



2018 Government Chemist Conference

Food chain resilience in a changing world

13 – 14 June 2018

BMA House, Tavistock Square, London WC1H 9JP





2018 Government Chemist Conference

Food chain resilience in a changing world

Day 1 Wednesday 13 June		
09:45	Registration and coffee	
Opening session – chaired by Paul Berryman, GCPEG		
10:30	Welcome and introduction	Julian Braybrook Government Chemist
10:45	Achieving a resilient food and drink sector for the UK in uncertain times	Prof John Loughhead BEIS Chief Scientific Advisor
11:15	Referee casework outcomes	Michael Walker Consultant Referee Analyst
12:00	Application of whole genome sequencing for public health interventions around foodborne pathogens	Kathie Grant Public Health England
12:30	Lunch	
Afternoon session – chaired by Bhavna Parmar, Food Standards Agency		
14:00	Resilience through food forensics – essential post EU exit	Jon Griffin Association of Public Analysts
14:30	Regulating Our Future – modernising food regulation in the UK	Catriona Stewart Foods Standards Agency
15:00	The European Commission Knowledge Centre for food fraud and quality	Franz Ulberth European Commission Joint Research Centre
15:30	Break	
15:50	The Scottish Food crime Unit: how FSS is using science to verify authenticity of the food chain in Scotland	Lynsey Scullion and Duncan Smith Food Standards Scotland
16:20	Road map for the harmonisation of DNA testing for meat speciation	Tim Wilkes LGC
16:50	Screening of “Food evolution”	Film narrated by Neil deGrasse Tyson
17:50	Networking and drinks reception – All welcome	
19:30	Conference dinner	



2018 Government Chemist Conference

Food chain resilience in a changing world

Day 2 Thursday 14 June		
09:15	Registration and coffee	
	Morning session – chaired by Simon Branch, Herbalife Nutrition	
10:00	Chair's introduction	
10:05	Are your genes to blame when your jeans don't fit?	Giles Yeo Cambridge University
10:35	How the food industry is preparing for EU exit	Helen Munday Food and Drink Federation
11:05	Foodsafety challenge - Hong Kong perspective	Chi Shing Ng Hong Kong Government Chemist Laboratory
11:35	Break	
11:50	Can Blockchain provide the answer? Data management to optimise and enhance productivity, safety, quality and legality in the agrifood and food and drink processing sectors	David May University of Lincoln
12:15	How can measurement science assist in improving the molecular detection and management of antimicrobial resistance?	Jim Huggett LGC
12:45	Lunch	
	Afternoon session – chaired by Victor Aguilera, Defra	
13:45	The Hand That Feeds: A musical about food crime	Kate Cooper Birmingham Food Council
14:10	Early warning systems to detect, predict and assess food fraud	Yamine Bouzemrak RIKILT
14.40	Break	
14:55	How far have we come since horse-gate; global tools available to fight food fraud	Selvarani Elahi LGC
15:20	Accelerating rice improvement in South Asia	Katherine Steele Bangor University
15:50	Closing remarks	Selvarani Elahi Deputy Government Chemist
16:00	Close of conference	



Day 1 Wednesday 13 June

Welcome and introduction

Julian Braybrook, Government Chemist

Dr Julian Braybrook is Director of Measurement Science for the National Measurement Laboratory at LGC, and Government Chemist, where he is responsible for the science strategy and partnership development of the associated metrology and regulatory analysis programmes, in support of the UK National Measurement System.



Since joining LGC in 1988, Julian has carried out a variety of roles delivering and managing national and European analytical research innovation and exploitation and contract service solutions, for a variety of chemical and biotechnology applications and across both the public and private sectors. He holds several national, European and international positions informing standards generation and application, as well as government and commercial policy and practise.

Julian has a degree in Chemistry from the University of London and a PhD from the University of Cambridge for research into novel contrast agents for magnetic resonance spectroscopy and imaging. He has an honorary DSc from Kingston University London for his contributions to chemistry. He is a Chartered Chemist, Fellow of the Royal Society of Chemistry (CChem FRSC).

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Achieving a resilient food and drink sector for the UK in uncertain times

Professor John Loughhead, Chief Scientific Adviser, BEIS

Abstract

We are in an era of accelerating societal and scientific change with:

- conflicting attitudes towards food - local vs all year round supply, authentic vs cheap, enhanced production vs better supply,
- major global political reshaping - China as a supplier and market, and its emerging regulatory status,
- scientific advances - particularly devices/technologies which enable fast and portable point of use/test, identify predictive biomarkers both directly or through enhanced interrogation of acquired data and lead to increased personalisation of nutrition and health choices, or promise blockchain technologies for potential future transformation of supply chains.

Whatever the change, our food must be authentic and secured in a safe manner, and stakeholders have to be positioned to cope with the accelerated pace of scientific and geopolitical change.

Professor Loughhead's keynote presentation will indicate the importance of the food and drink sector to the UK and internationally, the importance of addressing societal and scientific change and the role of the Government Chemist, amongst others, in securing food chain resilience, especially at a time of negotiating the UK Exit.

The Government's modern Industrial Strategy sets out a vision for decisive intervention where government can make a difference, for a successful free-market economy built on solid foundation, and for government and private sector partnership deals where the former are missing. The Food and Drink Sector Council has been formed to secure the UK's position as a global leader in sustainable, affordable, safe and high-quality food and drink.

The role of Government Chemist – overseeing the statutory function of referee analyst and resolving disputes over analytical measurements particularly in relation to food regulatory enforcement – is fundamental to providing an independent voice for sound analytical measurement science and preventing miscarriages of justice, and for advising Government on policy, standards and regulation based on research carried out by them and their team.

It is only by bringing all the stakeholder representation together through the Sector Council and meetings such as these to address future challenges, that this vision for the sector will be achieved.



Speaker biography

Professor Loughhead is Chief Scientific Adviser at the Department for Business, Energy and Industrial Strategy (BEIS). Prior to this he was Chief Scientific Adviser at the Department of Energy and Climate Change (DECC).

