Department for Business, Innovation, Science and Trade

Government Chemist

Review 2025

October 2026

CP 1701



Government of the United Kingdom

Department for Business, Innovation, Science and Trade

Government Chemist Review 2025

Presented to Parliament by
the Minister for Science, Innovation and Investment
by Command of His Majesty

October 2026

CP 1701

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Foreword from the Government Chemist



The strength of the UK food system depends on the alignment of healthy ecosystems, secure and resilient supply chains, scientific innovation, trusted regulatory frameworks, and economically viable markets and societal choices. Throughout 2025, the Government Chemist continued to provide the UK with the scientific foundation on which long-term food security and public confidence can thrive.

The year represented a proud moment for the Government Chemist: the opening of our new laboratory on the Surrey Research Park. It marks a significant step forward – a clear investment in the future of our long scientific heritage. Our sincere thanks go to all our partners and stakeholders. Your continued engagement and confidence in our work have been critical to the impact that we have achieved, and will continue to achieve, together.

This year also saw the development of the new Government Chemist Programme 2026-2029. With the additional support for the programme by the Department for Business, Innovation, Science and Trade (BIST), the Government Chemist will be able to expand the definition of measurement frameworks suitable for the challenges facing the sector and help enable the UK to remain agile and confident in the face of change.

Globalised supply chains, while enabling resilience and diversity of supply, have increased exposure to disruption, fraud and variability in quality. Climate change is altering agricultural inputs, shifting pest and contaminant profiles, and driving the need for new raw materials and processing approaches. At the same time, geopolitical pressures and new trade deals are placing greater emphasis on the comparability and equivalence of regulatory systems. These dynamics are compounded by rapid scientific and technological innovation, reshaping both what we eat and how it is produced - particularly in novel foods and ingredients, and production processes.

The emergence of novel foods, such as cell cultivated products and advanced plant-based formulations, often sits beyond the scope of traditional compositional and safety assessment frameworks, requiring new approaches to their characterisation, identity and risk assessment. Questions of equivalence, provenance and functional behaviour must be addressed using analytical methods that are themselves still evolving. The challenge is therefore not simply to detect known analytes, but to define what should be measured, how it should be measured, and what constitutes fitness for purpose in entirely new categories of food, produced using novel processes.

Overlaying these challenges is a growing expectation of transparency and trust. Consumers, business operators and regulators alike require assurance, not only that food is safe but that it is authentic, accurately described and produced in line with stated claims.

This Annual Review demonstrates how the Government Chemist continues to play a vital role in strengthening the UK's analytical and regulatory infrastructure. Through its statutory referee function, it continues to provide independent adjudication where analytical results are contested, ensuring that enforcement decisions are supported by robust and defensible science. Through its

continuing analytical measurement leadership and dissemination of good practice across the analytical community, it ensures that decisions taken by enforcement authorities and industry are grounded in sound, defensible measurement science.

The inherent global nature of food supply chains and systems does mean that the challenges being faced are rarely confined to national boundaries. The Government Chemist continues to engage actively with international partners, including standards bodies, metrology institutes and regulatory agencies, to promote harmonisation of methods, comparability of results and mutual recognition of measurement frameworks. Through its leadership and scientific contributions in areas including genetically modified organism (GMO) analysis, cannabidiol (CBD) measurement and honey authenticity, the Government Chemist has helped advance internationally recognised approaches to measurement and assurance. By working with our counterparts, the Government Chemist can continue to reduce duplication of effort, support regulatory coherence, and enable UK businesses to operate effectively in global markets.

I trust that this Annual Review provides on-going confidence that the Government Chemist is continuing to deliver and evolve, anticipating future challenges, responding to emerging risk, and ensuring that the UK's measurement capability remains both rigorous and agile.

Professor Julian Braybrook

BSc, PhD, Hon DSc, CChem FRSC





Note from the Chair of the Government Chemist Programme Expert Group



As Chair of the Programme Expert Group, I am privileged to provide independent oversight of the Government Chemist function, which remains a cornerstone of the UK's food and feed system. With over 150 years of scientific heritage, it continues to deliver a vital public service, underpinned by scientific excellence, impartiality, and a clear commitment to public value.

Over the past year, I have observed the programme continue to evolve in response to a rapidly changing landscape. The increasing complexity of global supply chains, the emergence of novel foods and production methods, and the growing importance of sustainability and transparency all place new demands on measurement science. The Programme Expert Group has worked closely with the Department for Business, Innovation, Science and Trade (BIST) and the Government Chemist team to ensure that the programme remains focused on these priorities and, importantly, is well-positioned to deliver against future needs, including the transition to the 2026–2029 programme.

I am encouraged by the continued strengthening of the programme's core functions which underpin the referee function and support the wider analytical community. The programme's growing contribution to regulatory science is also notable, including through input to consultations and standards development, helping to ensure that UK measurement frameworks remain robust, relevant, and globally aligned.

The Programme Expert Group also recognises the importance of effective knowledge transfer and skills development in sustaining national capability. Continued investment in training, stakeholder engagement and dissemination activities is critical to ensuring that expertise is shared, and laboratory capability is strengthened. Engagement with stakeholders across government, industry, academia, and the wider scientific community continues to be a central pillar of the programme. Regular dialogue ensures that the Government Chemist function remains aligned with user needs and is responsive to emerging risks, while also reinforcing its role as a trusted and impartial source of scientific advice.

This Annual Review demonstrates the breadth and depth of the programme's activities and its ongoing contribution to the UK's analytical and regulatory infrastructure. The Programme Expert Group will continue to provide independent challenge and strategic guidance to ensure that the Government Chemist function remains resilient, forward-looking, and capable of addressing the evolving challenges facing the food and feed system.

Professor Paul Berryman

BSc, MSc, MChemA, MBA, PhD, CBiol FRSB, CSci FIFST, CChem FRSC



> The Government Chemist function remains resilient, forward-looking and capable of addressing the evolving challenges facing the food and feed system.



What we do

Statutory function | Advisory function | Our governance | Our people

The Government Chemist position was created to protect the public from fraud, malpractice, and harm. In 1875, the laboratory was appointed the "referee analyst", a role linked to the Sale of Food and Drugs Act of that year.

To this day, the Government Chemist acts as an independent laboratory, fulfilling statutory and advisory functions, funded by Department for Business, Innovation, Science and Trade (BIST). Hosted within LGC and with over 150 years of scientific heritage, the Government Chemist provides expert arbitration to resolve scientific disputes involving chemical and biological analytical measurements, primarily in the food and feed sectors.

We use authoritative measurement procedures coupled with experienced interpretative skills to deliver advice to UK Government and industry, develop new analytical capabilities to address emerging challenges, and deliver targeted knowledge transfer initiatives to upskill UK laboratories and embed good practice. In doing so, we protect consumers and provide a route of technical appeal for businesses, ensuring food safety for the public and supporting regulatory compliance for future needs.

The Acts and Regulations under which the duties of the Government Chemist as the referee analyst fall are listed in the "What we do" section of the Government Chemist website (www.gov.uk/governmentchemist).

"with over 150 years of scientific heritage, the Government Chemist provides expert arbitration to resolve scientific disputes involving chemical and biological analytical measurements, primarily in the food and feed sectors.

Find out more about what we do

Our statutory function

Our duties support public protection, safety, health, value for money and consumer choice. At the core is the referee analyst role, resolving disputes between regulators and businesses through independent measurements, clear interpretation, and authoritative expert opinion. By settling these cases without the need for legal action, we help reduce pressure on public finances and sustain a strong national analytical testing infrastructure.

