium tumefaciens*. Thus P35S and TNOS are useful screening targets. Further screening targets are genes encoding for the *Bacillus thuringiensis* endotoxin Cry1Ab/Ac, genetically engineered as an insect resistance trait sequence.

The Government Chemist received four cases for GMO analysis during 2020, an increased number from previous years and largely resulting from the reduction in the capacity and capability of laboratories within the UK since 2019. The analytical approach used for the quantification of GMOs is described in detail in the Government Chemist Review 2017. The results from the four cases are summarised in Table 1. One of the cases (2023-1) did not proceed to the analysis step at the request of the Food Business Operator.

Table 1

Case	1720-32	2023-1	2023-3		2023-5
Food type	Brown rice noodles	Chilli crackers	Rice noodles	Rice noodles	Rice noodles
Disputed GM element	P-35S	Cry1Ab	Cry1Ab/Ac	Cry1Ab/Ac	T-NOS
Government Chemist findings	Cry1Ab/Ac present	No analysis conducted	Cry1Ab/Ac negative	Cry1Ab/Ac negative	T-NOS negative
Outcome	Consignment refused entry to UK		Consignment allowed entry into UK	Consignment allowed entry into UK	Consignment allowed entry into UK

¹ Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed <https://eur-lex.europa.eu/eli/reg/2003/1829/2008-04-10>

Antibiotics in Manuka honey

Honey, being a complex matrix is often subject to dispute. In this case, the dispute revolved around the presence or absence of the antibiotics streptomycin and dihydrostreptomycin.

Antibiotics are used in apiculture to treat a number of bacterial diseases. The Animal Products (Examination for Residues and Maximum Residue Limits (MRL)) (England and Scotland) Regulations 2015 implement a number of EU regulations governing the residues of pharmacologically active substances in food of animal origin. There is no set MRL for streptomycin and dihydrostreptomycin in honey, and therefore the provisions of EC regulations 37/2010² and consequently Commission Decision 2002/657/EC³ apply.

The sample was investigated using Hydrophilic Interaction Liquid Chromatography coupled with tandem Mass Spectrometry (HILIC-MS/MS) utilising an internal standard approach. In the absence of isotopically labelled analogues of the targets, a number of similar antibiotics were investigated for use as internal standards. However, none of these were deemed suitable; so instead, a novel approach was adopted whereby added streptomycin was used as the internal standard for dihydrostreptomycin and vice-versa. Matrix standards were analysed to address the complexity of the honey matrix.

Two batches of five replicates for each target were analysed (20 analysis in total), 19 of which returned a result of not detected above Limit of Quantitation (LOQ) for the target analyte. One analysis produced

a positive result for streptomycin. However, as it could not be explained or duplicated it was deemed an artefact and the sample was therefore considered compliant with relevant UK and EU measures applicable to these compounds.

Food labelling

This was a particularly interesting case, referred to us by the Food Business Operator (FBO), after the Public Analyst had found a number of irregularities with the sample label and composition. The product was a niacin food supplement, pertaining to contain the newly approved novel food, nicotinamide riboside chloride (NRC), with the labelling and associated health claims relying on the statutory recognition of NRC as a source of niacin.

Whilst no dispute had occurred in relation to the NRC content, independent analysis by the Government Chemist, using liquid chromatography (method supplied by the FBO, with thanks) and nuclear magnetic resonance spectroscopy techniques developed within LGC, confirmed that the product contained NRC at the stated amount.

The labelling irregularities hinged on the statutory recognition of NRC as a source of niacin. Whilst an approval had been granted for use of NRC in food supplements,⁴ NRC had not been transposed into the statutory closed list of compounds that are permitted as forms of niacin.⁵ As a result, the nutrition information was incorrect and the health claims not authorised. It was noted that a draft European Commission regulation existed that would remedy these defects but was not in force at the time.

It was also noted that the product label would remain non-compliant even with the promulgation

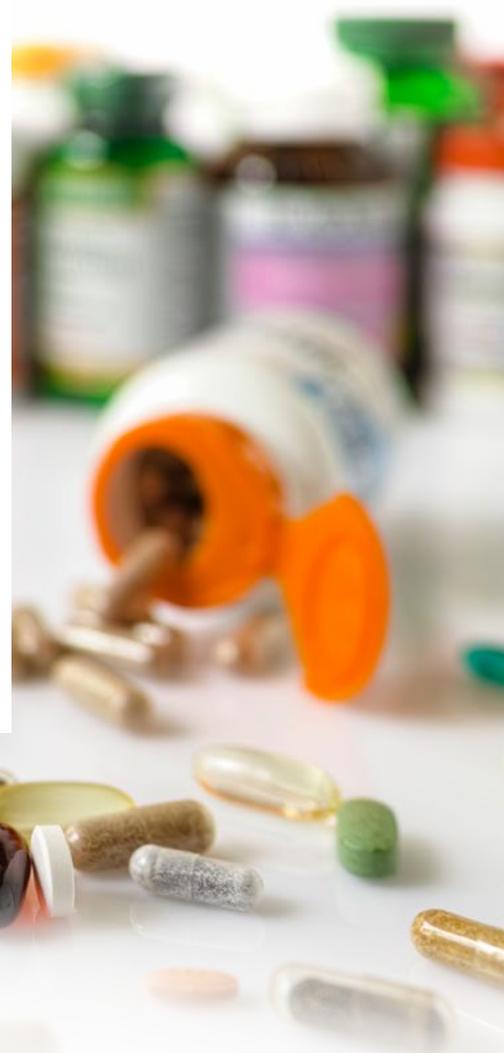
of the aforementioned draft regulation, due to the use of the proprietary name for niacin/NRC not being permitted in the nutrition declaration and that the label failed to address the prescribed maximum permitted daily intake for pregnant and lactating women.

Honey authenticity

This case is a desktop exercise as a result of newspaper reports alleging that a large proportion of UK retail honeys are bulked out with exogenous sugar products.

The reports were based on the analysis of 13 own brand samples from major UK retailers, with 177 individual data points to be considered generated from a number of techniques, including traditional analysis and more recent methods such as NMR, IRMS and HRMS analysis.

Due to the extent and complexity of the review, the case was still active at the time of publication.



² Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin

³ Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results

⁴ Commission implementing regulation (EU) 2020/16

⁵ Regulation (EC) No 1925/2006 of the European Parliament and of the Council of 20 December 2006

3

The advisory function

The Government Chemist provides specific advice related to measurement topics on a broad range of policy and regulatory developments to local, central and devolved administration governments, the European Union and the wider community of stakeholders. Scientific and measurement-based support is also provided to those industries where chemical and bio-measurements are an important aspect of their activities. The publication of our outputs through the Government Chemist website is an important means of disseminating such advice, as well as receiving feedback.



Enquiries from stakeholders

Many stakeholders regularly turn to the Government Chemist for advice on a wide range of topics. Often the enquiries are related to measurement techniques and the interpretation of results. Sometimes our expert opinion is sought on topical issues such as cannabidiol, allergens or food authenticity claims. We answered over 57 requests for advice during 2020.

