Annual report on Activities Performed by the UK NRL for GMOs in Feed and Food

FSA Contract Reference Number: FS616029
Provision of UK National Reference Laboratory Services for Genetically Modified Organisms in feed and food

Period covered: 1st April 2020 – 31st March 2021

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Glossary

BVL - German Federal Office of Consumer Protection and Food Safety

CRM - Certified Reference Material

DNA - Deoxyribonucleic acid

EFSA - European Food Safety Authority

ENGL - European Network of GMO Laboratories

EURL - EU Reference Laboratory for GMOs in food and feed

FSA - Food Standards Agency

FVO - European Commission Food and Veterinary Office

GE – Gene Editing

GeMMA - genetically modified materials analysis

GMM - genetically modified microorganisms

GMO - Genetically Modified Organism

JRC – Joint Research Centre (Italy, Ispra)

NRL - National Reference Laboratory (appointed under Regulation (EC) 2017/625)

OCL – Official Control Laboratory based in the UK

PA - Public Analyst

PCR - Polymerase Chain Reaction

SC – Steering Committee

WG – Working Group

Role of the National Reference Laboratory

Commission Regulation (EU) 2017/625 (which replaced Commission Regulation (EC) 882/2004) seeks to remove variation in the way European Community legislation is implemented in different Member States. This regulation relates to official controls designed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules. The aim is to create an integrated and more comprehensive, risk-based, 'farm to fork' approach to official controls. The objective is to improve the consistency and effectiveness of controls across the EU and, as a consequence, raise standards of food safety and consumer protection.

The Regulation sets out the general approach that must be taken and the principles that must be adopted by the authorities in EU Member States with responsibility for monitoring and enforcing feed and food law. These include the competent authorities organising and undertaking official controls. The various central Government agencies and local authorities that are responsible for organising and undertaking official controls constitute the competent authorities and include (for food and feed) the Food Standards Agency, the Health and Safety Executive and the Department of Environment, Food and Rural Affairs (Defra).

Regulation (EU) 2017/625 also specifies requirements for certain specialised laboratories to provide the science that underpins regulation:

- Official Control Laboratories (OCLs): Central competent authorities designate official laboratories for the purposes of chemical analysis or microbiological examination of feed or food samples taken by enforcement practitioners (in the UK they are Public Analysts (PAs) and Agricultural Analysts (AAs)).
- National Reference Laboratories (NRLs): In order to provide technical and scientific support for the official control framework, the European Commission has created a network of National Reference Laboratories (NRLs) co-coordinated by European Union Reference Laboratories (EURLs).
    - EURLs are appointed by the European Commission. They provide the Commission with scientific and technical assistance. They are responsible for providing NRLs with details of analytical or diagnostic methods, including reference methods, and co-coordinating their application (in particular by organising comparative testing). They conduct training courses for NRL staff and keep them up to date in their field of expertise. They also coordinate practical arrangements needed to apply new analytical/diagnostic methods.
    - NRLs: Each Member State must designate an NRL to correspond to each EURL. NRLs must collaborate with the EURLs in their particular area of expertise and disseminate nationally information provided by the EURLs. They are responsible for co-coordinating the activities of OCLs and should, where appropriate, organise comparative tests between them. In addition, they provide scientific and technical assistance to the central competent authorities.

The responsibilities and tasks of NRLs are specified in Article 101 of Regulation (EU) 2017/625. National reference laboratories shall, in their area of competence:

a) Collaborate with the European Union reference laboratories, and participate in training courses and in inter-laboratory comparative tests organised by these laboratories;
b) Coordinate the activities of official laboratories designated in accordance with Article 37(1) with a view of harmonising and improving the methods of laboratory analysis, test or diagnosis and their use;