Before joining DECC, John was Executive Director at the UK Energy Research Centre (UKERC). Prior to that, he was Corporate Vice-President of Technology and Intellectual Property at Alstom's head office in Paris.



John's professional career has been predominantly in industrial research and development for the electronics and electrical power industries, including advanced, high power industrial gas turbines, new energy conversion systems, spacecraft thermal management, electrical and materials development for electricity generation and transmission equipment, and electronic control systems. He has extensive international experience in both industry and academia.

John is a Chartered Engineer, graduating in Mechanical Engineering from Imperial College, London, where he also spent 5 years in computational fluid dynamics research. He is Past-President of the UK's Institution of Engineering and Technology, Fellow of both the UK and Australian national Academies of Engineering, Professor of Engineering at Cardiff University and Fellow of Queen Mary University of London.

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Referee casework outcomes

Michael Walker, Consultant Referee Analyst

Abstract

Independent expert analysis and interpretation, 'referee analysis', to help avoid or resolve disputes are provided by the Government Chemist under statutory provisions stemming from the Food Safety Act 1990 and the Agriculture Act 1970. Cases begin with the contemplation or commencement of legal proceedings where the prosecution intends to adduce analytical evidence. The referral may be by the local authority or Port Health Authority authorised officer, the prosecutor or the court. The defendant may also, subject to agreement to defray some or all of the Government Chemist's costs, request referral.

The Government Chemist also acts as a source of advice for government and the wider analytical community. Recent years have seen increased recourse to the Government Chemist as an advisor to both central and local government.

Michael will describe the rationale and process for technical appeal in the UK food and feed control system, with outcomes and examples of cases. The need for referee analysis is frequently greatest in areas where measurements are difficult, and new methods need to be developed and validated. The most challenging recent investigations involved alleged allergens in spices, and the new methods of analysis we developed have now been published.

Many familiar examples reoccur - mycotoxins, food additives, genetically modified food and jelly mini-cup choking hazards, with maintained interest and complexity. Several new questions including honey authenticity and the status of the powdered leaf of *Mitragyna speciosa* also known as kratom, will be discussed.

Expert application of sophisticated techniques by a multidisciplinary team, a high analytical replication rate and contextual and forensic awareness contribute to ensuring food chain resilience in an evolving trading and regulatory landscape for the benefit of consumers, industry, the courts and regulators.



Speaker biography

A published scientist Michael as Referee Analyst and head of the Office of the Government Chemist is also comfortable in strategy and policy. He advises on research on allergen measurement, acts as APA Training Officer and represents the Government Chemist e.g. on IFST Scientific Committee. Michael is a member of the European Academy of Allergy & Clinical Immunology and was a subject matter expert to the DH/Defra Elliott Review. Michael's non-executive director experience includes as a founder board member of the FSA.



His background is in chemistry; he is a Chartered Chemist, Fellow of both IFST and RSC, and with the statutory MChemA qualification was resident Public Analyst in Northern Ireland until 2004 when he moved across to Forensic Science Northern Ireland. Michael joined LGC as a consultant in 2006 and has contributed 60 peer reviewed papers enabling him to obtain a PhD by publication from Kingston University London for a thesis on advances in forensic measurement science and the regulation of allergens, additives and authenticity.

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Application of whole genome sequencing for public health interventions around foodborne pathogens

Kathie Grant, Public Health England

Abstract

Foodborne outbreaks of infectious disease are a major public health and food safety concern. Their successful detection and investigation depends upon microbiological and epidemiological tools being used in concert with food trace back studies to define and quantify the number of cases, identify the pathogen, detect the source of infection and determine the route of transmission. This enables effective control measures to be implemented and action to be taken to stop further cases and prevent outbreaks in the future. Tracking food to its source is often complicated: many foods go through multiple processing and distribution steps and more than one country may be involved. Once the food source has been established, the point at which and exactly how contamination occurred needs to be determined to enable effective public health measures to be implemented.

Whole genome sequencing (WGS) offers unprecedented levels of sensitivity and specificity for determining the genetic relatedness of bacterial strains and has proven to be a transformational tool for investigating foodborne infectious illness. The application of WGS to foodborne bacterial pathogens is able to provide strong microbiological evidence linking cases of illness and is identifying clusters and outbreaks of foodborne disease previously unidentified by conventional typing and surveillance tools. It is robustly linking isolates from human illness with those from food and environmental samples which is refining case definitions in outbreaks and thus honing epidemiological investigations. In addition, WGS information on the evolutionary relationship of strains is providing enhanced source attribution and evidence for the initial point of contamination as well as geographical signals as to where the strain may have originated from. This presentation will demonstrate how WGS of bacterial foodborne pathogens is transforming the investigation of foodborne bacterial disease that is leading to improved public health interventions.

Speaker biography

Dr Kathie Grant is an internationally recognised expert in the field of foodborne pathogens with 30 years' experience in clinical and public health microbiology and a research interest in exploiting whole genome sequencing (WGS) of bacterial pathogens to improve the understanding and control of foodborne bacterial illness. She is currently Head of Public Health England's Gastrointestinal Bacteria Reference Unit at Colindale, United Kingdom which is the national reference laboratory for a range of foodborne pathogens including

Salmonella, *E. coli* VTEC, *Campylobacter*, *Listeria monocytogenes* and *Clostridium botulinum*. Since joining the laboratory in 2001 she has championed the use of molecular methods leading to improvements in the detection and investigation of bacterial foodborne disease within the UK.





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Her laboratory is one of the first laboratories in the world to implement the use of WGS for routine bacterial reference service delivery.

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Resilience through food forensics – essential post EU exit

Jon Griffin, Association of Public Analysts

Abstract

The presentation will aim to initially give a brief history of the role of the Public Analyst, where the service currently stands and how it should remain as an integral part of a food enforcement service in the UK.

The information supplied will also give an outline of how the laboratories are currently operating under continuing financial and sampling pressures and how they still offer invaluable analytical support to Trading Standards and Environment Health Departments within the UK as well as supporting businesses through Primary Authority Partnerships.