Figure 2 shows the origin of the source of the enquiries. Figure 3 shows the breadth of topics that were the subject of enquiries received. The 'other' category included enquiries on trace elements, sampling and sample preparation.

on the question, where applicable, or referring the enquirer to another source of information.

The enquirers are invariably grateful for our time and advice.

In each case, we gave carefully considered advice, supplying a copy of peer reviewed research findings

Source of enquiries

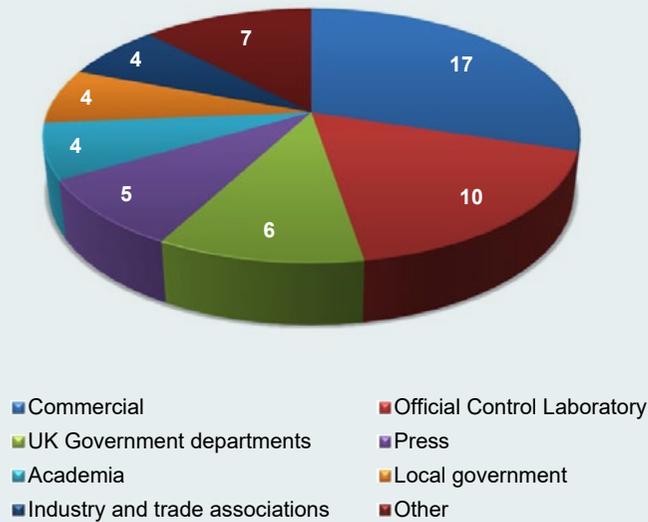


Figure 2 Distribution of enquiries by source

Enquiry topics

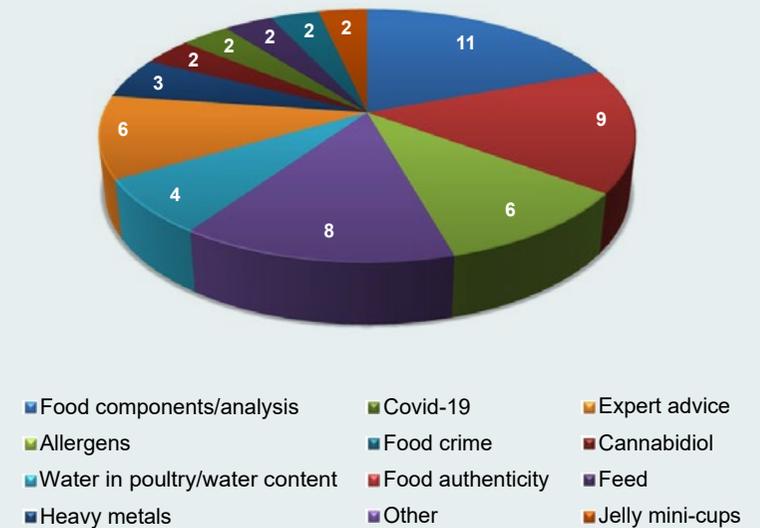


Figure 3 Distribution of enquiries by topic

Expert opinion to stakeholders

Government Chemist staff provide their expert input into a number of Committees (see Box 2) to influence the development of new legislation, standards and policy and ensure that they are based on sound measurement science and are fit-for-purpose.

Box 2 List of committees to which the Government Chemist contributes

Association of Public Analysts (APA) Training Committee
Authenticity Methods Working Group (AMWG)
Authenticity Steering Group (ASG)
BSI Committee AW/275 – Food analysis – Horizontal methods
BSI Committee AW/9 – Microbiology
BSI Committee AW/10 – Animal feeding stuffs
BSI Committee AW/34 – Food Authenticity
BSI Committee AW/307 – Oilseeds, animal and vegetable fats and oils and their by-products
CEN TC 460 - Food Authenticity Technical Committee, Plenary & Working Groups
CEN Food Authenticity Coordination Group (FACG)
CEN workshop 86 – authenticity in the feed and food chain
Codex Committee on Methods of Sampling and Analysis (CCMAS)
European Network of GMO Laboratories (ENGL): Steering Committee & Plenary meetings
Food Law Group
Food Standards and Labelling Focus Group
FSA(England)/DH Committee on Toxicity, COT – Food Contact Materials Joint Expert Committee
Hazardous Substances Advisory Committee (HSAC)
ILSI Expert Group: Methods needed to deploy allergen quantitative risk assessment and their implementation
Institute of Food Science and Technology (IFST) Science Committee
MChemA Exams Board Meeting
University of Manchester Allergy Network (MFAN)
Nanomaterials Environment and Health Industry Group (NEHIG)
Nanomaterials Environment and Health Government Group (NEHGG)
Royal Society of Chemistry (RSC) Analytical Methods Committee (AMC) Food and Feed Authenticity Expert Working Group
Royal Society of Chemistry (RSC) Food Group
Safe to Trade Scheme Governance Board
Standing Committee of Analysts (SCA) board
UK Chemicals Stakeholder Forum (UKCSF)

Response to consultations

Consultations are carried out by the government (including the devolved administrations and agencies), standards bodies or Directorates-General of the European Union, to obtain the input of both interested and expert stakeholders on proposed new policy, guidance or legislation, prior to enactment. They are considered by legislators to be an important part of the development process for new legislation.

The Government Chemist has continued to provide input to these official consultations, being well-placed through the additional expertise within the National Measurement Laboratory and wider LGC organisation across a range of analytical science, to respond authoritatively and independently where the consultations have chemical or bioanalytical measurement implications.

The full list of the consultations responded to by us during the year are listed in Box 3, a selection of responses being available at www.gov.uk/governmentchemist.

Box 3 Consultations to which the Government Chemist has responded

A report of a NIST Food Safety Meeting in Gaithersburg in November 2019.

A 'Chair of Evidence Committee Meeting Questionnaire' from Defra (as Selvarani Elahi is Chair of Defra's Authenticity Methods Working Group).

UK guidance for the implementation of the new Official Controls Regulation (EU) 2017/625 (OCR), which came into effect from 14 December 2019.

Drawing on the experience of Brand Reputation Compliance Global Standards (BRCGS) plant based standard, Government Chemist staff were able to provide constructive feedback on BSI Draft PAS 224 (2020) Plant-based foods – Characteristics and composition – Code of practice.

CEN Technical Committee 460 – Food Authenticity Working Group 4, a proposal for a preliminary work item on: Authenticity of coffee – Determination of the 16-O-Methylcafestol content – NMR method was put forward for voting; Government Chemist staff voted to accept this preliminary work item.

The Review of the Food Law Code of Practice, Food Law Practice Guidance, and implementation of the Competency Framework.

BSI proposal for the development of a PAS (Publicly Available Specification) on New Zealand Manuka honey; as honey authenticity is topical and a feature of referee samples, the Government Chemist supported this work and registered interest in being involved in the development of this specification.

Horizon scanning

Honey authenticity

Honey, a unique natural product known since antiquity, resonates in a particular way with many consumers. Hence the authenticity of honey provokes strong views particularly when it is impugned. With global supply chains, end-product testing of honey on the market is a conceivably attractive option to provide reassurance of authenticity. However, affirming or challenging the authenticity of honey with certainty, despite many thousands⁶ of published scientific studies, can remain an elusive goal.