Our credibility as the impartial referee, and our ability to develop new capability for emerging challenges, depend on first-class science which is also underpinned by the designation of our home laboratory, the UK National Measurement Laboratory (NML) at LGC, for chemical and biological measurement.

Our advisory function

The long history of the Government Chemist function and its involvement in a wide range of dispute cases mean that the team is uniquely positioned to advise on the analytical science considerations that underpin policy, standards and regulations. We deliver this advisory function by responding to government requests for advice, expert input into national and international standardisation efforts, and to public consultations where analytical science plays a significant role. Our responses to consultations for 2025, listed on page 30-31, are available on the Government Chemist website.

Our capability building

Referee analysis is often most challenging in areas where measurements are difficult, novel products are entering the market, or there is significant public and media interest. To meet future demand in these complex areas, the Government Chemist Programme undertakes targeted capability-building projects that strengthen and expand our analytical capacity.



Our governance

Responsibility for the Government Chemist programme lies with BIST which has put into place arrangements to ensure that the Government Chemist programme delivers value for money and that scientific standards, impartiality, transparency, and integrity are maintained. The Government Chemist Programme Expert Group (GCPEG) provides this independent scrutiny, overseeing the planning, delivery, and quality of impact of the programme, and offering advice to BIST regarding future priorities and strategic direction of the programme.

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

GCPEG membership during 2025 was:



Paul Berryman, Chair

Paul is Director of Berryman Food Science Ltd, which works closely with government and businesses, including BIST, UKRI's Innovate UK and SGS Ltd. He is also a visiting Professor at the University of Reading.



Simon Branch

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



John Collins

John has a multi-disciplinary background from nuclear physics to biotechnology with experience in R&D, materials and product development, manufacturing and manufacturing technologies, international trade, and technical sales.



Johnathon Griffin

Jonathan is a Public Analyst (PA) and Technical Manager for Kent Scientific Services, and former President of the Association of Public Analysts (APA).

Kasia Kazimierczak

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 (OPSS), also part of BIST. Chelvi was the UK representative at the Committee for Standardization (CEN) and Codex Alimentarius Commission (Codex) meetings in the standardisation of analytical methods for food from 2009-2019.



Declan Naughton

Declan is currently Professor of Biomolecular Sciences at Kingston University London with research interests ranging from food safety and nutrition to drug discovery and endocrinology. He was Interim Dean and Associate Dean for Research and Enterprise for the Faculty of Science, Engineering and Computing at the university until 2024.



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 involved with the import of foodstuffs of non-animal origin.

GCPEG membership during 2025 continued...



Sophie Rollinson

Sophie is the Food Science Lead in the Department for Environment, Food and Rural Affairs' (Defra) 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 a visiting Fellow and consultant at The Open University, Immediate Past-President of the RSC Analytical Division Council and Past-Chair of the Analytical Chemistry Trust Fund (ACTF).



Bhavna Parmar

Bhavna is a Senior Scientific Advisor at the Food Standards Agency, in the Scientific Surveillance and Laboratory Policy team, and represents the UK on Codex and through the British Standards Institution (BSI) on various CEN and International Organization for Standardization (ISO) standardisation committees.



Gillian McEneff

Gillian is the Head of Testing Laboratories at the Office for Product Safety and Standards (OPSS), with responsibility for laboratory testing capabilities to support national consumer and construction product regulatory activity, and traceability for the UK's legal metrology system.



Jessica Merryfield

Jessica is the Head of Policy and Campaigns at the Chartered Trading Standards Institute (CTSI), a Chartered Trading Standards Practitioner, and a CTSI Trainer in Food Standards. Jessica is also the former Chair of the Trading Standards East Midlands Food Standards and Allergens group.

Our people

LGC staff who directly support the Government Chemist function have clear and independently defined roles (Figure 1). Within this framework, there are 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;
- only the Government Chemist or Deputy, once satisfied that the case has been properly completed, countersigns the certificates of analysis.



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Figure 1 Government Chemist organogram and contact points.



In focus:
Artificial intelligence for food safety: Data, governance, and global inclusion in a rapidly evolving landscape





By Masami Takeuchi[1] and Floor van Meer[2]

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Abstract

Artificial intelligence (AI) is providing food safety authorities with increasingly powerful tools to improve technical and operational interpretation of complex datasets. As recently reported by the FAO, applications are emerging across scientific advice, laboratory analysis, inspection and border control. At the same time, the integration of AI into regulatory systems may present challenges related to data quality, explainability, accountability, and public trust. There is a need for pragmatic and well-governed implementation, combining technological innovation with strong data systems, human oversight and inclusive capacity development to support transparent and effective food safety management.

When artificial intelligence meets food safety governance

Should AI be used in public sector food safety systems? For regulatory authorities, this is no longer a theoretical question, but a practical one: how to use AI to prioritize inspections, interpret complex data and respond to emerging risks, while maintaining accountability and public trust. As relevant technologies advance rapidly, competent authorities are increasingly faced with decisions on how best to integrate them into regulatory contexts in ways that are reliable, transparent and aligned with public expectations.

The FAO has highlighted a growing range of applications, from supporting scientific advice and laboratory activities to strengthening inspection, border control and operational functions of food safety authorities (van Meer et al, 2025). When AI meets food safety governance, the emphasis shifts from technological capability to practical considerations such as data quality, accountability, explainability and institutional readiness.

Where artificial intelligence is already adding value

Machine learning models are being used to support hazard identification, for example, by analysing genomic data to detect pathogen characteristics or by identifying patterns in contamination data that may not be visible through conventional analysis. In this context, AI also shows potential to support *in silico* approaches for risk assessment, contributing to the broader development of new approach methodologies (NAMs) that complement traditional experimental and laboratory-based methods.

Machine learning approaches have also been applied to whole genome sequencing data to support source attribution in outbreak investigations, improving the ability to link pathogens to likely food sources. In laboratory contexts, AI can assist in interpreting complex analytical outputs, such as spectral data, enhancing both speed and consistency.

In inspection and border control, AI is increasingly used to prioritize sampling. The UK Food Standards Agency (FSA), for example, has demonstrated how AI can be used to process and structure large volumes of regulatory data, supporting more timely identification of risks and more efficient use of resources. Predictive models have also been developed to assess the likelihood of non-compliance in imported food consignments based on historical data, compliance records and supply chain characteristics, enabling inspectors to focus on higher-risk shipments.

Operationally, natural language processing tools have been used to analyse global food safety alerts and scientific literature, enabling earlier identification of emerging hazards. These applications build on existing systems rather than replacing them. Their value lies in improving targeting, efficiency and timeliness, particularly in complex environments where data volumes exceed human processing capacity.

From tools to decision support

As AI becomes more embedded in food control systems, a critical shift is taking place, from standalone analytical tool towards regulatory decision making. While AI can process large volumes of data, identify patterns and generate predictions, its outputs remain probabilistic and dependent on underlying assumptions and data quality.

A key challenge in this transition is that many AI models, particularly more advanced ones, may be perceived as “black boxes”, where the reasoning behind outputs is not easily traceable. In regulatory contexts, this is particularly critical where outcomes need to

be justified, audited or challenged, and where the basis for regulatory action must remain transparent and defensible.

For the public sector, food safety management involves judgement, context and responsibility that cannot be fully delegated to automated systems. Maintaining a human in the loop is therefore a governance requirement. Properly applied, AI can strengthen consistency and evidence use, while preserving accountability within competent authorities.