As referred to in the title, robust and resilient processes and procedures are necessary in enforcement laboratories as results are continually being challenged and procedures scrutinised. The profession has a long history of working successfully in this environment and the talk will also show how this will be vital as we move forward beyond 2019 and leave the European Union.

Speaker biography

Born in South Wales, but schooling in East Lothian in Scotland, he graduated from Robert Gordon's Institute of Technology (now Robert Gordon's University), Aberdeen in 1988 having obtained an honours degree in Physical Sciences majoring in Chemistry.

Being a sandwich course, he managed to get a year's paid work experience at a Dairy Research establishment in Ayr on the West Coast of Scotland where his enthusiasm for food analysis was kindled.

He joined Kent County Council in 1988 as a Graduate Scientist where he carried out classical and instrumental analysis of foods, agricultural samples, waters and consumer goods. In 1997 he registered for the Mastership of Chemical Analysis (MChemA) and completed the qualification in 2002 when he was then appointed as a Public Analyst. Since then Jon has also completed a Diploma in Management studies at Canterbury Christchurch University and continues the role of Public Analyst, Technical Manager and Analytical Services Manager at Kent Scientific Services, West Malling, Kent.

In 2015 he was elected President of The Association of Public Analysts, taking the lead in discussions with central and local government bodies and chairing the Council of the Association.

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Regulating Our Future – modernising food regulation in the UK

Catriona Stewart, Food Standards Agency

Abstract

The Food Standard's Agency's Regulating Our Future Programme aims to modernise how food businesses in England, Wales and Northern Ireland are regulated to check that our food is safe and what it says it is. We are building a system that is dynamic and flexible and can adapt as the global food economy changes and as technology develops in the future. We are doing this so that our system has the sophistication needed to regulate an increasingly diverse food industry and to adapt quickly to changing risks and so that it can respond to changing patterns of food production, trade and consumption when the UK leaves the EU. The presentation will outline why the FSA is changing the way the food sector is regulated, what changes are being made and the benefits these changes are expected to bring. It will focus in particular, on the key changes that that will be made to the regulatory regime in time for the UK leaving the EU.

Speaker biography

Catriona began her career at the former Ministry of Agriculture, Fisheries and Food where she held a number of scientific posts supporting and developing food labelling and composition policy. She moved to the FSA when it was established in 2000 and since then has been involved in working on regulatory delivery policy. Catriona led for the UK in the negotiations on the Official Feed and Food Control Regulation and then on the cross-Government project to implement its provisions nationally. Following that, she led the work to develop and roll out the FSA's flagship Food Hygiene Rating Scheme (FHRS). She then spent a year at the Department for Business, Energy and Industrial Strategy working on the expansion and simplification of Primary Authority. On returning to the FSA last October Catriona joined the Regulating Our Future Programme with responsibility for developing a sustainable funding model for the new regulatory system, and for work to put the FHRS on a statutory basis in England.



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The European Commission Knowledge Centre for food fraud and quality

Franz Ulberth, European Commission Joint Research Centre

Abstract

International collaboration on food safety is already well established, while for food authenticity this is not yet the case. There is a great need for international harmonisation in order to be able to detect and, what is more important, prevent or at least minimise fraud. Therefore, the fight against food fraud calls for a global approach involving cooperation and consultation among all stakeholders at all levels of the food chain.

On 14 January 2014 the European Parliament published a resolution on the food crisis, fraud in the food chain and the control thereof, calling on the European Commission, amongst other issues, to give food fraud the full attention it warrants and to take all necessary steps to make the prevention and combating of food fraud an integral part of EU policy. Consequently, the European Commission undertook to create the necessary structures, among them the creation of a dedicated Knowledge Centre. The European Commission Knowledge Centre for Food Fraud and Quality produces, collects and collates information, makes sense of it, and transforms it into knowledge, which shall inform policy making to ensure and protect the authenticity and quality of food supplied in the EU.

The Knowledge Centre for Food Fraud and Quality aims at:

- Creation of a formalised science/policy interface which facilitates the flow of scientific evidence into the policy making cycle to support initiatives for safe-guarding the quality of agri-food products and protecting the integrity of the food chain;
- Community of Practice linking policy makers from different Commission services, scientists and competent authorities in the Member States to access and make best use of shared knowledge;
- Building collaboration with authorities in Third Countries.

Speaker biography

Franz Ulberth is Head of the Fraud Detection and Prevention Unit at the European Commission's Joint Research Centre. Franz graduated (PhD) in "Food Science and Biotechnology" from the University of Natural Resources and Applied Life Sciences (BOKU) in Vienna, Austria. Franz joined JRC in 2002 as a programme co-ordinator for food and environmental reference materials. In 2007 Franz was nominated Head of the Food Safety and Quality Unit. As of July 2016 he heads a newly created Unit devoted to detection of fraud in the food chain and selected consumer goods such as tobacco. He represents the JRC in relevant food related technical committees of standards developing organisations such as the European





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Committee for Standardization, International Organization for Standardization, AOAC International and the FAO/WHO Codex Alimentarius.

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The Scottish Food Crime and Incidents Unit and how Food Standards Scotland is using science to verify the authenticity of the food chain in Scotland

Duncan Smith and Lynsey Scullion, Food Standards Scotland

Abstract

The Scottish Food Crime and Incidents Unit (SFCIU) was launched in 2015. The unit's remit in relation to food, drink and animal feed, is to prevent, investigate and disrupt serious and/or complex fraudulent conduct and serious and/or regulatory non-compliance involving dishonesty in relation to the Scottish food and drink industry.

SFCIU comprises 3 distinct areas: Incidents who manage food and feed safety/standards incidents, which may involve foodborne outbreaks and the criminality aspect by the Intelligence Unit and a team of Investigators targeting food crime/fraud and serious regulatory breaches.