The Government Chemist has been involved in advising the UK Government on the measurement science aspects of this problem for a number of years. A particular milestone in 2020 was the publication of our report on a UK seminar on the application of a powerful analytical technique, nuclear magnetic resonance (NMR) to honey authenticity.

The Government Chemist, Defra, FSA and Food Standards Scotland (FSS) held the seminar in November 2019. It was attended by 57 delegates representing a wide range of UK and international stakeholders involved in honey production and analysis. The aim was to discuss this topic and ideally come to an agreed position. The seminar consisted of a series of presentations from invited experts that set the scene followed by breakout groups to discuss the suitability of NMR for enforcement purposes and to identify gaps and priorities.

There was consensus support for NMR as a tool in verifying the authenticity of foods but that, based on the available evidence, NMR methods are not yet suitable for the detection of exogenous sugars in honey for enforcement purposes. In order to address this, stakeholders made a number of suggestions centred on:

- the creation of a forum for continuing dialogue between all parties,
- provision of training, education and guidance on the production and analysis of honey, and
- standardisation of the application and interpretation of NMR approaches for the determination of exogenous sugars in honey.

The seminar provided a valuable forum for constructive dialogue on the use of NMR. The Government Chemist continued to work with other government departments and interested stakeholders to consider how to take forward the suggestions and themes from the seminar. While the COVID-19 pandemic clearly stifled some of these initiatives the Government Chemist calls on the major stakeholders to show leadership in re-establishing lines of communication to facilitate dialogue particularly between the analytical laboratories and the industry to move towards consensus.

This report includes a referee case on the detection of antibiotics in Manuka honey, and information on a desk-based referee case assessing newspaper reports alleging that a large proportion of UK retail honeys are bulked out with exogenous sugar products (section 2).

⁶ A search of Google Scholar 03.02.2021 for the terms honey + authenticity returned 'about 85,300 results'



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Impact of our work

The impact of the work of the Government Chemist programme is broad and the effects can be observed in a number of ways.

Horizon scanning activities identify the areas where referee cases are more likely to arise, or where new legislation may lead to food business operators and local authorities requiring advice or support. We can then prioritise the resources required to plan and carry out our research projects to support the areas identified.



These projects have benefits beyond the Government Chemist's statutory function. They often impact on the wider measurement community by promoting best measurement practice in the scientific areas where disputes are more likely to arise.

The breadth of knowledge generated through the Government Chemist's advisory function – and disseminated through to government, European Commission and wider stakeholder communities – provides a secure scientific basis for more efficient and cost-effective regulations. This is achieved by translating current capabilities into timely support and advice, by generating chemical and bio-measurement solutions for the Government Chemist's own referee case use and for adoption by stakeholders, and by predicting future regulatory issues.

Of course this year, Government Chemist activities have been focussed particularly on supporting the measurement challenges associated with the COVID-19 pandemic.

Building new capabilities

Food Allergy

Food allergy, a subset of food hypersensitivity that is immunologically mediated, causes adverse reactions to certain food proteins. It has reached epidemic proportions in the industrialized world affecting up to 10% of young children and 2–3% of adults⁷ and has resulted in considerable morbidity.⁸ Anaphylaxis, a rapid onset multi-organ system allergic reaction can cause fatalities. The risk of such deaths, though comparatively rare,⁹ contributes to well-documented detriment to the quality of life for allergic consumers and their families.¹⁰ There are burdens on healthcare, on businesses (food recalls, for example) and regulators. Current reputed cures for food allergies remain experimental and lifelong avoidance of the eliciting food(s) is required.

The FSA has a commendable record of research, guidance and training on the risk analysis and risk management of food hypersensitivity. A current major FSA strategic aim is that the UK should be the best place in the world to be a food hypersensitive consumer.¹¹

The Government Chemist team make regular invited contributions to relevant FSA workshops and research prioritisation exercises. During 2020, Michael Walker contributed to a series of workshops organised by FSA with the aim of prioritising the Top 10 questions about food hypersensitivity to be addressed through research.

Analysis of food and other matrices for food allergens plays a significant part in both risk assessment and risk management. However the analysis of large allergen protein molecules in food can be challenging.^{12,13} Recognising this the Government Chemist carries out research on allergen analysis to build and maintain capability and to provide leadership to the analytical community. The difficulties and outcomes of referee casework on food allergens are described in the Government Chemist Review of 2019.¹⁴

⁷ Cianferoni, A. and Spergel, J.M., Food allergy: review, classification and diagnosis. *Allergology International*, 2009, 58(4), 457-466

⁸ Muraro, A., Werfel, T., Hoffmann-Sommergruber, K., Roberts, G., Beyer, K., Bindslev-Jensen, C., Cardona, V., Dubois, A., du Toit, G., Eigenmann, P. et al., on behalf of the EAACI Food Allergy and Anaphylaxis Guidelines Group, EAACI Food allergy and anaphylaxis guidelines, diagnosis and management of food allergy, *Allergy*, 2014, 69, 1008–1025

⁹ Umasunthar, T., Leonardi-Bee, J., Hodes, M., Turner, P. J., Gore, C., Habibi, P., Warner, J. O. and Boyle, R.J., Incidence of fatal food anaphylaxis in people with food allergy: a systematic review and meta-analysis, *Clin. Exper. Allergy*, 2013, 43, 1333-1341

¹⁰ Venter, C., Sommer, I., Moonesinghe, H., Grundy, J. Glasbey, G., Patil, V. and Dean, T., Health related quality of life in children with perceived and diagnosed food hypersensitivity. *Pediatr. Allergy Immunol.*, 2015, 26, 126-132

¹¹ Sudworth, R. 2019, Food Standards Agency Food Hypersensitivity Strategy, Board meeting – 21 January 2020 Ref: FSA 20-01-08, <https://www.food.gov.uk/about-us/fsa-board-meeting-january-2020> (Accessed 05.02.2021)

¹² Walker, M.J., Burns, D.T., Elliott, C.T., Gowland, M.H. and Mills, E.C., Is food allergen analysis flawed? Health and supply chain risks and a proposed framework to address urgent analytical needs. *Analyst*, 2016, 141(1), 24-35

¹³ Walker, M.J., Food Allergens: An Update on Analytical Methods. In: Melton, L., Shahidi, F., Varelis, P. (Eds.), *Encyclopedia of Food Chemistry*, 2019, vol. 1, 622–639. Elsevier

¹⁴ Government Chemist 2019 Annual Review, pp 13, 14 <https://www.gov.uk/government/publications/government-chemist-2019-annual-review>

For one of these cases, the Government Chemist, represented by the Referee Analyst, was called to give evidence virtually on the referee analysis at the inquest into the death of a young teenager. The Coroner concluded that death was as a result of acute anaphylaxis to cow's milk allergen through cross-contamination of ingested popcorn somewhere in the food chain. Unfortunately the point at which contamination occurred could not be determined, in part because delays in reporting the death prevented timely sampling and analysis but also because the concentration of milk allergen likely to trigger the fatal response was thought to be close to the reported analytical limit of detection. To address timely reporting, and hence sampling and analysis, the Coroner recommended a national reporting system and a register of fatalities and their investigations.¹⁵