c) Where appropriate, organise inter-laboratory comparative testing or proficiency tests between official laboratories, ensure an appropriate follow-up of such tests and inform the competent authorities of the results of such tests and follow-up;
d) Ensure the dissemination to the competent authorities and official laboratories of information that the European Union reference laboratory supplies;
e) Provide within the scope of their mission scientific and technical assistance to the competent authorities for the implementation of MANCPs referred to in Article 109 and of coordinated control programmes adopted in accordance with Article 112;
f) Where relevant, validate the reagents and lots of reagents, establish and maintain up-to-date lists of available reference substances and reagents and of manufacturers and suppliers of such substances and reagents;
g) Where necessary, conduct training courses for the staff of official laboratories designated under Article 37(1); and
h) Assist actively the Member State having designated them in the diagnosis of outbreaks of foodborne, zoonotic or animal diseases or of pests of plants and in case of non-compliance of consignments, by carrying out confirmatory diagnoses, characterisation and epizootic or taxonomic studies on pathogen isolates or pest specimens.

For the 2020-2021 period, the EURL did not publish an annual work programme.

NRL duties include advising the competent authority (FSA, Defra, Chemicals Regulation Directorate and Veterinary Medicines Directorate), and OCLs on sound measurement science and appropriate sampling methods.

LGC has maintained the position for the UK National Reference Laboratory for Genetically Modified Organisms (GMOs) in feed and food since the inception of the position in 2009, following open competitive tenders in 2009, 2013 and 2017. LGC's appointment by the Food Standards Agency on behalf of the European Commission is under Regulation (EU) 2017/625, which aims to remove variation in the monitoring and enforcement of feed and food law across the European Union. As the National Reference Laboratory for GMOs, LGC conducts the following activities, as specified in the contract with the FSA:

Core Function
Objective 01 – Secretariat Service (Core Function A)
Objective 02 – Advice and Representation within the UK/EU (Core Function B)
Objective 03 – Production of Standard Operating Procedures, Codes of Practice and Guidance Documents (Core Function C)
Objective 04 – Compliance Assessment via audits and ring trials (Core Function D)
Objective 05 – Co-ordination within the UK of EURL initiatives (Core Function E)
Objective 06 – Communication of results and data use (Core Function F)

Additional Tasks
Objective 07 – Additional services and Tasks (as detailed in Annex I of the invitation to tender)

Core Function

Production of the NRL annual report

This report details the activities carried out during the 12th year of the NRL operation (April 2020-March 2021) in relation to the duties of the NRL.

OBJECTIVE 01 - SECRETARIAT SERVICES - (CORE FUNCTION A)

Tasks:

- **Disseminating information/advice supplied by the EURL and its working groups to the FSA, OCLs and other relevant laboratories in a timely and effective manner.**
- **Creating and maintaining an efficient two-way channel of communication with OCLs and relevant laboratories and the EURL, including disseminating information on analytical methods and EU Regulations to OCLs and feedback of comments from OCLs to the EURL.**
- **Providing regular updates to the FSA on NRL activities, and up-to-date information on UK OCLs and other relevant laboratories to the FSA as requested.**
- **Creation and maintenance of a dedicated website for communication of the work of the NRL including provision of advice and support to OCLs, information on methods of analyses, SOPs, latest developments and other background information.**

Example activities in relation to these Tasks:

- Updated and published the NRL Annual Report 2019/2020 following feedback from the FSA
- Compiled and submitted the NRL Annual Report 2020/2021
- Received an E-mail from the EURL-GMFF notifying all NRLs of the cancellation of the second EURL Comparative Test in 2020 due to the COVID-19 pandemic. Circulated this to the FSA and all UK OCL and UK ENGL members for awareness
- Made the FSA aware of the scientific publication by Chhalliyil *et al.*, 2020[1], which claims to use a real-time PCR approach for the identification of the first gene edited (GE) commercial species of canola from the United States. The NRL discussed with the FSA the efficacy of the approach in providing unequivocal identification of a product of gene editing
- The NRL attended the 31st ENGL plenary meeting, organised by the JRC (Ispra) using virtual teleconferencing services in September 2020
- Wrote and distributed the LGC summary report to the 31st ENGL plenary meeting held in September 2020 to the FSA and all UK OCLs and UK ENGL members
- Distributed the official EURL-GMFF report to the 31st ENGL plenary meeting held in September 2020, to all UK OCLs and UK ENGL members. The official report was released in October 2020