The Food Protection Science and Surveillance branch of Food Standards Scotland (FSS) is concerned with using scientific evidence to support the strategic outcomes of the organisation. This branch works with SFCIU to provide scientific support where required, including, but not limited to, the authenticity of food.

Food authenticity relates to not only the chemical or biological composition of a food product, but also relates to any statements about the source of ingredients, i.e. their geographic, plant or animal origin. Provenance claims are not straightforward to verify and FSS is in the process of commissioning a pilot service to verify the geographical origin of beef sold at processing, retail and catering establishments in Scotland through the use of stable isotope ratios.

Speaker biographies

Duncan Smith is the Intelligence Manager for the SFCIU at Food Standards Scotland. A former Police Officer, with 30 years' Service with Grampian Police, the Scottish Drug Enforcement Agency and latterly Police Scotland, undertaking a variety of overt and covert roles in the investigation of Serious and Organised Crime.

Duncan joined the SFCIU in 2016 and has since been laying the foundations for the Unit, developing key partnerships and managing the intelligence function.





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Dr Lynsey Scullion has a PhD in Chemistry from the University of Strathclyde. Lynsey joined Food Standards Scotland (FSS) as a scientific advisor in 2017 where she leads on food authenticity and allergens.

Prior to joining FSS, Lynsey worked as a Knowledge Transfer Partnership Associate between Heriot-Watt University and an independent food manufacturer developing novel ingredients for manufactured foods.



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Road map for the harmonisation of DNA testing for meat speciation

Timothy Wilkes, LGC

Abstract

This presentation will explore some key issues associated with the harmonisation of results for meat species detection and quantitation using DNA (PCR) based approaches. Using the 2013 horse meat incident as an example, an analytical approach based on a series of Defra and FSA projects undertaken at LGC will be described. A road map will be presented highlighting the main analytical issues encountered and remedial actions undertaken. The talk will also provide a brief overview of a number of novel technologies that may provide the analyst with further insight into this important and evolving area.

Speaker biography

Timothy joined LGC from Cancer Studies at Birmingham University in 2006 and currently works alongside Malcolm Burns, the Principal Scientist and Special Advisor to the Government Chemist, within the Molecular and Cell Biology Team, undertaking work within the food testing area. This role involves the delivery and management of projects for internal and external (UK Government and industrial) customers and in supporting Government Chemist/NRL activities. Examples of recent project work have included the management of an international comparative trial to evaluate a quantitative real-time PCR method for determining horse meat content, as well as participating in a number of knowledge exchange events for UK public analysts and investigating the application of novel technologies such as spectral imaging to foods analyses.



Timothy is a post-doctoral researcher with over 25 years of academic and industrial experience within the fields of genetics, molecular biology and measurement research. Timothy has specialised in the area of genomics and gene expression as applied to areas such as food testing, as well as in technology evaluation/development for clinical and non-medical diagnostics. Additional areas of expertise include DNA sequencing, microarray development and cytogenetic analysis.

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Day 2 Thursday 14 June

Are your genes to blame when your jeans don't fit?

Giles Yeo, MRC Metabolic Diseases Unit, University of Cambridge

Abstract

The recent increase in obesity is due to dramatic changes in our environment over the past 50 years. However, not all of us are obese. Genetic differences mean we respond differently to the environment, allowing us to use genetics as a tool to understand the mechanisms underlying obesity. Some of us are slightly more hungry all the time and so eat more others. In contrast to the prevailing view, obese people are not bad and lazy; rather, they are fighting their biology. Society has to accept this, before we can form successful strategies to tackle this largest of public health problems.

Speaker biography

Giles Yeo is from San Francisco, receiving his bachelor's degree in Molecular and Cell Biology from the University of California, Berkeley. In 1994, he came to Cambridge joining the lab of Prof Sydney Brenner (Nobel Laureate 2002) for his PhD studies. In 1998 he began his post-doctoral training with Prof Sir Stephen O'Rahilly in the Department of Clinical Biochemistry, working on the genetics of severe human obesity. He was the first to report that mutations in the *melanocortin-4 receptor (MC4R)* and in the neurotrophic receptor *TRKB* resulted in severe human obesity. In 2007, Giles became Director of the core Genomics/Transcriptomics facilities and a group leader at the University of Cambridge Metabolic Research Labs.



Giles is also a graduate tutor and fellow of Wolfson College, Cambridge. His group is interested in studying the brain control of food intake and bodyweight, and how these might be dysregulated in obesity. Giles also presents science documentaries for the BBC. His critically acclaimed investigative piece '*Clean eating – The dirty truth*' was screened on Jan 19th 2017 and prompted an important national debate about dieting advice and evidence based science. He is also one of the presenters on BBC's '*Trust me I'm a doctor*'.

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How the food industry is preparing for EU exit

Helen Munday, Food and Drink Federation

Abstract

Brexit is an issue that is 'front and centre' for many in the food and drink sector. Yet whilst there has been much debate and scenario planning for the UK's exit from the EU, the reality is that firm plans are still proving elusive due to a lack of clarity on the political front. The Government has made clear its intention is to formally commit to Brexit at 23:00 GMT on Friday 29 March 2019, so at least we have relative certainty over the time and date of departure, although even that date has some lack of clarity if we consider the much-discussed topic of transitional arrangements! This means that the majority of the enormous amount of work that needs to be done to ensure that there are no so-called 'inoperabilities' on the first day of Brexit, must be completed during 2018. Nowhere will the enormity of the task be felt more than with those civil servants in departments that interact with the food and drink industry, who must be champing at the bit for officials to put pen to paper.

The production, processing, distribution, retail, packaging and labelling of food and drink is governed by a wealth of laws, regulations, codes of practice and guidance; the majority of which is in place at an EU level. All of that needs to 'lifted and shifted' into UK law and in some cases new provisions made, if we essentially become a 'third country' to the EU. This latter area is incredibly important when it comes to import and export considerations, health certificates etc. and is a major area of concern for many food and drink businesses. The issue of the Irish border with the constant toing and froing of ingredients and products across it, which has been widely debated, brings many of these topics into sharp relief, and will be an essential early indicator of whether provisions have been adequately made.