¹⁵ Harris, A. 2020, Report To Prevent Future Deaths, dated 18 December 2020, <https://www.judiciary.uk/publications/ruben-bousquet/> (Accessed 05.02.2021)

Such deaths reaffirm how crucial it is to continue to improve the science of allergen risk assessment and consequent allergen risk management. The Government Chemist continues to support such initiatives through activities ranging from:

- appointment as Vice-Chair of an International Life Sciences Institute (ILSI) expert group on Allergen Quantitative Risk Assessment (QRA) contributing to an introductory stakeholder webinar, virtual international workshops and forthcoming peer-reviewed publication and open access best practice report
- support for the University of Manchester Food Allergy Network, (MFAN) which brings together international stakeholders representing retailers, food and test-kit manufacturers, academics and analytical service providers to discuss food allergy, analysis and allergen management
- contribution of a lecture on 'The pitfalls of food testing and electronic allergen information provision' to Food Allergy and Anaphylaxis 2020 (FAAM), a major clinical and scientific food allergy biennial conference run as part of the European Academy of Allergy & Clinical

Immunology (EAACI). The presentation was selected to be part of an EAACI medical e-learning module, "Latest updates in the diagnosis and management of food allergy"

- representation at the European Network of Food Allergen Detection Laboratories (ENFADL) run by JRC (Geel) which coordinates food allergen analysis in Official Food Control Laboratories in all EU Member States
- substantial contribution to the FSA/BEIS-funded multi-allergen reference material kit produced by the National Measurement Laboratory at LGC, in collaboration with the University of Manchester and Romer Labs as a direct response to the acknowledged difficulties in food allergen analysis. The kit contains chocolate paste (blank) and chocolate paste fortified with five of the most important allergens (skimmed milk powder, egg white powder and almond, hazelnut and walnut flours) and traceable to the SI (International System of Units). It will help support method development to determine 'true' allergen content and monitoring of laboratory performance on a day-to day basis

- production of an e-seminar which will provide an introduction to food allergen risk assessment International Life Sciences Institute (ILSI)
- contribution into a presentation 'Future of Food and Agriculture' given by the FSA Chief Scientific Adviser at a New scientist Live event in November aimed at showcasing how science and technology are helping address modern food and agriculture issues, inclusive of sustainability, protecting the environment and feeding a growing population. The Government Chemist provided input into how the use of multispectral imaging (MSI) for food analysis, with a focus on screening for allergens, represents a rapid, non-targeted, multi-analyte and non-destructive imaging approach for screening food samples for quality, safety, adulteration and authenticity



Cannabidiol (CBD)

Cannabidiol (CBD) is a non-psychoactive cannabinoid¹⁶ present in the cannabis plant (*Cannabis sativa* L) along with many other cannabinoids that may either exhibit psychoactive or non-psychoactive properties.

CBD plant extract or plant isolates are preparations identified as ingredients in some cosmetic products and food supplements supplied to the UK market. The popularity of CBD-containing products has increased exponentially in recent years, but the purity of the source ingredients and reliability of the methods used to determine levels of CBD present are variable. The process of extracting or isolating CBD from the cannabis plant can lead to unintentional co-extraction of other cannabinoids with non-psychoactive or, more significantly, psychoactive substance effects.

The novel food status of CBD extracts was confirmed in January 2019¹⁷ by the FSA and businesses given a deadline of 31 March 2021 to submit their novel food authorisation applications. Thereafter, only products which were on the market at the time of FSA's announcement on CBD (13 February 2020) and linked to an application which is subsequently validated will be allowed to remain on the market.

The need for robust analytical methods, that accurately determine the concentration of CBD and controlled cannabinoids required to regulate the safety and authenticity of CBD in consumer products, was created. An advisory project was included in the Government Chemist Programme 2020–2023 to develop capability to discharge the statutory function of Referee Analyst in case of submission of referee samples.

However, as CBD was known to be of policy interest to a number of government departments, the Government Chemist also convened monthly meetings from May 2020 to bring all interested parties together to share experiences. During these discussions, it became apparent that the 'controlled drug' content 'threshold' of one milligram in a product or preparation referred to in the Home Office Drug Licensing Factsheet – Cannabis, CBD and other cannabinoids¹⁸ was presenting difficulties in interpretation and analysis.

The Government Chemist, with contributions from other government departments, produced 'Guidance on Analytical Limits for Controlled Cannabinoids in Specified Products Containing Cannabidiol (CBD)', which is available on the [Government Chemist webpages](#).¹⁹

The Government Chemist developed high accuracy liquid chromatography tandem mass spectrometry (LC-MS/MS) methods for determination of CBD and controlled cannabinoids in Novel Foods/ cosmetics. These were challenged by a range of commercial samples through collaboration with the [Association for the Cannabinoid Industries](#),²⁰ before transfer of the Government Chemist methods via an international ring trial, which is planned to commence in early 2021. Following a FSA/UKAS workshop entitled 'CBD Product Approval Event' at which the Government Chemist presented on the work being carried out, UKAS set-up a multi-stakeholder 'UKAS CBD Food Product approval Awareness Expert Group' aimed at developing awareness in this area; Government Chemist staff are members of this group.