The real bottleneck: Data quality, not algorithms

AI's effectiveness in food safety fundamentally depends on the quality and availability of structured, consistent and relevant data. Where data are incomplete, inconsistent or biased, outputs may be unreliable or misleading, with direct implications for public health decisions.

In practice, food safety data are often fragmented across institutions, collected for different purposes or not systematically consolidated. These challenges are particularly pronounced in low- and middle-income settings, where resources and capacities for data generation and consolidation may be limited. In data-rich environments, data integration, consistency and fitness for regulatory purpose can significantly restrict interoperability, standardization and data governance.

This suggests that the primary constraint is not algorithmic sophistication, but data readiness. Efforts to improve data quality and align data systems with regulatory needs are likely to yield more sustainable benefits than the rapid deployment of AI applications. The emergence of foundation models, pre-trained on large, diverse datasets, will reduce the reliance on very large, task-specific datasets, which may lower the barrier to applying AI in food safety contexts with limited data availability. However, the performance, reliability, and regulatory acceptability of these approaches remain critically dependent on the availability of high-quality, well-curated datasets.

Governance and risk: Avoiding premature deployment

Limitations in the use of AI in food safety regulatory settings include biased or unrepresentative data, limited explainability, and the risk of incorrect or fabricated outputs (so-called hallucinations), particularly in generative systems. These can influence decisions, accountability and public trust. The risk of premature deployment of AI tools before sufficient validation, data readiness or institutional capacity are in place may lead to over-reliance on outputs that are not yet robust, or to misalignment with regulatory processes.

At the same time, an overly cautious approach may limit learning and innovation. Carefully governed and transparent use of AI systems can help expose their limitations in practice, including hidden biases, data gaps and operational constraints. In this sense, a balanced approach is required, combining caution with active, well-governed experimentation.

Inclusion and capacity: The global dimension

The FAO study shows that the development and application of AI in food safety are not evenly distributed. Much of the current research and implementation is concentrated in high-income settings, where digital infrastructure and data availability are more advanced. Without deliberate effort, the expansion of AI could reinforce existing disparities in inclusion across different food safety system settings.

This creates an opportunity to rethink how capacity is developed. Strengthening data systems, improving data literacy and supporting context-appropriate applications can enable broader participation, even in resource-constrained settings. Facilitating knowledge sharing, promoting interoperable approaches and supporting capacity development, global initiatives can help ensure that AI contributes to more inclusive and resilient food safety systems.

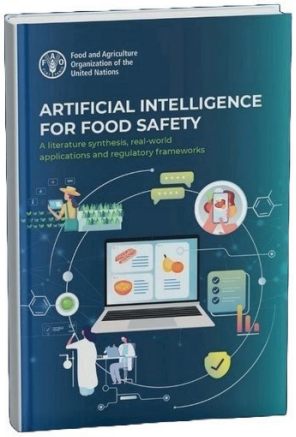
The way forward: A pragmatic approach

As AI continues to evolve, its role in food safety will expand. AI has the potential to support more targeted, efficient and responsive food safety systems, and may offer cost efficiencies over time.

The challenge for public sector institutions is to integrate these technologies in ways that are proportionate, evidence-based and aligned with regulatory objectives. This begins with clearly identifying the problems to be addressed, rather than starting from the technology itself. It also requires sustained investment in data systems, AI literacy development, attention to governance and a commitment to human oversight.

For regulators, this means embedding AI within existing risk-based frameworks, rather than treating it as a parallel system.

Realizing this potential will depend not only on technological advances, but on how thoughtfully, transparently and inclusively these tools are applied.



Reference

van Meer, F. van der Velden, B. & Takeuchi, M. 2025. Artificial Intelligence for food safety – A literature synthesis, real-world applications and regulatory frameworks. Rome, FAO. https://doi.org/10.4060/cd7242en

> AI has the potential to support more targeted, efficient and responsive food safety systems.



Protecting consumers in increasingly challenging times

Dispute resolution | Referee cases | Horizon scanning

Consumer demand, rising energy and cost-of-living costs, and wider geopolitical pressures are reshaping how food is produced, sold, and consumed, while climate change is placing increasing strain on food systems and supply chains. Embedding environmental sustainability and traceability considerations into practice is critical to maintaining a safe, trusted and resilient food system.

At the same time, advances in technologies, such as engineering biology and AI, are transforming the food landscape, offering opportunities for innovation but also introducing challenges for safety, quality, and regulation.

The Government Chemist supports the UK Government in mitigating these risks by providing expert measurement science advice on matters of national and international importance, monitoring regulatory developments through horizon scanning activities, and continuing to work collaboratively with stakeholders to help prevent future disputes.

Dispute resolution

The Government Chemist underpins industry and public confidence in the food and feed official control system by providing an independent, impartial and technically robust route of appeal. We maintain the credibility of this referee role through stringent governance, rigorous analytical practice, and well-informed interpretation of all data.

Analytical findings must increasingly be assessed within global supply chain and against complex scientific, legal and policy contexts. Our default analytical approach is effectively equivalent to a stand-alone method validation and provides the necessary high level of analytical confidence. Significant analytical steps are witnessed by a second scientist, all data transcriptions are verified, and the entire dataset is evaluated independently by statisticians to identify bias, outlying results and, where required, to determine a case-specific measurement uncertainty. A certificate is drafted and reviewed by a qualified person before the case file is submitted to the Government Chemist for peer review. Only when every stage meets the required standards does the Government Chemist authorise the finding for release.

Referee analysis of retained portions of samples referred to the Government Chemist is inherently more complex and resource-intensive than the work carried out by official control or trade laboratories. This is because:

- our results and opinion must be definitive and withstand detailed scrutiny, nationally or internationally,
- referrals often concern matters close to a legislative limit, requiring the highest analytical confidence, and
- the issues we address frequently arise where the science, the law, or both are uncertain or controversial.

Overview of referee cases in 2025

Resolving disputes in the UK official control system for food and feed is a demand-led service 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.

Seven referee cases were received during 2025.

Mercury in animal feed

The sample was referred by Trading Standards as a result of a dispute over the level of mercury in an animal feed. The official control laboratory, using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) had reported 0.463 ± 0.092 mg/kg against a limit of 0.1 mg/kg (at 12 % moisture). The feed business operator's laboratory, using a mercury fluorescence detector, had reported 0.010 mg/kg.

Following sample homogenisation, a standard analytical plan was adopted using microwave digestion in an oxidising acid with and without the addition of hydrofluoric acid (HF) and final analysis using ICP-MS. All applied quality controls passed, with an analyte recovery of 97 %. A result of 0.01 mg/kg mercury was found at 12 % moisture. The sample was therefore deemed satisfactory with regards to the requirements of the Animal Feed (Composition Marketing and Use) (England) Regulations 2015.

During the analysis, it was noted that the sample contained tungsten, this being a potential interferant when using ICP-MS for mercury analysis, thereby requiring careful mass selection when using this technique.



Formaldehyde migration from melamine kitchenware

The sample consisted of five melamine pots detained by Port Health following analysis by the Official Laboratory (OL), which had found increasing levels of formaldehyde migration in repeat testing, albeit below the maximum permitted migration level. The food business operator's (FBO) lab, quoting their results as single digits, did not report any increase over the repeat tests.

The sample was analysed according to the requirements laid out in Annex V of assimilated Commission Regulations 10/2011 on plastic materials and articles intended to come into contact with foods and EUR 24815 EN 2011, namely three migrations carried out on each of the three items, using both the chromotropic acid and pentane-2.4-dione methods.