The subject of whether the UK should continue to follow the regulatory lead of the EU is also a hot topic. Regulatory alignment with the EU has the benefit of ensuring fewer non-tariff barriers to trade with our nearest neighbours. However, many business operators, especially those who have little movement of raw materials or finished goods across national borders, argue that divergence of regulations could be highly beneficial when it comes to encouraging innovation. Somewhere in the mix are considerations, such as regulatory equivalence, mutual recognition and outcome equivalence.

We know that preparation and 'getting this right' is key for business continuity and profitability, and more importantly ensuring continued consumer trust in the food chain, and therefore it is something that everyone in the food and drink sector will agree is of the highest priority. Thus, Helen will discuss in her talk, the preparations that are being made within businesses and with regulatory bodies, as we head towards EU exit.



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Speaker biography

Helen Munday re-joined the Food and Drink Federation in 2016 as Chief Scientific Officer (CSO) having worked for the trade association as Director of Food Safety and Science earlier in her career. In her role as CSO, Helen is accountable for sustainability and the diverse food safety and science policy briefs at FDF, and as a Registered Nutritionist also contributes to health and wellbeing policy.



Helen has a wealth of experience of the food and drink industry, having previously held senior global roles in companies such as Mars and Coca-Cola. Helen has also worked as Lead Technologist in AgriFood at Innovate UK. Helen has a high level of expertise in R&D, Scientific and Regulatory Affairs as well as Product Development and Innovation across the AgriFood chain.

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Food Safety Challenge – Hong Kong Perspective

Chi Shing Ng, Government Laboratory, HKSAR

Abstract

The Government Laboratory is a unique and independent government department in Hong Kong which discharges statutory functions as referee analyst under various ordinances and regulations. This includes the analysis of food products for regulatory compliance and the provision of testing services to support the regular food surveillance programme to ensure food safety in HK. Besides, urgent testing services related to food incidents and technical support to the implementation of new regulations related to food safety also constitute a significant part of work conducted by the Laboratory.

Being a metropolitan city with only limited agricultural activities, HK relies heavily on imported food from other parts of the world. Therefore, any food safety related incidents happen around the world will certainly have an impact to HK and cause public concern. Also, to better protect public health and with a view to harmonise between local and international standard, food regulations in HK are being reviewed by the administration.

In this presentation, recent examples on the role of GL in the provision of urgent testing services in response to food incidents, whether it is a minor or large scale event, will be discussed. Technical support to the implementation of new regulations related to food safety in the last decade will also be discussed.

Speaker biography

Mr Chi Shing Ng is currently the Senior Chemist of the Additives, Contaminants and Composition Section of the Government Laboratory of HKSAR. Mr Ng holds a B.Sc. degree in chemistry from the University of Hong Kong and a M.Sc. degree in chemistry from the State University of New York at Stony Brook. He started off his career in analytical chemistry at the Government Laboratory in the application of high resolution mass spectrometry for dioxins analysis. Since then he has been working in the analysis of various toxic contaminants/ingredients in environment, food and traditional Chinese medicines before he took up his present position in 2016.



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Can Blockchain provide the answer?

Data management to optimise and enhance productivity, safety, quality and legality in the agrifood and food and drink processing sectors

David May, University of Lincoln

Abstract

Highlighting advancement opportunities related to Blockchain technologies, this presentation reviews a broad range of sector challenges drawn from across the agrifood and food & drink processing sectors. Advances enabling the availability of comprehensive and often “real-time” data held in batch related blockchain systems has the potential to enhance the assurance of food quality, safety and legality, enabling control systems to become far more proactive. Alongside this, significant productivity and supply chain optimisation benefits associated with the application of these new technologies are also considered.

This presentation highlights the failure of current systems to show in real time where products are in the supply chain and how slow the progress has been between the 1999 ‘Dioxin in Chocolate’ scare to 2017 Fipronil in eggs problem, to create better solutions. Both issues highlighted the failure of current traceability systems.

Research into current supply chains has highlighted the large quantities of data generated by even relatively simple operations, much of which is still paper based. The need to maintain traceability within factory operations is key. Examples studied show current systems generate large quantities of records e.g. sourcing Crayfish from China is likely to generate around 720,000 unique records per year, for just one producer into one UK site, excluding the temperature and shipping records. This data when combined with other products, multiplies the data further.

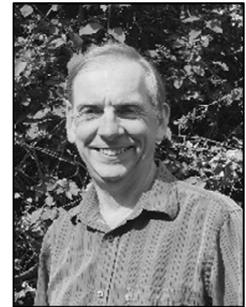
The presentation proposes using a hybrid solution, with blockchain creating the spine for the traceability systems, whilst using the data generated by other existing systems to provide process data on conformance e.g. temperature, origin, pesticides etc.. Integrating existing data sources such as Global Gap Numbers (GPNs) is suggested, as these are well established and provide information down to farm level. Retailers and suppliers have a need to understand if the product they are buying meets their agreed standards from approved sources. A system which allows products to pass through approval gates and flag any non-conformances would be of significant benefit to these organisations. Blockchain has the potential to facilitate this requirement.



Speaker biography

David currently works as a Senior Project Manager for the Lincoln Institute for Agri-Food Technology, based within the University of Lincoln. He provides a link between academic research and the needs of industry.

Having worked for more than 20 years with the UK's largest food retailer at a senior level, David has a wealth of experience in delivering safe and fresh food to customers. He has extensive knowledge in Quality Assurance (QA), having run a 70 strong QA operation, as well as working on temperature management in the food supply chain. David has been involved in food supply from farm to fork and has built up a broad experience of supply chain processes. This includes developing better management systems for customer complaints and the creation of the early retailer Due Diligence systems.



David runs his own specialist consultancy business working with customers to improve quality. His clients include a world leading fast food retailer and a major supermarket chain.

David has managed a significant consumer and sensory research team, working on customer perception of food and non-food. This includes home use testing of products to help the business develop new and better products.