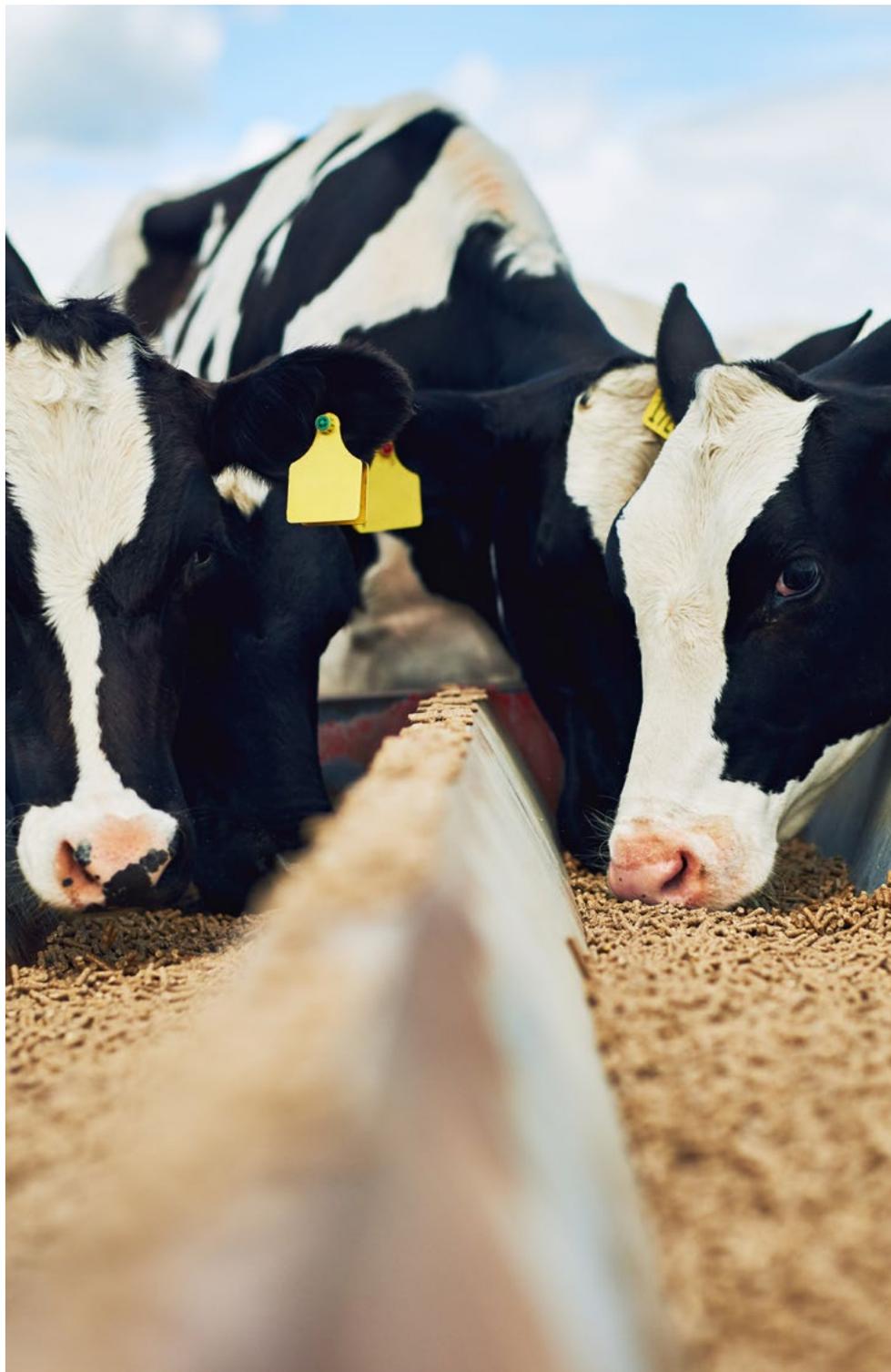
¹⁶ Cannabinoid: a compound found in the cannabis plant, strictly, 'phytocannabinoid' to distinguish from synthetic and other compounds of the same structure

¹⁷ Novel foods authorisation guidance <https://www.food.gov.uk/business-guidance/regulated-products/novel-foods-guidance>

¹⁸ Cannabis, CBD and other cannabinoids: drug licensing factsheet <https://www.gov.uk/government/publications/cannabis-cbd-and-other-cannabinoids-drug-licensing-factsheet>

¹⁹ <https://www.gov.uk/government/publications/guidance-on-analytical-limits-for-controlled-cannabinoids>

²⁰ www.theaci.co.uk



Development of a CEN standard for the determination of theobromine in animal feed

Theobromine (3,7-dihydro-3,7-dimethyl-H-purine-2,6-dione) is a colourless and odourless alkaloid with a slightly bitter taste that is present naturally in the cacao tree (*Theobroma cacao* L.) and its seeds. Theobromine has been reported to exhibit moderate acute oral toxicity in experimental animals and toxic effects in a range of farmed and domesticated animals. As cocoa bean shells, cocoa bean meal, cocoa germs and discarded confectionary can be added to animal feed, EU regulations have set maximum levels of theobromine in feed material.

The European Committee for Standardisation (CEN) technical committee for animal feeding stuffs (CEN/TC 327) put out an open call for the development of a standard method to check compliance with these maxima. The Office of the Government Chemist was successful in the tender process and, under the leadership of its Analysis Manager, developed and validated a method for the determination of theobromine in animal feed materials and compound feed, in particular for those with cocoa derived content.

The developed method involved defatting the sample, followed by extraction of the theobromine into ammonium acetate buffer. After cleaning with Carrez reagents, the extract is analysed by liquid

chromatography with UV detection or LC-MS/MS. The approach of one extraction procedure with the option to use either LC-MS/MS or LC-UV was considered to be the most versatile, being applicable to a wide range of laboratories, and provided the option to use UV as a routine screening method with MS confirmation of the identity of any theobromine detected. Following single laboratory validation, a collaborative trial was organised with participants from laboratories in the UK, Europe and Saudi Arabia.

The CEN Working Group discussed the draft standard method in meticulous detail and the performance criteria were minutely scrutinised, prior to its universal approval by representatives of the national standard bodies from the 34 CEN members and its publication as EN 17270:2019 Animal feeding stuffs: Methods of sampling and analysis - Determination of theobromine in feed materials and compound feed, including cocoa derived ingredients, by liquid chromatography. With the requirement for the validation data to be openly available, a peer reviewed paper was published in the Journal of the Association of Public Analysts as an open access paper.²¹ We are grateful to Professor Duncan Thorburn-Burns for his assistance in drafting the paper.

²¹ Gray, K and Burns, DT, 2019, Validation of a method for the determination of theobromine in feed materials, in particular cocoa derived, and compound feed by liquid chromatography, J Assoc Public Analysts, 47, 1-35, http://www.apajournal.org.uk/html/japa_vol_47_pg_01-35.html (Accessed 05.02.2021)

Sharing and transferring knowledge

The Government Chemist supports innovation and policy making by sharing knowledge gained through our work, particularly in referee analysis, with the analytical and regulatory communities to improve knowledge and skills.

Government Chemist conference

The Government Chemist conference is a biennial event. The last conference took place in 2018 and was reported in the Government Chemist Review for that year. The 2020 conference had to be postponed due to the global COVID-19 pandemic but, at the time of writing, plans are well underway to organise a 2021 conference as a virtual event around the topic of “Safe food for tomorrow’s world”. The conference will offer perspectives from industry, regulators and academics on the future challenges in the manufacturing, packaging, retailing and testing of food that is safe and consumers can trust.

The Government Chemist website

The Government Chemist website is hosted on the GOV.UK platform with the landing page: www.gov.uk/governmentchemist

The Government Chemist pages can also be reached from anywhere on the site by entering “Government Chemist” in the search box. Updates on Government Chemist news can be obtained by subscribing for alerts via the website.

During 2020, 33 articles including news and reports were published on the Government Chemist webpages. The most frequently accessed documents are the quarterly updates on food and feed legislation, the Government Chemist review and articles about training events.

The Government Chemist team also uses Twitter (https://twitter.com/nml_chembiogc) and LinkedIn (<https://www.linkedin.com/showcase/uk-nml/>) for wider dissemination of articles, events and news.

Training

The Government Chemist acquires a great deal of expertise and knowledge through the discharge of its statutory function. This forms the basis of material which is used in the provision of training for practising analysts.