The results obtained were within the maximum permitted migration level, but the following increases (at the 99 % confidence limit) were observed:

Migration 2 to migration 3

- item 2: An increase of not less than 0.48 mg/kg (Chromotropic acid method) and not less than 0.74 mg/kg (Pentane-2,4-dione method).

Migration 1 to migration 2

- item 3: An increase of not less than 0.37 mg/kg (Chromotropic acid method) and not less than 0.43 mg/kg (Pentane-2,4-dione method).

Migration 1 to migration 3

- item 3: An increase of not less than 0.39 mg/kg (Chromotropic acid method) and 0.50 mg/kg (Pentane-2,4-dione method).

The sample therefore failed the stability requirements of the Plastic Kitchenware (Conditions on Imports from China) (England) Regulations 2011 and the Materials and Articles in Contact with Food (England) Regulations 2012.

Ethylene oxide in cumin

Ethylene oxide is a fumigant used in a number of countries but not permitted for use in the UK. It readily breaks down to form 2-chloroethanol, with a maximum residue limit of 0.1 mg/kg as the sum of ethylene oxide and 2-chloroethanol expressed as ethylene oxide, as prescribed by assimilated EU Regulation 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin.

The sample consisted of six retail packs of cumin, which had been detained by Port Health following the official control laboratory detecting 0.24 mg/kg as the sum of ethylene oxide and 2-chloroethanol. The FBO's laboratory had reported <0.01 mg/kg. Referee analysis proceeded using the procedures laid out by the EU Reference Laboratory Single Residue Methods 'Analysis of ethylene oxide and its metabolite 2-chloroethanol by the QuOil or QuEChERS method and Gas Chromatography-Tandem Mass Spectrometry (GC-MS/MS)' with an analysis plan of three sample batches analysed over three days. Isotopically labelled 2-choloroethanol was employed as an internal standard.

Accordingly, 0.2218 ± 0.0068 mg/kg of 2-chloroethanol expressed as ethylene oxide was detected, this amount being in excess of the permitted maximum residue level.

Alcohol in vodka

The sample was received as the result of a dispute over the alcohol content of vodka.

The case is still in progress at the time of writing and will be reported on in the next review.

Anthraquinone in curry powder

The sample, referred by the FBO, consisted of a sample of curry powder which had been detained by Port Health due to excessive levels of anthraquinone.

Numerous analytical interferences were observed using both Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)-based approaches; a suitable regime was identified using solvent extraction followed by solid phase extraction clean-up and LC-MS/MS. Methyl anthraquinone was employed as an internal standard.

The analytical plan proceeded using a standard 3 x 3 approach with a reporting limit set at 0.005 mg/kg based on matrix calibration standards. Anthraquinone was not detected in the sample above the reporting limit and therefore the sample was deemed satisfactory with regards to the requirements of assimilated EC Regulation 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin.

Aflatoxin in dried fruit (two samples)

Two cases were received relating to the same product, following their detention by Port Health due to the OL detecting excessive levels of total aflatoxin.

The samples of mixed dried fruit (which included figs as well as other dried fruit) were slurried in accordance with standard preparation procedures. However, the third part of one of the samples had inadvertently been disposed of. Hence, in agreement with all parties, the second part was analysed under a standard three replicates over three days approach.

The sample was found to be leaking from the container into the outer plastic bag. All components were (re-)combined prior to analysis. A methanol/water extraction was employed with immunoaffinity clean-up and analysis using Ultra Performance Liquid Chromatography (UPLC) with fluorescence detection.

The results for each sample were as follows:

LGC Sample Reference	Mean Concentration Aflatoxin B_1 ($\mu g\ kg^{-1}$)	Mean Concentration Total Aflatoxin ($\mu g\ kg^{-1}$)
Sample A	0.22	0.51
Sample B	0.38	0.79

Table 1: Mean concentration of Aflatoxin B_1 and Total Aflatoxin in samples.

In that the sample was mixed fruit, and the Contaminants in Food (England) Regulations 2013 prescribe different maximum limits for dried fruit and dried figs, a proportionate limit was considered based on the medley being 25 % figs. In both samples, the amount of aflatoxin B_1 and total aflatoxin was within the maximum permitted level, and the samples were therefore deemed satisfactory.



Horizon scanning

Engineering biology

Engineering biology (EngBio) is an emerging field at the interface between biology, chemistry, engineering, AI and data science. Its application is transforming the food sector by enabling novel approaches for food production and improvement, creating opportunities for innovation, sustainability, and economic growth. As such, it is a very powerful tool. However, responsible innovation and regulation of bio-engineered foods rely on measurement science to deliver credible detection, traceability and comparison.

Current limitations, including the lack of reference materials, harmonised terminology, validated methods, analytical traceability and shared genomic data, create regulatory uncertainty around the safe adoption of EngBio in the foods sector.

Addressing these challenges is essential to maintain public trust, enable innovation and ensure safety and biosecurity. Evidence-based good measurement practice advice will be key to underpinning confidence in this evolving area.

Findings from this horizon scanning activity are being used to shape future programmes and inform the creation of a national collaboration network (EngBioMet). The network will include food and feed within its scope, and will support responsible, reliable and accelerated innovation across the development pipeline for relevant EngBio products.

> responsible innovation and regulation of bio-engineered foods relies on measurement science to deliver credible detection, traceability and comparison.

DNA Synthesis

Advances in DNA synthesis now enable DNA sequences to be produced at larger volumes and lower cost, supporting safe and responsible use of EngBio in the food sector. DNA synthesis can rapidly generate custom sequences to help detect EngBio products in the food supply chain. Synthetic sequences can also serve as matched control materials for regulatory testing, validating methods without needing the engineered organism itself, and can be distributed quickly to UK Official Laboratories when reference samples are unavailable. In addition, such sequences can support bioinformatics by training algorithms to recognise engineered signatures in metagenomic food data.

Supported by the established DNA synthesis expertise of the NML, the Government Chemist programme is developing an ISO 9001-certified workflow for producing target sequences to strengthen rapid, resilient responses to emerging EngBio-related food incidents.



Sanitary and Phytosanitary (SPS) Agreement

The SPS agreement is a proposed UK–EU arrangement intended to reduce friction in agri-food trade by aligning rules on food safety and animal and plant health. The UK Common Understanding policy paper (May 2025) confirms that the UK will be seeking "dynamic alignment" of specific UK legislation with that of EU legislation in the agri-food areas, for areas within scope of the SPS agreement.

The Government Chemist has participated in meetings with FSA and Defra to share experiences of scientific engagement and continues to monitor the progress of the SPS negotiations, keeping government and the analytical community of the potential impact and implications of the agreement.





Supporting business and government across the four nations of the UK

Advisory function | Supporting stakeholder networks

The Government Chemist team provides world-class measurement science that underpins a resilient, innovative and globally competitive agri-food sector. Through impartial and authoritative technical advice, the Government Chemist acts as a trusted expert resource, forging meaningful dialogue with all stakeholders across the supply chain and participating, and often leading in, key scientific committees, advisory groups and networks. This collaborative approach strengthens the UK's measurement and regulatory frameworks, helping safeguard consumers, promote innovation and maintain confidence in the integrity of UK agri-food systems.

Advisory function

The Government Chemist provides specific scientific, chemical and biological measurement advice on a broad range of policy and regulatory developments to local, central and devolved administrations, the European Union and to the wider community of stakeholders where such measurements are critical to their operations.