David has a good understanding of the whole food supply chain having started as an Agronomist with ADAS, including environmental and ethical challenges. His work has allowed him to travel extensively across Europe, Asia and Africa, visiting both food and farming operations.

David is also a Non Exec Director of the AgriFood Training Partnership (AFTP). The AFTP is the leading high-level training provider for the agrifood sector. As a partnership between six leading UK universities, the AFTP is the bridge between industry and academia – translating cutting edge academic research into applied industry expertise.

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How can measurement science assist in improving the molecular detection and management of antimicrobial resistance?

Jim Huggett, LGC / University of Surrey

Abstract

A number of barriers exist which hinder the prevention and management of antimicrobial resistance. Current diagnostic methods can struggle to provide physicians with practical and timely information. Bacterial culture frequently provides the diagnostic gold standard due to its high sensitivity that automatically includes a measure of viability and thus an idea of drug susceptibility. However, culture is not a rapid method and requires specialist laboratory infrastructure so does not lend itself to testing near the patient or sample. Alternative methods that can complement culture and potentially assist in detection and management of AMR exist such as those employing molecular detection of pathogen DNA. Such approaches have been demonstrated to be applicable for near patient rapid testing that negate the need for complex laboratory infrastructure. The fact that molecular tests can provide genetic information has also led to studies highlighting the potential for management of outbreaks or prediction of potential drug susceptibility. This has led to hundreds of research papers demonstrating the potential of molecular methods in microbiology, with considerable wider discussion highlighting the potential for molecular methods to revolutionise diagnosis, management of patients and reduction of antimicrobial resistance.

Yet despite these publications, the number of applied molecular tests for routine application remains low. There are many reasons why these potentially valuable methods are not translated to impact routine testing; factors such as cost, complexity and need for retraining are often cited. However a major, and seldom discussed, factor is that research is typically performed in a manner that does not consider methodological technical error and reproducibility. This presentation will discuss the issue of accuracy and reproducibility in diagnostic research and explore how measurement science (metrology) could result in a wider uptake and impact of molecular methods in supporting microbiology and reducing antimicrobial resistance in the lifesciences sector.

Speaker biography

Dr Huggett read genetics in Liverpool University followed by a PhD in Cardiff University where he studied the transcription in bone disease. Particularly interested in the application of advanced molecular methods to clinical scenarios he moved to UCL in 2002 to take up a senior research fellow position with Professor Alimuddin Zumla. Here he investigated diagnostic approaches to infectious diseases in developing world settings before moving to LGC in 2009, while retaining an honorary lectureship at UCL, which he still holds. At LGC, which is the UK's National Measurement Laboratory and Designated Institute for chemical and bio- measurement, he has led a large number of molecular diagnostics, genomics and nucleic acid





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research projects. This work focuses on high accuracy measurement as well as strengthening the traceability of measurements that underpin legislation, regulation and standardisation. In 2016 Dr Huggett joined the University of Surrey as a Senior Lecturer and holds a joint appointment with LGC.

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The Hand That Feeds: A musical about food crime

Kate Cooper

Abstract

A case study of how a major UK city could tackle food crime gets the last word in the Elliott Review. That city was Birmingham, the result of a project led by Kate at the request of Professor Elliott.

Yet few Birmingham citizens were likely to notice, let alone read the case study or indeed, any part of the Elliott Review.

Humans don't process this kind of information well unless they're dedicated to and well-versed in its particular genre.

We are brilliant, however, at other kinds of information processing. For example, it is a truth universally acknowledged that the element upon which our minds can process dense information is, as Terry Pratchett said, "narrativium"; we are *pan narrans*, the story-telling ape.

Given that the Elliott Review ain't a story let alone a story set to music, why not a musical about food crime?

Hence this 'Narrativium' Project: *The Hand That Feeds*. With the Prof as its Scientific Advisor, it was written and musically directed by composer Sara Colman and novelist Mez Packer. They, along with director Graeme Rose, producer Charlotte Gregory, two professional musicians, Al Gurr and Xhosa Cole, two actors, Anthony Miles and Sam Frankie Fox and a full-throated community choir gave the show its world premiere on a sunny Saturday afternoon in May 2016 outside St Martin's in the Birmingham Bullring. It was noticed by many thousands of Birmingham citizens. And beyond; our hashtag #StopFoodCrime trended #3 across the UK.

note: It was supported by Arts Council England, Awards for All, Birmingham City Council, Castle Vale Tenants & Residents Association, Coventry University, the John Feeny Trust, Lench's Trust and mac birmingham.

Speaker biography

Much of Kate's working life was in doing interesting projects with blue chip clients, and she was also subject leader for innovation as the Warwick Manufacturing Group for a while. With hindsight, she realises these experiences set her up neatly to cajole a posse of regional scientists and others to contribute to a Birmingham 2050 Scenarios Project (2011-14) which explored possible food futures for the city.



This project generated several spin-offs, including a request from Birmingham Public Health to set up a Food Council, which she did in March 2014. She now chairs its Board. It's independent, a critical friend to the socio-political set-up.



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It focuses its limited resources on important matters that don't get much attention or airtime. Perhaps remarkably, this currently means food and the economy, also food safety, integrity and assurance, plus the role Birmingham can play in meeting the challenges of global as well as the city's food security. We also commission the upcoming generation on 'narrativium' projects to help communicate the important issues we raise.

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Early warning systems to detect, predict and assess food fraud

Yamine Bouzembrak, RIKILT

Abstract

Food supply chains are complex and many factors influence directly or indirectly the occurrence of food fraud which makes it difficult to be detected and prevented. Within the work pack 8 of the EU FP 7 project FoodIntegrity tools and approaches have been developed to help direct and prioritise industry monitoring and regulatory enforcement activities against food fraud.