[1] [1] P. Chhalliyil *et al.*, (2020) "A Real-Time Quantitative PCR Method Specific for Detection and Quantification of the First Commercialized Genome-Edited Plant" Foods (2020) 9, 1245

- Distributed a document summarising some of the views discussed at the 31st ENGL plenary meeting, regarding the published paper describing a detection method for a sulfonylurea (SU) herbicide-tolerant oilseed rape line (Foods 2020, 9, 1245; doi:10.3390/foods9091245) (https://gmo-crl.jrc.ec.europa.eu/ENGL/docs/ENGL%20Evaluation%20of%20the%20scientific%20publication%2002-10-2020.pdf)
- Provided the official EURL report to the 31st ENGL plenary meeting
- The NRL was in attendance at an NRL training workshop for measurement uncertainty evaluation for laboratories involved in testing for GMOs. This virtual workshop explained the principles behind the recently published 3rd edition of the EC "*Guidance document on Measurement Uncertainty for GMO Testing Laboratories*" which the NRL was also an author on. A summary report of the above workshop was provided to the FSA
- Provided a summary report to the FSA regarding two online workshops the NRL attended: the SPECENZYM workshop on detection of impurities in food enzyme preparations and a Sciensano workshop on detection of GMM in food enzymes
- Informed the FSA of a communication received from the EURL-GMFF on 18/12/2020, stating that the EURL-GMFF had been informed by the European Commission that official participation of UK labs to all activities of the EURL will cease as of 1st January 2021 (the end of the EU transition/implementation period)
- Notified the FSA of the Defra open consultation regarding the UK definition of products of gene editing and of GMOs (https://consult.defra.gov.uk/agri-food-chain-directorate/the-regulation-of-genetic-technologies/)
- A note summarising attendance at 16 distinct international GMO scientific engagements during the period 1st January to 31st March was sent to the FSA. These initiatives included scientific topics on digital PCR, Next Generation Sequencing, DNA extraction, detecting GMO animals, detecting products as a result of synthetic biology (gene editing), and detection of genetically modified microbes (GMM).

OBJECTIVE 02 - ADVICE AND REPRESENTATION WITHIN THE UK/EU - (CORE FUNCTION B)

Tasks:

- **Providing impartial expert advice as requested to the FSA, OCLs and other relevant laboratories on analytical methodology in the context of Official Controls.**
- **Representing the UK at relevant EURL meetings, and its working-groups, consulting the FSA on objectives and requirements before each meeting and providing the FSA with an internal report of the meeting within two weeks of each meeting.**
- **Participating in activities organised by the EURL and contributing to the scientific input at EURL meetings and in manner which supports UK policy based on best available scientific knowledge.**
- **Advising the FSA, OCLs and other relevant laboratories on best scientific practice in testing for Official Controls and undertaking activities in consultation with the FSA that facilitate and promote their application in the UK within the policy aims of the FSA.**
- **Keeping abreast of and advising the FSA, OCLs and other relevant laboratories of developments for the sampling, testing and detection of analytes.**
- **Identifying and informing the FSA, OCLs and other relevant laboratories of emerging analytical issues or developments at a national, European or international level and recommending action to address them.**

During the April 2020 to March 2021 period, the NRL received and responded to 54 individual enquiries as part of the NRL function. This included 38 enquiries from the FSA as the Competent Authority, 4 enquiries from UK OCLs and 12 enquiries from EURL/UK stakeholders (including other UK ENGL labs and Defra). As with the previous reporting period, the duration and complexity of a number of enquires was significantly increased, mainly due to the intricacy of the enquiries related to EU exit and the likely impact upon UK science.