We publish our outputs through the Government Chemist website. This enables effective dissemination of advice and creates a valuable channel for engagement and feedback from industry, regulators, and other stakeholders.

Enquiries from stakeholders

Many stakeholders regularly turn to the Government Chemist for advice on a wide range of topics, often related to measurement techniques and data interpretation. Other enquiries typically concern topical issues such as cannabidiol, allergens or food authenticity claims. We answered 41 requests for advice during 2025.

Table 2 shows the various sources of these enquiries, with just over a half originating from UK or overseas government departments and industry.

Table 3 shows the topics of enquiry. Whilst varied in their nature, over 40 % of the enquiries received related to food analysis and issues of food fraud and authenticity.

In each case, we gave carefully considered advice, supplying a copy of peer reviewed research findings where applicable or referring the enquirer to another source of information.

Table 2: Enquiries by source

Source	Total
Commercial	11
UK Government Departments	9
Independent	5
Industry Body and Trade Association	3
Media	3
Official Control Laboratory	3
Standardisation Body	3
Academia	2
Government Department, overseas	1
LGC	1

Table 3: Enquiries by topic

Topic	Total
Honey / honey authenticity	7
Food crime / authenticity	7
Food analysis	4
Freedom of information	4
Engagement / collaboration	3
Food standards / regulations/ legislation	3
Sampling	3
Other	3
Allergens	2
Toxins	2
Conflict of interest	1
Government Chemist	1
Procurement	1

Expert opinion to stakeholders

The Government Chemist team is regularly called upon to provide expert opinion on matters of food analysis, regulation, authenticity, and other similar topics by stakeholder organisations at meetings and events. Some examples of our contributions include:

- Honey Authenticity

Since 2018, the Government Chemist has been working closely with the UK Government to strengthen the evidence base underpinning honey authenticity assessments. The latest collaborative project with Defra was to develop a practical framework for the interrogation of honey authenticity databases.

Lack of transparency in these databases has led to legal disputes and undermines confidence in non-targeted analytical methods used for verifying honey authenticity. Recognising this, the Government Chemist, Defra, the FSA, and Food Standards Scotland convened a seminar in 2019 with experts and industry, which identified the need for a mechanism to assess honey authenticity database fitness for purpose.

The Government Chemist convened an independent expert group led by Professor Michael Walker and Dr David Hoyland. This group developed a framework, which offers detailed guidance on evaluating database scope, composition, metadata, representativity, and method validation. It also includes safeguards for database owners and describes international standards and UK/EU regulations.

This framework will enable the assessment of the fitness for purpose of authenticity databases used to interpret authenticity test results, enabling reliable enforcement decisions and reducing legal ambiguity. It empowers both regulators and industry, supporting transparent, science-based scrutiny and advancing the integrity of the global food system.

It will be put forward for standardisation in the future to CEN. The Protocol for the Collection of Honey Reference Samples, the output of a previous collaboration between the Government Chemist and Defra, is already being considered as a new work item proposal by CEN.

In addition, the Government Chemist contributes to 6-weekly cross government meetings on honey to exchange progress on projects and agree UK strategic position in relation to honey authenticity.

- Advice on determination of folic acid in fortified flour

With the forthcoming change to the Bread and Flour Regulations, which will require the fortification of certain flours with folic acid, Defra approached the Government Chemist to provide advice on the determination of folic acid in a flour matrix. After conducting a brief review of available methods, it became clear that further development was required in this area. During 2026, a project to produce a suitable method will be carried out by the Government Chemist, with findings made available to OLs and industry.

- Defra DNA Centre of Excellence

Government Chemist staff met with the leadership team for the Defra DNA Centre of Excellence (CoE) group to highlight the experience and expertise of Government Chemist and NML staff in the standardisation of DNA measurements. Government Chemist staff also joined a Q&A panel after a presentation from NML staff on eDNA in relation to the EMBRACE project (Enhancing Molecular Biodiversity Records to Assess Changes in the Environment). As well as greater engagement with the Defra DNA CoE group, Government Chemist staff proposed that a collaborative effort to produce a framework for eDNA measurements would be useful for this sector, which was well received.

Response to consultations

Consultations are carried out by government (including the devolved administrations and agencies), standards bodies or the European Union to obtain the input of interested parties 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 to respond authoritatively and independently where the consultations have chemical or bioanalytical measurement implications.

We responded to three consultations during 2025 which sought views, comments, and feedback from stakeholders:

- House of Commons Science, Innovation and Technology Committee consultation on innovation and global food security (1 August 2025 to 7 September 2025)

This consultation concerned innovations and low tech solutions that could be applied to improve global agricultural practices and strengthen food security, barriers to their adoption and the UK's role in addressing them.

The Government Chemist supported the consultation by indicating the importance of maintaining the UK's robust measurement system, maintaining centres of expertise, developing an internationally aligned, pro-innovation regulatory environment for the safe and effective translation and adoption of technologies and products, more novel solutions ranging from GMOs to novel proteins and cultivated meat, and maintaining UK lead of global surveillance efforts such as the Food Authenticity Network.

- FSA consultation on the applications for authorisation of three cannabidiol (CBD) food products as novel food (28 August 2025 to 20 November 2025)

This consultation addressed the authorisation of three regulated product applications, namely synthetic CBD, CBD isolate and isolated CBD derived from hemp (Cannabis sativa), all as novel foods, before providing final advice to Ministers in England and Wales (and as information to the Minister for Health in Northern Ireland).

The Government Chemist advised the FSA to consult the Government Chemist report on analytical limits for controlled cannabinoids in CBD products, alongside the Advisory Council on the Misuse of Drugs (ACMD) report and the Government's response, given enforcement challenges linked to the legal status of tetrahydrocannabinol (THC). The Government Chemist noted that the applications covered the risk of contamination with THC, but evidently not other cannabinoids. The Government Chemist highlighted its earlier work assessing laboratory capability to detect CBD and selected controlled cannabinoids noting that reference standards now exist for all 14 controlled cannabinoids, thereby creating an opportunity to expand the detection of contamination in food products. The Government Chemist also recommended a further interlaboratory comparison study be undertaken.

- FSA consultation on the proposal to implement a ban on the use of bisphenol A (BPA) and other bisphenols in Food Contact Materials (FCMs) (2 October 2025 to 24 December 2025)

This consultation sought a formal decision implementing a ban on the use of BPA and other bisphenols in FCMs.

The Government Chemist was broadly supportive of the ban of BPA and its analogues based upon the toxicological evidence. In considering how such a ban would be enforced, the Government Chemist raised a key regulatory question: whether the proposed framework intends to apply a nondetectable level for BPA and related substances, consistent with the conditions set out for any derogations. Concerning the proposed approach for the FSA to align their transitional periods and derogations with those of the EU to help prevent the UK market from being flooded with non-compliant products, the Government Chemist raised an important point about enforcement capacity. The Government Chemist asked whether the approach envisaged any additional inspection activity at designated points of entry to mitigate the risk of non-compliant goods entering the UK, and, if so, whether there will be corresponding support for Port Health Authorities and enforcement laboratories to undertake the increased workload.



Supporting stakeholder networks

Food Authenticity Network

The Food Authenticity Network (FAN) is a centralised, open-access platform that brings together critical resources related to food authenticity testing and food fraud prevention. By curating and consolidating the latest information in an online platform, FAN empowers stakeholders to improve food safety standards and adopt good practices and thereby help consumers worldwide have greater confidence in the food they buy.