First, we developed a food fraud tool (MedISys-FF) that collects, processes and presents food fraud reports published in the media world-wide. MedISys-FF is updated every 10 minutes 24/7. Food fraud reports were collected with MedISys-FF for 16 months (September 2014 to December 2015) and bench marked against food fraud reports published in Rapid Alert for Food and feed (RASFF), Economically Motivated Adulteration Database (EMA) and HorizonScan. The results showed that MedISys-FF collects food fraud publications with high relevance > 75% and the top 4 most reported fraudulent commodities in the media in the period tested were i) meat, ii) seafood, iii) milk and iv) alcohol.

Second, a holistic approach based on Bayesian Network (BN) was developed that takes into account factors that may lead or are linked to a fraudulent actions. Food fraud incidents published in the databases i) RASFF in EU and ii) EMA in USA published in the period 2000-2015 were retrieved and linked to 15 other data sources expected to be related to food fraud such as: prices of the fraudulent product, trade volumes, the supply chain index of the country of origin, fraud complexity.

The constructed BN model had a predictive accuracy of 91.5% for the fraud type and it was shown that the BN models are very useful in scenario studies.

The developed food fraud tool and the food fraud BN model demonstrate how expert knowledge and data can be combined within a model to assist risk managers to better understand the food fraud issues and can facilitate the development of control measures and to detect food fraud in the food supply chain.

Speaker biography

Dr Yamine Bouzembrak is a scientist with expertise on food supply chain modelling, mathematical optimisation, machine learning and Big data. He is currently involved in the development of systems to detect emerging food safety hazards in various food supply chains (Salmon, Milk) for the European food safety authority (EFSA). Furthermore, he has experience in modelling early warning and prediction systems, such as in the EU FP7 project "FOODINTEGRITY", he is developing an early warning model for food fraud prediction using Bayesian networks method. He has been involved in many (inter)national projects on food chain analysis and food safety predictions.





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How far have we come since horse-gate; global tools available to fight food fraud

Selvarani Elahi, LGC

Abstract

In early 2013, horse DNA was found to be present in beef burgers sold in a UK supermarket chain. This was the start of a meat substitution incident that was found to be widespread across Europe and affected other countries worldwide. This horsemeat incident presented a significant challenge to the UK's food analysis infrastructure, with Public Analyst methods being challenged and a loss in consumer confidence in meat-based products as evidenced by a rapid drop in sales of these foods.

The incident prompted the UK Government to commission the Elliot Review into the Integrity and Assurance of Food Supply Networks which made a number of fundamental recommendations around 'eight pillars of food integrity'.

This talk will look back on progress made in the five years since the 2013 horsemeat incident and review the tools available to improve the integrity of food focusing on the Food Authenticity Network (www.foodauthenticity.uk/) which is a free toolkit that can help fight food fraud and build a more resilient food supply chain. The Network raises awareness of the tools available to check for mislabelling and food fraud, and ensures that stakeholders have access to a resilient network of laboratories providing fit for purpose testing to check for food authenticity so that ultimately, consumers can have greater confidence in the food they buy.

The Network will be three years old in July and in this time it has grown significantly and has:

- over 830 members from 41 countries signed up to its website
- over 1,160 followers of the Network's Twitter account ([@FAAuthenticity](https://twitter.com/FAAuthenticity)).
- Google page rank 1 for the search term 'food authenticity'.

As this is a global issue, our plan, over the next three years, is to create a truly global Food Authenticity Network by working with stakeholders from around the world so there is a unified fight against food fraud.

Speaker biography

Selvarani is the UK Deputy Government Chemist and Business Manager for Food Research at LGC. She has over 25 years' experience in the analysis of food and agriculture samples for authenticity, contaminants, additives, composition and nutrients, and has also managed teams delivering consumer product testing. Selvarani is an experienced project manager who has successfully delivered numerous complex projects for the UK government, the European Commission and the private sector. She is the project





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manager for the Food Authenticity Network (www.foodauthenticity/uk). Additionally, she works across a variety of policy areas, with different stakeholder groups, to improve standards in measurement science.

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Accelerating rice improvement in South Asia

Katherine Steele, Bangor University

Abstract

This collaborative project involving partners in India, Pakistan and Nepal, as well as LGC Genomics and Bangor University in the UK, is addressing the challenge to improve food security and livelihoods in South Asia. Rice is a crucial staple food for about half a billion people in Asia, but it suffers from diseases that reduce yields. Modern varieties are not always well adapted to specific environments and so breeders aim to incorporate both biotic and abiotic stress resistance as well as yield components into locally accepted varieties that may already possess value traits such as aroma. Molecular markers such as microsatellites in rice were developed in the 1990s for marker-assisted selection and these are used by some rice breeders in Asia to improve selection efficiency. Smaller breeding companies, including our partner Anamolbiu in Nepal, do not have the resources to use such markers in-house. They can benefit from a service-based approach such as KASP technology developed by LGC Genomics. KASP assays are significantly cheaper and safer than the older techniques when carried out in breeders' own labs and they have the additional benefit that they can be provided as a full service at a much lower price.

This project has successfully identified over a million new KASP markers in rice that can help rice breeders to select for a wide range of resistance genes to improve many different varieties. It has already developed new methods to identify suitable KASP assays that can replace existing markers in target breeding crosses and these new KASP are currently in use by Nepalese breeders. Now, a broader survey of suitable KASP alleles, across a set of 130 publically available rice genome sequences selected for geographic diversity, is discovering suitable KASP alleles. We plan to make them available in the form of a searchable database so that rice breeders can easily find the most suitable ones to replace their target microsatellites in existing programmes or identify the appropriate loci for a range of possible new crosses. KASP offer flexibility for scaling up or down at any stage in a breeding programme. The resource produced by this project will thus give rice breeders the ability to carry out genomic selection with many thousands of loci across their populations, enabling smaller breeders to benefit from the same genomic scale technologies that have, until now, only been available to the largest breeding companies.