During 2020, face-to-face training events had to be cancelled, postponed or delivered online. Two webinars were organised during the year:

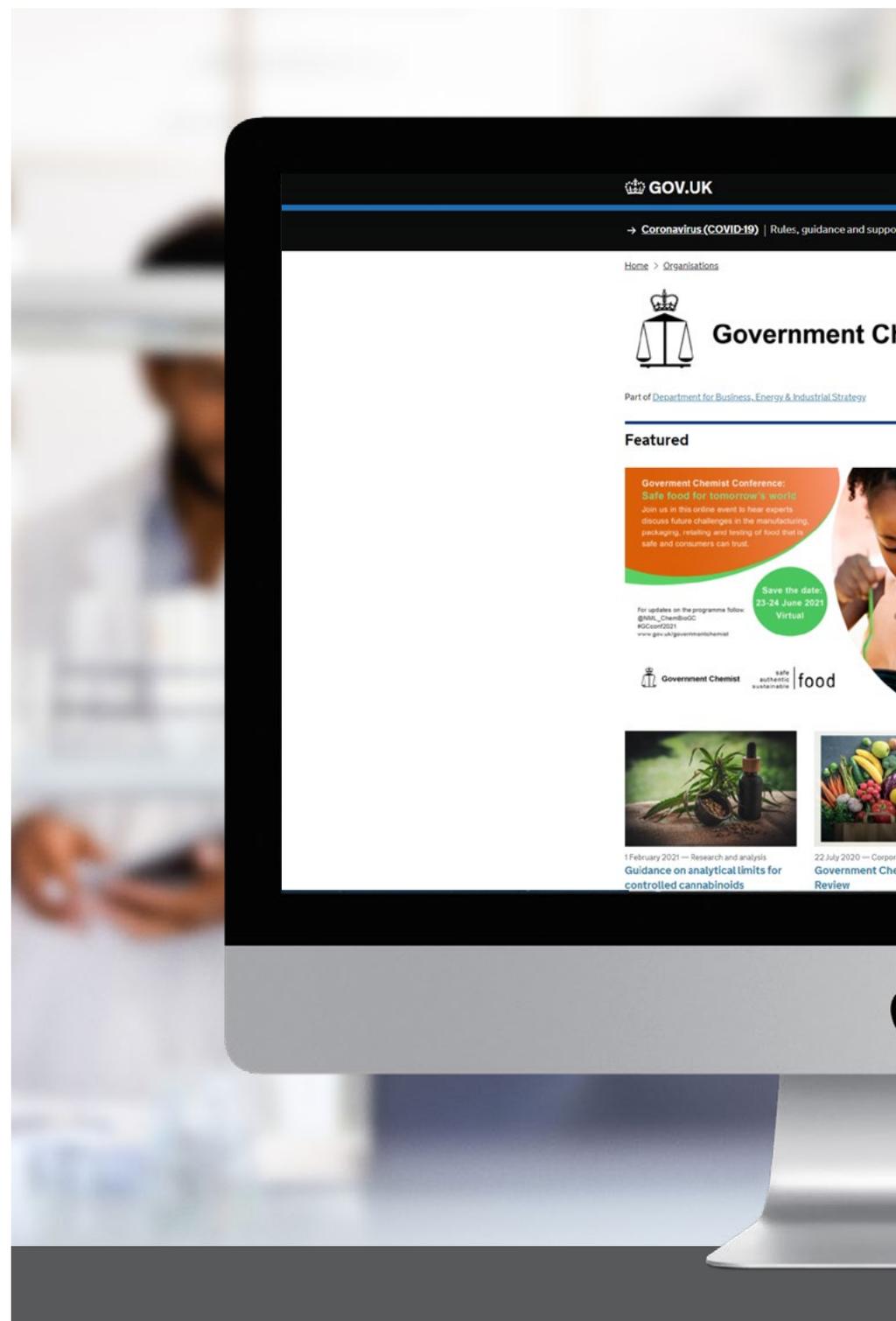
“Why do laboratories get it wrong?” presented by Michael Walker, 24 June.

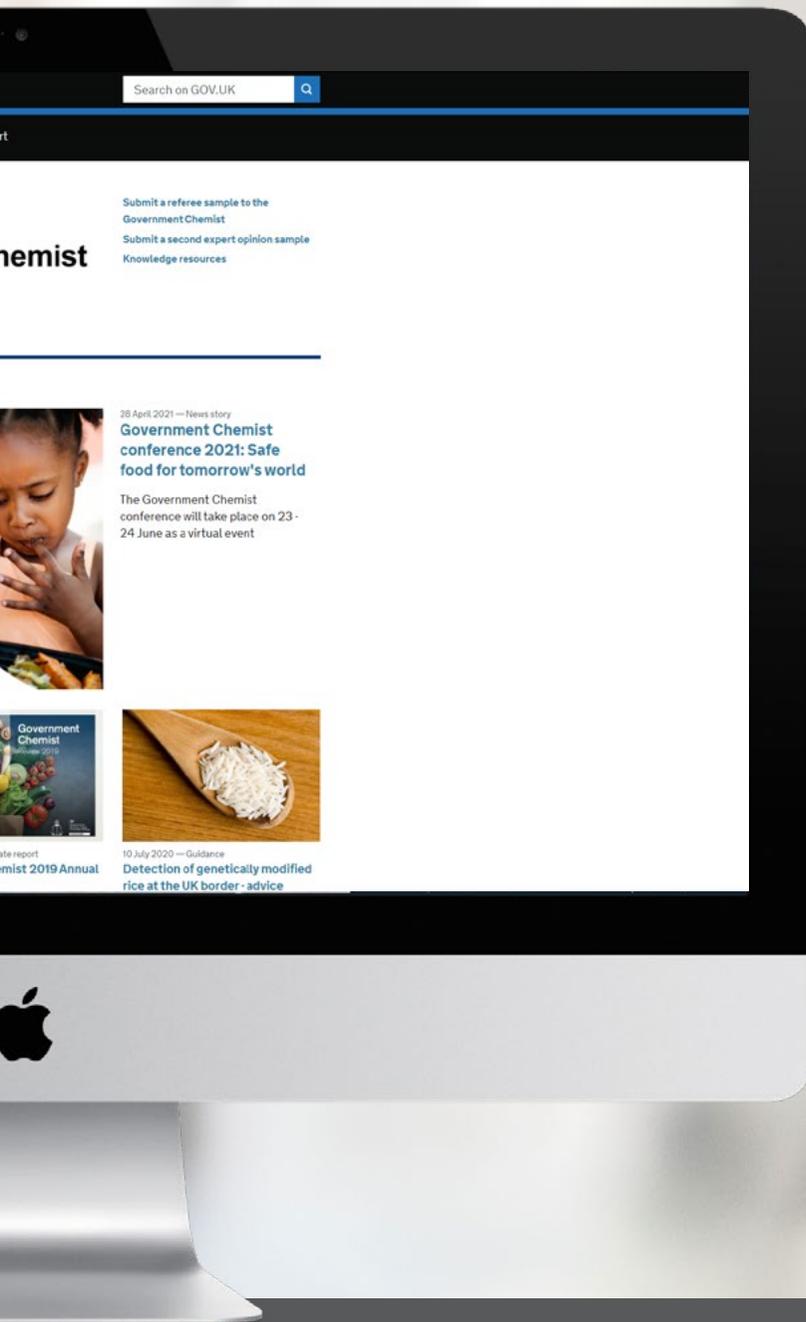
<https://www.gov.uk/government/news/webinar-why-do-laboratories-get-it-wrong>

“Sustainable Chemistry” presented by Professor Tom Welton (Professor at Imperial College and President of Royal Society of Chemistry), 17 December.