2025 marked the 10th anniversary of FAN, a significant milestone in its development as a globally recognised resource for food authenticity. This was marked by a number of activities including a joint webinar with the Institute of Food Science and Technology with key stakeholders, and a series of video messages from key collaborators. By December 2025, FAN had grown to 6,220 members spanning 121 countries, reflecting its international reach and impact.

Earlier in 2025, FAN published its 2025–2027 Strategy, which reaffirmed its commitment to providing free and equitable access to trusted information and resources. The strategy outlines a vision for expanding global collaboration, fostering innovation, and supporting science-based solutions to strengthen food authenticity and combat food fraud worldwide.

Throughout 2025, FAN continued to strengthen its global platform for collaboration, knowledge exchange and innovation in food fraud prevention. A key milestone was the delivery of its first Food Authenticity Online Conference, Analysis4Authenticity, funded by Defra, FSA and FSS and attracted almost 1,000 registrations. The conference highlighted the importance of science and evidence in policy development, the role of emerging technologies such as machine learning, and the need for robust datasets and reference systems to support authenticity testing. The publication of FAN's annual Global Food Fraud Report provided a valuable synthesis of intelligence from leading international sources, equipping stakeholders with evidence-based insights to support food fraud risk management and strengthen prevention and mitigation frameworks.

FAN co-hosted a webinar for the Food Industry Intelligence Network (fiin). The fiin/FAN webinar on Elemental Profiling for Food Authenticity Testing attracted strong attendance, positive feedback results, and active discussion, highlighting clear interest from fiin members in analytical approaches to support food authenticity, geographical origin verification, and future collaborative learning events.

Thanks to the support of its Partners, FAN continues to operate on an open access basis for all stakeholders and maintain key resources, such as its Authenticity Database Search Tool, Compendium of Analytical Techniques and information on Food Authenticity Centres of Expertise.

Anyone can become a FAN member; it's free and very simple to join:

Food Authenticity Network



Collaboratively building a resilient national skills base

Building networks | Knowledge dissemination | Skills, capabilities & training

The Government Chemist has a long history of supporting and underpinning the skills base across the UK through dissemination and collaborative training. The Government Chemist maximises the impact of the capability developed through its work programme by efficient and timely transfer of its expert knowledge, building on existing initiatives and proactively developing new collaborative opportunities both nationally and internationally, so that the right information is delivered to stakeholders in the most appropriate format.

Building networks

Food authenticity Centres of Expertise – framework for a coordinated response

By working with the UK Government to recognise laboratories with existing food authenticity expertise meeting Defra's Authenticity Methods Working Group (AMWG) criteria, 22 Food Authenticity Centres of Expertise (CoEs) have been acknowledged to date. As a virtual network, available to provide technical advice in response to food-related incidents or emergency situations, they are grouped into 5 different categories as shown in Figure 2.

The CoEs are convened twice a year, to strengthen alignment across the network, particularly relating to sharing their experiences in applying advanced techniques to emerging issues, and to ensure the jointly agreed incident response framework remains relevant.

Figure 2: Food Authenticity Centres of Expertise



Knowledge dissemination

Government Chemist Conference

The biannual Government Chemist Conference 2026 will, for the first time, take place at Nexus, University of Leeds Innovation Hub. The conference will bring together experts from science, industry, and policy to tackle one objective: how trusted evidence-based measurements support responsible regulation for food in a time when climate change, population growth and increasingly complex supply chains place new pressures on the food system.

Joint Knowledge Transfer (JKT) activities

The JKT framework shares knowledge from government-funded research with stakeholders to support UK laboratory capability and good practice in food safety and standards analysis. Its dissemination activities, agreed with the funding partners Defra, FSA, FSS and BIST, are delivered through the Government Chemist and external experts as required.

During 2025, the following activities were delivered and published under the "Resources" section of the Government Chemist website (https://www.gov.uk/government/collections/knowledge-resources):

E-seminars:

- A review of allergen analytical testing methodologies
- Verification of frozen poultry via hydroxyacyl-coenzyme A dehydrogenase (HADH)

Publications:

The year saw publication of a number of key articles and guides resulting from the Government Chemist work programme:

Comprehensive allergen screening and semi-quantification in plant-based milk alternatives by mass spectrometry. Food Chemistry. Available at: https://doi.org/10.1016/j.fochx.2026.103504

Meat speciation via deployable Atmospheric Solid Analysis Probe Mass Spectrometry (ASAP-MS) using prototype RADIAN-ASAP. Rapid Communications in Mass Spectrometry. Available at: https://doi.org/10.1002/rcm.70089

A guide for testing laboratories on the application of Laser Direct Infrared (LD-IR) for the characterisation of microplastics. GOV.UK. Available at: https://www.gov.uk/government/news/guidelines-for-the-characterisation-of-microplastics-with-ld-ir

An evaluation of the sustainability of novel food production methods. GOV.UK. Available at: https://www.gov.uk/government/publications/quantitative-review-of-sustainable-novel-food-production

Detection of microorganisms obtained by new genomic techniques in food and feed products. Publications Office of the European Union, Luxembourg. Available at: https://data.europa.eu/doi/10.2760/1846532

POSTnote 740: Cultivated meat. UK Parliament POST. London: Parliamentary Office of Science and Technology. Available at: https://doi.org/10.58248/PN740

MIQE 2.0: Revision of the minimum information for publication of quantitative real-time polymerase chain reaction (PCR) experiments guidelines. Bustin, S.A. et al. Clinical Chemistry. Available at: https://doi.org/10.1093/clinchem/hvaf043

2025 Global food fraud report Food Authenticity Network. Available at: https://documents.foodauthenticity.global/index.php/research/2025-global-food-fraud-report/viewdocument/200

Skills, capabilities and training

Skills impacting UK official control of food and feed

Defra and FSA formally recognised the importance of maintaining a robust UK official food and feed control capability in the face of ongoing skills shortages. In correspondence with BIST, both organisations endorsed the Government Chemist's view that sustained cross-government support is essential to ensure the resilience and effectiveness of the official control system.

Alongside the cross-government funded Joint Knowledge Transfer Framework, the FSA committed to working collaboratively with the Government Chemist and other stakeholders to address skills gaps, and strengthen the pipeline of suitably qualified scientists and technical specialists needed to support official food and feed controls across the UK.

Building on two previous surveys, in collaboration with FSA, Defra, and FSS, the Government Chemist will send a questionnaire to Public Analyst Official Laboratories to assess whether skills have been maintained since the last survey and if there are any new or emerging needs required to maintain a robust UK official food and feed control capability.

The Mastership in Chemical Analysis (MChemA) training

The MChemA is the statutory qualification for those who want to practice as a PA and Agriculture Analyst in the UK. The training programme, funded by the FSA and supported through the Government Chemist, delivers high quality, bespoke training to candidates training for their formal qualification, as well as to staff in OLs and practising PAs.

A series of training courses delivered during 2025 were led by MChemA candidates, OL staff and other stakeholders, such as the RSC and APA Educational Trust. One training course included practical visits which provided an opportunity for attendees to gain a more in-depth experience, focussed on microscopy and microbiology skills which could not be delivered online. Two successful residential courses were held at the University of Birmingham in January and December 2025, with one reaching full attendance capacity and the other close to capacity.

Other courses delivered as part of the MChemA training included: "An Introduction to Statistics and Quality Assurance", which was attended by 26 OL staff, and "Evaluating Measurement Uncertainty", attended by 18 OL staff. Financial support was also provided to a number of MChemA candidates to support individual learning enquiries and their examination process.