Speaker biography

Katherine Steele is currently a Senior Lecturer in Sustainable Crop Production at Bangor University. She graduated in Biology from the University of Nottingham (1993) and gained an MSc in Applied Genetics at the University of Birmingham (1994) before returning to Nottingham for a PhD in Molecular Plant Pathology (1998). She moved to Bangor, North Wales as a post-doctoral researcher and undertook three DFID-funded projects on rice marker-assisted breeding in collaboration with partners in India. This led to a well-





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cited application of marker-assisted selection to improve a quantitative trait, with the successful release in 2009 of the drought-tolerant rice variety Birsa Vikas Dhan 111 for rainfed upland environments. Since then she has developed a research group applying molecular breeding technologies in a range of crops and other species. She supervised a PhD project in partnership with a British plant breeding company that resulted in the release of a blight resistant tomato cultivar, Crimson Crush in 2015. She is the Academic lead on a DFID-funded Innovate UK Agri-Tech Catalyst project in partnership with LGC Genomics.

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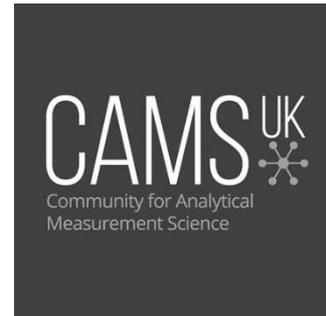
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Exhibitor information

CAMS - UK

CAMS-UK, the Community for Analytical Measurement Science, brings together industry and academia to develop analytical measurement science through research and training. It is a membership based network which is funded through a combination of membership fees, Research Council grants and Analytical Chemistry Trust Fund support.

cams-uk.co.uk



Food Authenticity Network

The Food Authenticity Network (www.foodauthenticity.uk and www.twitter.com/Fauthenticity) is a free open access toolkit that can help fight food fraud and build a more resilient food supply chain. It is a UK government-funded initiative that was born out of the 2013 horsemeat issue and brings together all those with an interest in food authenticity testing and food fraud mitigation.



The Network will be three years old on 14 July 2018 and it has grown substantially with over 830 members from 41 countries and over 1,170 followers of the Network's Twitter account.

So if you're not already a member, sign-up today to get all your food authenticity/food fraud mitigation information in one convenient place.

www.foodauthenticity.uk

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IFST: Institute of Food Science & Technology

Institute of Food Science & Technology (IFST) is the UK's leading professional body for those involved in all aspects of food science and technology. We are an internationally respected independent membership body, supporting food professionals through knowledge sharing and professional recognition.



The Institute's core aim is the advancement of food science and technology based on impartial science and knowledge sharing.

Our membership comprises individuals from a wide range of backgrounds, from students to experts, working across a wide range of disciplines within the sector.

www.ifst.org/

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We are a leading global producer and distributor of reference materials and proficiency testing schemes. Headquartered in Teddington, Middlesex, UK, LGC Standards has a network of dedicated sales offices extending across 20 countries in 5 continents and more than 30 years' experience in the distribution of reference materials. These high quality products and services are essential for accurate analytical measurement and quality control, ensuring sound decisions are made based on reliable data. We have an unparalleled breadth of ISO Guide 34 accredited reference material production in facilities at 4 sites across the UK, the US and Germany.

Our portfolio of over 100,000 products and over 40 proficiency testing schemes supports a wide range of sectors

www.lgcstandards.com

LGC as National Measurement Laboratory (NML)

LGC, as the UK National Measurement Laboratory (NML) and Designated Institute for chemical and bio-measurement delivers world-leading chemical and bio-measurement science (metrology) to improve quality of life, promote economic growth in the UK and ensure the sound basis for trade based on a harmonised international system of accurate and reliable measurements.



We underpin confidence in chemical and bio-measurement needs through our state-of-the-art measurement capabilities.

We address measurement challenges of the future to foster innovation.

We work in partnership with governments, intermediaries and private sector organisations to support measurement needs in healthcare, food, environmental sustainability, national security and energy.

www.lgcgroup.com/nmi

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Neogen Europe Ltd

Neogen Europe has been developing and supplying diagnostic kits and expert services to determine the quality and safety of food and agricultural products since 1998. With wide ranging expertise, Neogen offers on-site diagnostic kits and laboratory testing services to ensure food safety throughout the entire supply chain, from farm to fork.



Neogen offers solutions to detect mycotoxins, marine and other natural toxins, speciation and allergens as well as a wide range of products for traditional and rapid microbiology, pathogens and spoilage organisms. Neogen also offers a complete hygiene monitoring system.

In addition, our forensic toxicology and life science kits are being used by many leading organisations across the globe. Neogen also offers world beating genomic testing programmes for the improvement of livestock and crops.

www.neogen.com

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www.rsc.org



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SwissDeCode

"SwissDeCode was founded in 2016 in Lausanne, Switzerland, with the vision to build trust and secure the global supply chain.

SwissDeCode

Approved by the Swiss Federal laboratory, we provide rapid DNA detection solutions that meet the industry's fast evolving product safety needs. SwissDeCode's DNAFoil line is the world's first portable, completely self-administered, on-site DNA detection kit, allowing staff to confirm product integrity in 30 minutes without lab delays. Applications of DNAFoil include the detection of pork, salmonella, or vegetal adulterants and allergens, but the possibilities are endless, according to your specific needs. Learn more at www.swissdecode.com and keep doubt out of your supply chain!"

www.swissdecode.com

UKAS

The United Kingdom Accreditation Service (UKAS) is the national accreditation body for the United Kingdom. UKAS is recognised by government, to assess against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services.

UKAS plays a significant role in ensuring food safety. UKAS accredits food and water testing laboratories a wide range of chemical and microbiological scopes including packaging and environmental testing, sensory analysis, plant health, and veterinary microbiology. Certification bodies are accredited to certify a wide range of UK Food Quality Assurance schemes, including Red Tractor Assurance Schemes, BRC global standards, GlobalGAP Integrated Farm Assurance, the Label Rouge Product certification scheme, Organic certification and HACCP. Accreditation also covers the inspection of pre-shipment, plant health, meat and slaughterhouses, and hotels. UKAS demonstrates that these laboratories, inspection bodies and certification bodies are competent to carry out these services.

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