<https://www.gov.uk/government/news/gc-christmas-webinar-sustainable-chemistry>

Links to the recorded webinars are available from the www.gov.uk/governmentchemist pages.





Joint Knowledge Transfer Framework

This jointly-funded cross-government (Defra/FSA/FSS/Government Chemist) programme for knowledge transfer is aimed at:

- creating better value for money by maximising resource use and delivering a more sustainable and efficient approach to knowledge transfer
- building analytical laboratory capability to respond to future food safety and fraud incidents
- continuing to support delivery of the response to the 2014 Elliot review into the integrity and assurance of food supply networks following the 2013 horse meat incident.

The programme has developed and delivered different Knowledge Transfer (KT) activities including single day workshops, electronic seminars (e-seminars) and a set of work instructions. A number of new and emerging detection methodologies which may be adopted to support food safety and food standards analysis in the future have been discussed in a series of e-seminars. Examples included digital PCR, DNA melt curve analysis and next generation sequencing; all e-seminars included dissemination of best practice in their application and advice on how these technologies can be used to respond to analytical need.

During 2020 two e-seminars were developed and published:

- Fish speciation inclusive of the Labelfish project
<https://www.gov.uk/government/news/fish-speciation-for-food-authenticity-e-seminar>
- An introduction to quantitative PCR assay validation
<https://www.gov.uk/government/news/an-introduction-to-quantitative-pcr-assay-validation>

The e-seminars are available from the Resources section in the Government Chemist webpages.

Publications

Publishing peer reviewed papers, case studies and articles is an important aspect of the work of the Government Chemist. Publications enhance the impact of the programme and enable greater transparency into its activities. A selection of papers published in 2020 include:

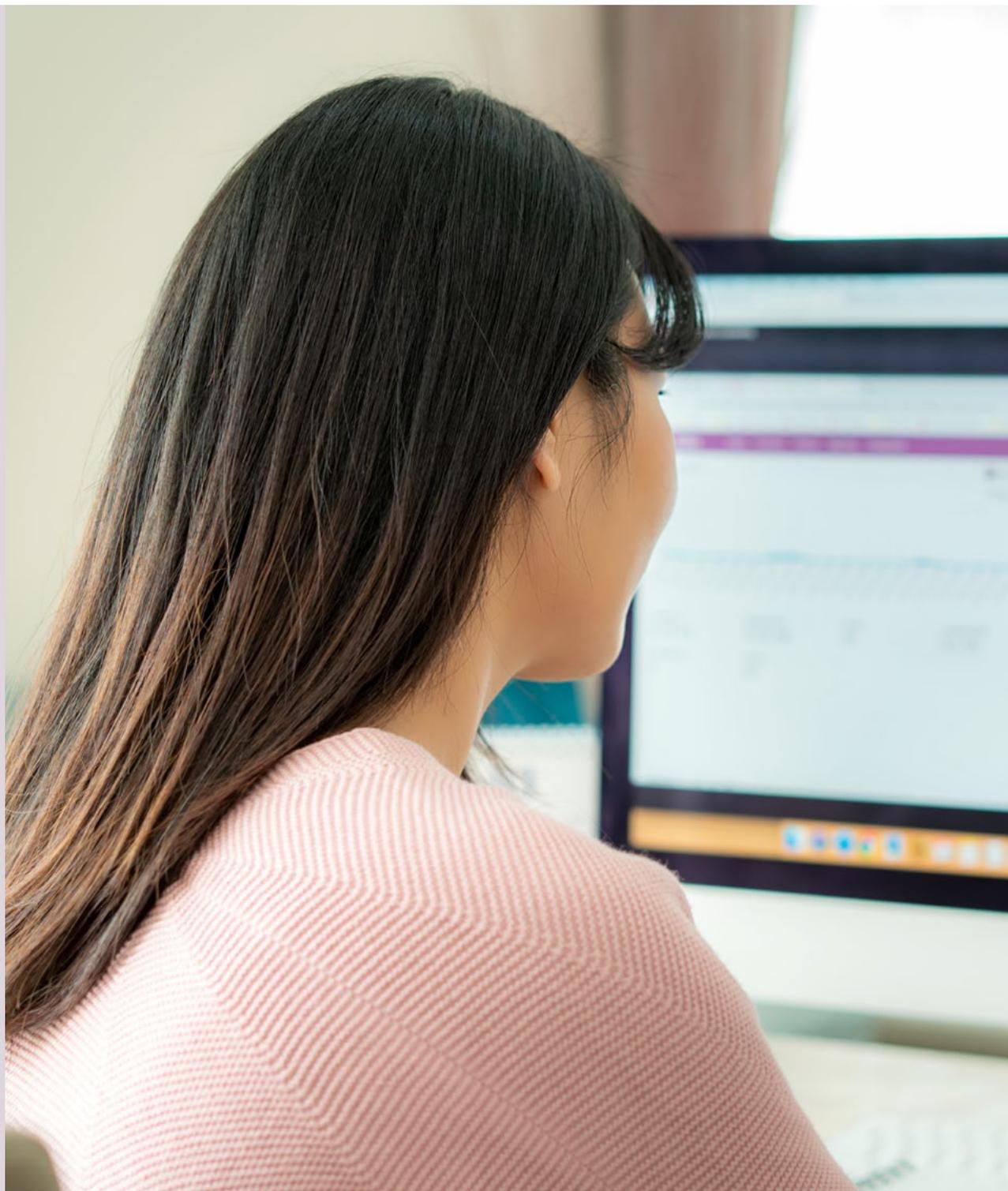
Walker, M., Johnson, E. and Burns, D., Authenticity and the potability of coconut water - a Critical Review, *Journal of AOAC International*, (2020): <https://doi.org/10.1093/jaoacint/qs2008>

Steele, K., Tulloch, M.Q., Burns, M. et al, Developing KASP Markers for identification of basmati rice varieties, *Food Anal. Methods* 14, 663–673 (E-pub 2020): <https://doi.org/10.1007/s12161-020-01892-3>

Walker, M. J., Detection of genetically modified rice at the UK border – advice. (2020) Published online: <https://www.gov.uk/government/publications/detection-of-genetically-modified-rice-at-the-uk-border-advice>.