One of the candidates successfully obtained their MChemA qualification during 2025 and recognised the contribution the training programme had made in supporting her studies.

Accreditation

The effectiveness of building a national skills base and the global reach of expertise associated with the Government Chemist role was recognised by the Belgian National Accreditation Authority (BELAC). They appointed a Government Chemist staff member as the scientific lead for GMO analysis for an audit of an EU Member State national laboratory to be audited to ISO 17025 (methods of analysis), ISO 17034 (reference material production) and ISO 17043 (provision of proficiency testing services). Written positive feedback was received from BELAC in relation to the level of technical expertise, scientific knowledge, preparedness and professionalism demonstrated during the audit.



Maximising UK measurement expertise to address global challenges

Capability building | Committee memberships | Stakeholder engagement
Collaborative projects

The Government Chemist Programme aims to extend and grow links with the scientific community, partner organisations and the government departments across the four nations of the UK, to enhance and future-proof existing capabilities and maximise collaborative synergies between stakeholders to address global challenges.

The capability building projects delivered within the Government Chemist Programme are prioritised to address key drivers identified through regular consultation with stakeholders. This activity is complemented by the participation in committees, working and expert groups, and in actively seeking collaboration in projects involving stakeholders across government departments, industry and academia.

Capability building projects

The impact of the work of the Government Chemist Programme is broad, and the effects can be observed in a number of ways. Regular 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. Prioritisation of our resources then allows development of measurement research projects in support of the identified areas.

These projects have benefits that impact on the wider measurement community, by promotinggood measurement practice in the scientific areas where disputes are more likely to arise.

However, the breadth of knowledge generated through the Government Chemist activities also provides a secure scientific basis for use by related stakeholder communities, including for the support of more efficient and cost-effective regulation. This is achieved by translating our current capabilities, generated through the development of chemical and biological measurement solutions to the identified food and feed sector challenges, into timely support and advice.

Insect proteins

The growing need for environmentally sustainable food sources, with a low carbon footprint, has led to increased interest in alternatives to traditional meat-based diets. To provide product traceability for consumer choice, market confidence, labelling and food safety (inclusive of potential allergenicity), there is an analytical need for the detection and identification of insect proteins in the food and feed supply chain.

The Government Chemist Programme has optimised and validated DNA extraction and quantitative-PCR (qPCR)-based assays for the analytical detection of insect species found in the UK and EU markets, including yellow mealworm (Tenebrio molitor), house cricket (Archeta domesticus) and migratory locust (Locusta migratoria) in raw and processed food materials.

The application of key molecular-based methods to novel food products enables the traceability of insect species in the food and feed supply chain, to identify both authorised and unauthorised insect products.

This project has a real-world impact, as recent scientific reports show that there are large mis-labelling issues associated with food products containing edible insects and potential allergenicity problems (because of the genetic similarity to crustaceans). Our work enables consumer choice, promotes market confidence, permits transparency, protects product identity, and allows testing for authenticity and adulteration.



Alternative proteins

The UK is currently witnessing an increasing interest in the development and commercialisation of sources of alternative dietary protein, for which markets already exist within the UK. Driven by relevant technological advances, combined with the need for more sustainable sources of dietary protein, the sector has witnessed an acceleration in both innovation and product development. To date, progress has been focused primarily on identifying alternative protein sources (for example, plant, algal, precision fermentation) that require less resource-intensive means of production and emit fewer greenhouse gases.

The Government Chemist published an evaluative summary of the leading categories of alternative dietary protein based on recent publications in the current scientific and grey literature, with particular focus on plant-based meat substitutes: novel protein sources (inclusive of insects, microalgae and macroalgae), precision fermented biomass (inclusive of fungal and bacteria), and cell cultivated meat. For each category, evaluation included consumer-based opinion, commercial market options, technical and non-technical challenges, sector regulation and recommendations for category progression.

Food Adulteration

Food adulteration in premium products, such as Extra Virgin Olive Oil (EVOO) and meat, is a global issue, driven by increasing demand and rising market value. To address this, rapid and cost-effective screening methods have been developed for detecting adulteration in olive oil and meat using ASAP-MS with chemometric modelling, as a more economical alternative to conventional GC-MS and LC-MS approaches.

Sample preparation workflows were streamlined to minimise solvent use and enable high throughput analysis while still generating robust lipid profiles suitable for classification. PCA-LDA models successfully differentiated a broad range of edible oils and meat species based on their lipid fingerprints.

For olive oil, the models achieved high classification accuracy (approximately ~ 95.6 %) and detected adulteration at levels as low as 10 %, enabling rapid identification of adulterated EVOO. Meat speciation showed comparable performance, distinguishing seven species and detecting adulteration down to 5 % within five minutes. The meat work was further validated using processed foods and ready meals.

Together, these case studies demonstrate the strong potential of portable ambient mass spectrometry for high throughput, field deployable food authenticity testing, supporting improved consumer protection and supply chain integrity.



Novel Contaminants in Food Packaging

Single use plastics are a major global environmental challenge because they are non biodegradable and can persist in the environment for hundreds of years. In response, the food industry has increasingly adopted recycled materials and novel bio-based packaging materials, such as polylactic acid (PLA). However, this shift towards recycled and plant-derived packaging can introduce new chemical risks, potentially exposing consumers to harmful contaminants, for example, per- and polyfluoroalkyl substances (PFAS).

In the UK, there is currently no specific statutory limit for total fluorine, extractable organic fluorine (EOF), adsorbable organic fluorine (AOF) or total PFAS in bottled water (including natural mineral water, spring water and bottled drinking water). For public drinking water, the Drinking Water Inspectorate (DWI) guidance introduces a threshold value of 0.1 µg/L limit for the sum of 48 PFAS in drinking water. As the UK considers aligning with the EU's 2026 Packaging and Packaging Waste Regulation, monitoring contaminants in recycled and bio-based materials has become increasingly important.

To investigate these concerns, a liquid chromatography–high resolution mass spectrometry (LC HRMS) method was developed for screening of PFAS alongside two targeted LC MS/MS methods designed to detect polyethylene terephthalate (PET) monomer bis(2-hydroxyethyl)terephthalate (BHET) and emerging "green" plasticisers.

The developed methods were applied to determine contaminant levels in recycled versus virgin PET, and to assess the presence of green plasticisers in PLA consumer products. The data generally indicated that increased recycled material composition led to increased PFAS and BHET contamination. All the green plasticisers were detected in all samples, with tributyl citrate and derivatives being the most abundant. The findings provide new insights into the chemical safety of alternative packaging materials.

A full report for all analytes will be published on the Government Chemist website during 2026 and several of the methods have been disseminated internationally through a European Metrology Network to help support harmonised analysis across Europe.

Input into committees – committee membership

The Government Chemist has continued to contribute to national and international committees to ensure the establishment of legislation, standards, and policy that are relevant and contain references to measurement practice that are fit for their intended purpose.

The list of committees the Government Chemist team contributes to is available under the membership section on the Government Chemist website.

A selection of committees joined during 2025 are highlighted below.

- Scientific expert registered with the UKRI Microbial Food Hub
- Member of the Working Group on Policy, Safety and Regulations for Sustainable Proteins at the Bezos Centre
- Member of the Novel Foods Expert Network UK (NFX UK)
- Member of NAPIC (National Alternative Protein Innovation Centre)

Key committee contributions in 2025 include:

- CEN Technical Committee (TC) 460 Chair's Advisory Group (CAG) on Honey

The Government Chemist participated in the Honey Expert Advisory Group, which was established to provide scientific advice and evidence on honey authenticity. Discussions focused on strengthening collaboration with international initiatives, including the EU Honey Platform, and engaging relevant stakeholders from laboratories and industry.

