

Evidence Proforma  
Food Authenticity Centres of Expertise

**Laboratory of the Government Chemist (LGC)**

**What is your organisations particular area(s) of expertise in food authenticity testing?**

LGC (Laboratory of the Government Chemist), an international organisation providing excellence in investigative, forensic, diagnostic and measurement science, has in addition a heritage and culture in regulation, accreditation and standard setting. With experience in the food, agricultural biotechnology, pharmaceuticals, environment, security and sports sectors, LGC brings wide contextual salience to the concept of authenticity centres of excellence. In particular, LGC is the UK's designated National Measurement Institute (NMI) for chemical and bio-measurement<sup>1</sup> and hosts the Department for Business Innovation & Skills Government Chemist Programme<sup>2</sup> delivering adjudication on technical appeals from the UK food and feed official control system, supported by a capability maintenance programme. Hence LGC remains at the forefront of testing approaches, techniques, instrumentation and policy associated with food authenticity. LGC exhibits in depth practical knowledge in authenticity testing and detection of food fraud across, but not limited to, all of the disciplines mentioned in the "Analytical Toolbox" (referred to in Annex A of the "Interested Parties for a virtual authenticity network" letter distributed by E-mail from Defra on 10th September 2014):  
Genomics (inclusive of all forms of PCR); Mass spectrometry (organic and inorganic); Spectroscopy and other physical methods; Microscopy; Immunoassay including ELISA and Western Blotting; Proteomics; Metabolomics; Chemical analysis including stable isotope ratio and trace element analysis; and new and emerging techniques (e.g. multi and hyperspectral imaging; digital PCR; multi-parallel next generation sequencing; nanotechnology, etc.).

**Please highlight your organisations key skills and capabilities in this area and provide a justification as to why you feel it should be regarded as a Centre of Expertise? In particular you should focus on highlighting your key analytical skills and capabilities and any accreditation and how you ensure fitness for purpose testing. (250 words max)**

**Accreditation and certification:**

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<sup>1</sup> <http://www.lgcgroup.com/our-science/national-measurement-institute/#.Vcxi97JViko>

<sup>2</sup> <https://www.gov.uk/government/organisations/government-chemist>

- ISO 9001 for all business processes.
- ISO/IEC 17025:2005 to provide statements of opinions and interpretation in relation to GC role.
- ISO/IEC 17025:2005 for laboratory testing and calibration services, and ILAC G19 for forensic activities.
- Accreditation to ISO 17043 for the operation and management of proficiency testing schemes
- Certified Reference Materials production to ISO/IEC 17025:2005 and ISO Guide 34:2000
- Full-time statistics team to support design and analysis of experiments

**Key analytical areas:**

**Genomics (inclusive of all forms of PCR)**

Trace detection of food ingredients using DNA; extraction from complex matrices; GMO analysis (detection, identification and quantitation), meat/fish speciation and quantitation, country of origin labelling, breed identification, pasta authenticity, bioinformatics, etc. Delivery of numerous Defra/ FSA Knowledge Transfer events for OCLs. UK NRL and ISO 17025 flexible scope of accreditation for GMOs analysis.

**All forms of organic and inorganic mass spectrometry**

Extraction, separation, identification and quantitation of all chemical components; stable isotope ratio and trace analysis; GC and LC field flow fractionation; nanoparticle tracking; speciation.

**Spectroscopy and microscopy**

Examples include Nuclear Magnetic Resonance spectroscopy and optical/bright field/phase contrast/fluorescence microscopy.

**Proteomics**

Approaches including ELISA immunoassays, Western blotting, mass spectrometry, NMR, and bioinformatics.

**Metabolomics**

Approaches including mass spectrometry, capillary electrophoresis and NMR.

**New and emerging techniques**

Examples include multispectral imaging, digital PCR, Next Generation Sequencing, DNA point of test devices, etc.

**Briefly highlight your experience in method validation, data interpretation and evaluation and the reporting of analytical results? (150 words max)**

- LGC maintains a fully traceable track-record and demonstrable experience in ISO 17025 and 882/2004 including key requirements in method validation, uncertainty of measurement, traceability of measurement results, participation in external quality assessment schemes, and testing/calibration of methods.
- LGC runs regularly training courses on method validation, understanding ISO/IEC 17205, statistics for analytical scientists, evaluating measurement uncertainty, and using proficiency testing in the analytical laboratory.
- LGC runs regular Defra/FSA funded Knowledge Transfer events for Public Analysts, covering all topics of food authenticity testing including data analysis and interpretation from molecular biology approaches.
- Full-time statistics team who support the design and analysis of in-house method development and validation studies and interlaboratory studies for method validation, reference material characterisation and proficiency testing. We have designed and analysed nitrogen factor studies and other food composition survey work. We also maintain expertise and software in multivariate statistics and chemometrics for classification, clustering and multivariate calibration.

**Please provide brief details where possible, of your experience in dealing with complex technical authenticity challenges and evidence of your ability to provide solutions. (150 words max)**

LGC helped advise the UK Government (Defra and FSA) throughout the 2013 horse-meat issue and provided input towards the FSA four-point plan:

- Provided advice on methods for horse-meat detection for the original UK beef product survey
- Provided advice associated with analysis around the 1% (w/w) level for enforcement action;
- Represented UK expert at EU consultative meeting for 2<sup>nd</sup> round of horse-meat testing
- LGC is a member of Defra's AMWG and AMWG-TSG;
- LGC lead on projects including determination of LOD of methods used in the UK survey of beef products (Defra FA0134), development of a qPCR approach for quantitation of horse DNA (Defra FA0135), and establishing whether species cross contamination occurs in UK meat processing plants (FSA/Defra FA0137).

LGC also provided compelling evidence in authenticity prosecutions including, for example, recent cases of substitution of strawberry vs raspberry flavouring, and identification of contamination in cumin.

**Are you willing to provide advice on your areas of expertise and assist others through partnership working and sharing of information? Outline briefly your experience in collaborative working and how you could contribute to enhancing**

**the UKs standing in the field of authenticity testing. (150 words max)**

As the UK's designated National Measurement Institute for chemical and bio measurements, LGC plays a major role in disseminating best measurement practice that is important to the UK's industrial competitiveness and quality of life.

Additionally, the GC function provides advice for HM Government and the wider analytical community on the analytical chemistry implications concerning matters of policy, standards and regulations.

Last financial year LGC had over 240 collaborations with more than 120 organisations for measurement work. LGC has coordinated over 50 key international comparisons and pilot studies with other National Measurement Institutes. LGC was a workpackage leader on the EU Framework 6 EU-CoExtra project, as well as leading on the recent Defra FA0157 project with Campden BRI and Royal Holloway collaboration.

LGC is committed to providing open access to best measurement practice guidance in food authenticity testing, this being reinforced through publication of around 50 peer reviewed papers associated with the GC function since 2012.

**Please prove a brief statement of your capabilities to be included on the virtual food authenticity network portal ( 50 words max)**

Through LGC's National roles (designated National Measurement Institute, Government Chemist, and National Reference Laboratory) we bring 140 years' demonstrable national and international analytical capability and expertise to provide fit for purpose measurement solutions across the whole range of food authenticity and adulteration testing scenarios.