Interview on food fraud for the Science Explorer's new web series 'Challenges in food science': <https://www.facebook.com/watch/?v=146615556931204>

Article in FoodSafetyTech, March 2020: Food fraud information sharing, Karen Everstine and Selvarani Elahi, 'An update on the Food Authenticity Network seven years after the global horsemeat incident.': <https://foodsafetytech.com/column/food-fraud-information-sharing/>





Engagement with stakeholders

In addition to the regular participation on the advisory committees described in the Advisory Function section of this Review, the Government Chemist is invited to contribute to a number of events organised by stakeholder organisations. Some of the highlights of the year are outlined below:

- Julian Braybrook and Selvarani Elahi attended the Science and FSA Reception on 10 March to celebrate 20 years of the FSA's work
- Selvarani Elahi attended the Defra Evidence Committee Annual Chairs meeting, as Chair of Defra's Authenticity Methods Working Group
- The Parliamentary Office of Science and Technology (POST) requested input from the Government Chemist team for a POSTnote on Food fraud
- Government Chemist staff, with colleagues from the FSA, visited Rowse (member of the British Importers and Packers Honey Association) to view the honey production process
- Selvarani Elahi presented a webinar entitled 'Future challenges and global tools to combat food fraud' to 333 people from 29 countries as part of the Institute of Food Science and Technology (IFST) Spring Conference webinar series
- Selvarani Elahi attended the CEN TC 460 (Food Authenticity) Plenary Meeting as part of the UK delegation
- Selvarani Elahi attended the Safe to Trade Scheme Governance Board, developed as a consequence of COVID-19 restrictions to give consumers and employees confidence that food businesses are going above and beyond government guidance so as to be able to re-open safely, with ongoing checks and monitoring through compliance controls
- Selvarani Elahi was invited to give a keynote presentation on technical dispute resolution in the UK Official Food Control System at IMEKO FOODS 2020: Metrology for Sustainable Food Production
- Selvarani Elahi co-presented at the formal launch of iKANN (International Knowledge Application Network Hub in Nutrition) (www.ikann.global) at the NNEdPro 6th International Summit on Medical Nutrition Education and Research
- Malcolm Burns provided expert advice to a meeting on the CCQM-NAWG Key/Pilot Comparison study "Genomic DNA Extracted from a Protein Matrix" for meat speciation and quantitative meat estimation respectively
- Malcolm Burns attended an EC Expert Working Group meeting, providing written guidance on method performance requirements for the application of digital PCR for GMO analysis
- Ian Axford participated in the UK Chemical Stakeholder Forum where there was a discussion on Global Chemicals Strategies to identify regional and national chemical markets and regulation where the UK can have an impact

Areas of collaboration with stakeholders

It is clear that collaboration with other organisations with common or complementary interests not only helps the Government Chemist discharge its roles efficiently but also contributes to a more rapid development and implementation of methods and standards. Our more substantial collaborations during 2020 are highlighted below.

Oxford Nanopore Technologies

As part of the current Government Chemist Programme Capability Building project “Food authenticity testing using Next Generation Sequencing (NGS) applications”, the Government Chemist has been working closely with Oxford Nanopore Technologies to explore the use of the MinION portable genomics NGS-based technology. Collaborative efforts have developed and optimised a basic analysis pipeline, in terms of throughput and sensitivity, for the application of whole genome sequencing for determination of meat species in food samples.

Rapid non-targeted multi-analyte approaches

With a similar remit looking at portable technologies for rapid, non-targeted multi-analyte approaches, the Government Chemist has been collaborating with a number of instrument manufacturers in the assessment of point of contact devices in the food analysis field. This has included the evaluation of portable and benchtop multispectral imaging devices with Videometer, as well as the assessment of transportable ambient mass spectrometry with the Scottish Whisky Research Institute and instrument manufacturer

Waters. Outputs previously reported have been expanded with the Government Chemist team working collaboratively with Felix Instruments – Applied Food Science to explore the application to food authenticity testing of the handheld F-750 NIR spectroscopic-based instrument.

Traceability and labelling tools to protect fisheries and aquaculture

The Government Chemist has been working with members from SEATRACES, an inter-regulatory Atlantic Area project, aimed at using traceability and labelling tools to protect and provide value to Atlantic Area’s fisheries and aquaculture. Focus has been on participation in an inter-laboratory trial for identification of important crustacean species.

SARS-CoV-2

The Government Chemist has undertaken a number of initiatives in support of its food and feed stakeholders during the pandemic. These have included support for the previously mentioned Safe to Trade Scheme, and the establishment of the COVID-19 Resource base and assessment of global food fraud incident data through its Food Authenticity Network activities. The Government Chemist has also provided wider measurement advice on analytical matters relating to the pandemic, collaborating with NHS laboratories, DHSC, NHS Test and Trace, Medicines & Healthcare products Regulatory Agency (MHRA), Public Health England (now part of the newly formed UK Health Security Agency), reference (control) material providers and test

kit manufacturers. In particular, the Government Chemist was invited to provide independent measurement advice for a NHS Test and Trace evaluation programme of mass spectrometry as a diagnostic technique for SARS-CoV-2.





[View website](http://www.foodauthenticity.global/)
www.foodauthenticity.global/

Food Authenticity Network

The Food Authenticity Network (FAN) has now entered its sixth year of operation and has continued to grow in popularity. It has over 2,100 members from 81 countries/territories around the world, 1900+ Twitter followers (@FAAuthenticity) and 1100+ LinkedIn contacts (<https://www.linkedin.com/company/food-authenticity-network/>).

It continues to share best practice on food authenticity testing and food fraud mitigation measures around the world, helping to better protect food supply chains and ultimately, provide greater consumer trust in the food they buy.

2020 saw a 78% increase in the number of users (from 133 different countries) accessing the website, demonstrating that FAN has gained further recognition as an authoritative source of information through:

- increased collaboration with the two UK Food Crime Units

- publishing additional e-seminars produced via the Joint Knowledge Transfer Framework
- expert contributions to initiatives such as the previously mentioned POSTnote on Food Fraud
- the COVID-19 Resource Base which provides valuable information to help businesses to continue to secure food supply chains by mitigating food fraud during the pandemic
- collaboration, with Mérieux Nutrisciences, to undertake a detailed assessment of global food fraud incident data to establish whether food fraud incidents had increased due to the disruption caused by the COVID-19 pandemic²²

Three new Food Authenticity Centres of Expertise (CoEs) were added to the FAN website:

- The Asset Technology Centre/IGFS, Queens University Belfast, Belfast
- Aberdeen Scientific Services, Aberdeen
- GFL (Gesellschaft für Lebensmittel-Forschung) GmbH, Berlin

which means stakeholders now have direct access to named experts in 15 Food Authenticity Centres via the Centre of Expertise tab of the FAN website.

iKANN

The Government Chemist collaboration with NNEdPro Global Centre for Nutrition and Health (<https://www.nnedpro.org.uk>) culminated this year in the launch of the International Knowledge Application Network Hub in Nutrition (iKANN) website (www.ikann.global), an open access online portal of published evidence in nutrition. Its objective is to support high quality, scalable nutrition education to achieve sustained impact in global healthcare systems.

The Deputy Government Chemist co-presented the NNEdPro 6th International Summit on Medical Nutrition Education and Research to formally launch iKANN.



[View website](http://www.ikann.global)
www.ikann.global

²² Article published by IFST: Has COVID-19 caused a significant increase in observed food fraud incidents?, Massimo Frera, Selvarani Elahi, Mark Woolfe, Sterling Crew and John Spink, https://doi.org/10.1002/fsat.3510_1.x



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