The Group considered progress on interlaboratory validation studies for LC-MS methods and opportunities to develop proficiency testing schemes to support method implementation and comparability. The Government Chemist contributed expertise on emerging analytical approaches, including next-generation sequencing (NGS), and shared relevant outputs from UK collaborative work.

The need for continued investment in reference materials, authentic sample collections and analytical databases was highlighted as a key enabler of robust honey authenticity assessments. The Government Chemist also promoted opportunities to advance capability through accreditation (United Kingdom Accreditation Service (UKAS) pilot on accreditation of non-targeted analysis involving databases), public-private partnerships and international collaboration, drawing on experience from UK honey authenticity research, the FAN and established industry assurance schemes.

- Defra's Sludge Review

The Government Chemist contributed to the Expert Elicitation Workshop, which seeks to scope the key challenges in sludge with respect to risks to human, animal, and environmental health.

- Codex Alimentarius Commission

The Government Chemist contributed to the Codex Alimentarius Commission National meeting where UK positions were agreed for items raised by the following Codex Committees:

- food additives
- methods and analysis and sampling
- contaminants in food
- pesticide residues
- fresh fruit and vegetables
- spices and culinary herbs
- Defra's UK-EU SPS agreement: Industry stakeholder information forum.

Engagement with stakeholders

The Government Chemist also organises and contributes to a number of events organised by stakeholder organisations. Some of the key stakeholder engagements of the Government Chemist team during 2025 are listed below:

- hosted a seminar at the request of Defra for colleagues and representatives from the FSA and FSS on the basic principles and techniques of crop breeding techniques, inclusive of genome editing and precision breeding, and how they are being applied in the food and feed sector.
- delivered a presentation at the Food Law Group with representatives from the National Food Crime Unit at the FSA and Gough Square Chambers on food fraud/ crime, its prevention and the law.
- contributed to the scientific kick-off meeting of the Bezos Centre for Sustainable Proteins established at Imperial College London and supported by the Bezos Earth Fund and UKRI. Following discussion on synergistic activities inclusive of GMOs, Precision Bred Organisms (PBOs), novel foods, sustainable proteins and engineering biology, the expertise of the Government Chemist will feed into the Centre's Working Group on policy, safety and regulations.
- co-hosted a meeting with the Parliamentary and Scientific Committee on sound policymaking for future foods, bringing together expert speakers representing the Office of the Government Chemist, the Department for Bioengineering at Imperial College London and the FSA. The meeting explored developments in food safety, innovation, and regulation. Emerging opportunities and analytical measurement challenges associated with producing microbial foods were highlighted, alongside the role of innovation in policymaking, including new regulatory initiatives aimed at supporting safe commercialisation of novel food technologies.
- delivered a spotlight lecture highlighting geopolitical and economic drivers of food fraud and leading two workshops addressing these topics at the International Food Fraud Conference in Berlin.
- presented the world's first research registry for Nutrition, developed by NNEdPro (Global Institute for Food Nutrition and Health) with Government Chemist funding, at NNEdPro's 11th International Summit.
- contributed to a cross-group policy meeting, hosted by the Bezos Centre for sustainable proteins (Imperial) with representatives from the NFX UK, NAPIC, Cellular Agriculture Manufacturing Hub (CARMA) and the Alternative Proteins Association to discuss the progress and likely impact of the EU UK negotiations on the SPS agreement on emerging UK legislation associated with engineering biology in foods.
- presented the Government Chemist's expertise on elemental seaweed analysis at a workshop hosted by the UK Seaweed Network.
- presented to the Europol/Interpol Operation OPSON XV kick-off meeting in Lithuania, highlighting the role of the Food Authenticity Network in helping prevent global food fraud.

Collaborative projects

Working with its stakeholders, the Government Chemist collaborates on matters to address global challenges and ensure food safety and authenticity.

“Charlock” in mustard

A potential allergen incident arose through notification to the FSA of a positive “mustard” result in a UK flour sample, thought to involve a species referred to as “Charlock”. The FSA asked the Government Chemist to explore suitable confirmatory methods for allergenic mustard species. The main challenge was analytical ambiguity: ELISA tests used by flour millers can produce false positives because of cross-reactivity with oilseed rape (Brassica napus) and other Brassicaceae, while follow-up PCR testing can distinguish mustard from oilseed rape but not from charlock. This creates regulatory uncertainty because “mustard” must be declared as an allergen despite the lack of a clear legal definition. A Government Chemist literature review and bioinformatic analyses indicated high DNA sequence similarity between charlock and mustard, meaning standard DNA metabarcoding is unlikely to provide reliable discrimination. Further sequencing and laboratory work is continuing in the new Government Chemist Programme.



Honey

The Government Chemist has played a central role in strengthening the evidence base and infrastructure needed to address honey authenticity.

This has included leading on the development of a protocol for the sampling of honey, co-funded by Defra, which is advancing towards European documentary standardisation through CEN TC460 for Food Authenticity.

In parallel, the Government Chemist has developed a framework for the interrogation of honey authenticity databases, in collaboration with Defra and stakeholders.

The project incorporates sector feedback and has been published to support more robust and transparent data use.

Ongoing work also includes providing expert advice to cross-government initiatives, supporting laboratory accreditation for authenticity testing, and contributing to coordinated UK strategy development.

Together, this work is helping to improve the reliability, comparability and regulatory confidence of honey authenticity testing, supporting effective enforcement and reducing the risk of fraud.



The European Food Fraud Community of Practice (EFF-CoP)

EFF-CoP is a network and knowledge sharing platform established to detect and prevent food fraud. Bringing together experts in the field, including scientists, regulators, food businesses, policy, and industry stakeholders, the group aims to improve authenticity, traceability and transparency in food supply chains, share research and good practice on food fraud and develop guidance and support businesses to identify fraud risks and vulnerabilities.

2025 saw the EFF-CoP develop and launch a range of promotional materials and a central hub (EFF-HUB), providing access to project updates, partner profiles and shared resources. This collaboration strengthens knowledge exchange, raises awareness and supports a more coordinated, international approach to tackling food fraud.

FAN continued its active partnership in EFF-CoP, with Defra co-funding, and is helping to strengthen stakeholder connections and promote shared resources. FAN is leading Work Package 2 (WP2), which aims to establish the needs of the community for better food fraud prevention, leading to a future research agenda that will address those needs. FAN marked the launch of WP2 with a poem, an ode to authenticity.

FAN organised a PESTLE analysis (Political, Economic, Sociocultural, Technological, Legal and Environmental) stakeholder workshop at the International Food Fraud Conference (IFFC) in Berlin (November 2025). Attendees identified 42 items as both 'IMPORTANT' and CERTAIN (top left PESTLE quadrant), which were ranked high to low using frequency the issues were identified by participants and categorised into:

- 17 drivers (creates pressure or motivation for fraud)
- 17 enablers (makes fraud easier to carry out or scale, for example, how it happens)
- 8 weaknesses (gaps, failures, or vulnerabilities that can be exploited).

This data will be fed into a needs assessment for food fraud prevention.

EU Horizon DETECTIVE project

This European project is aimed at creating, validating, and applying pioneering detection techniques for identifying new genomic techniques (NGTs) and their resulting products in plants and animals in the EU.

A representative from the Government Chemist team sits on the Scientific Advisory Board and provides independent scientific comment, advice and input towards the direction of the project.



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