Example activities in relation to these Tasks:

Received and responded to 38 individual enquiries from the FSA.
Example advice provided:

- Attended discussions and provided advice to the FSA in relation to authorisation of GMOs post EU exit implementation/transition phase
- Provided responses on a questionnaire from the FSA on the potential issues and impact to the UK regarding loss of access to EURL services for GMO analysis following the end of the EU transition period
- Organised a teleconference with the FSA to provide advice on the procedures involved and indicative cost estimates associated with renewal of GMO authorisations and evaluation of new GMO applications in the UK following the end of the EU transition period
- Provided further advice and details to the FSA regarding GM renewals and new GM authorisations in the UK post the EU implementation/transition period
- Responded to an E-mail from the Head of Science Strategy, Capability and Research (FSA) to all FSA funded NRLs regarding participation in any upcoming relevant EURL meetings, proficiency tests and provision of NRL summaries to relevant meetings that have been attended

- In collaboration with the FSA, provided a traceable response and information on how the UK had responded to any outstanding issues associated with the 2014 EC Food and Veterinary Office (FVO) audit. This included traceability on interaction, documents and how the UK had addressed the implementation of Regulation (EU) 619/2011
- Following the end of the EU transition/implementation period, and in view of the current NRL interim contract period of January to March 2021, provided the FSA with advice on what additional activities the NRL could engage with to further augment UK testing and control capabilities for GMOs. This included additional international meeting/workshop attendance, participation in proficiency test schemes
- Provided advice to the FSA in relation to the current state-of-play on EURL and ENGL initiatives for harmonised guidance on analytical methods for the detection of genetically modified microorganisms (GMM) in food and feed products. This followed a dispute between a Belgian laboratory and a UK based food business operator over the presence of GMM in a feed product
- Provided further in-depth consultation to the FSA on a position note regarding the above GMM discussions
- Discussed with the FSA the NRL view on the efficacy of the Chhalliyil *et al*., 2020 method for detection of gene edited (GE) canola, as well as providing a link to the official German Federal Office of Consumer Protection and Food Safety (BVL) response on their website
- Provided advice and guidance to the FSA policy division on which parameters were important to consider for UK centric GMO authorisation during FSA discussions with applicants
- Responded to a query from the FSA on whether the results from the recent EURL comparative test round (GMFF-20/01) had any implications in terms of official control laboratory capabilities and guidance. Queries arose following discussions over the appropriateness of how the assigned value was calculated and the use of different CRMs used for the calibrant and test material, both derived from GA21 maize. The NRL advised that any such impact should be minimal as 95% of participating laboratories still received an acceptable Z' score. Should the EURL release any further guidance as a result of the study, the NRL would also circulate this to all UK OCLs and UK ENGL members
- Provided advice to the FSA on likely timescales for the award of accreditation to an international laboratory for methods for detection of Genetically Modified Microorganisms (GMM)
- Discussed with the FSA some of the current issues surrounding the confidentiality clause in dossiers submitted to EFSA for authorisation of placing on the market of food enzymes. DNA sequence information and other pertinent method parameters are not currently released to EU enforcement bodies, precluding effective control and monitoring of GMM in food enzymes in the market place

Received and responded to 4 individual enquiries from Official Control Laboratories. Example advice provided:

- The EURL published the official meeting reports to the 38th and 39th ENGL Steering Committee meetings held in 2020. All UK OCL and ENGL members were made aware of this and a link was sent round to the meeting reports.

- Provided advice to an OCL on the applicability of new qPCR machines for general GMO analysis as well as suitability for Chinese GM rice testing with using melt-curve analysis.

Received and responded to 12 individual enquiries from additional sources (e.g. other UK ENGL labs, Defra, etc.)

Example advice provided:

- Contribution towards a Government Chemist advisory note which was placed on the Government Chemist website, emphasising the importance of applying the correct tests for Chinese GM rice as described by the EURL-GMFF and relevant EU legislation (https://www.gov.uk/government/publications/detection-of-genetically-modified-rice-at-the-uk-border-advice). This was as a result in the increased number of enquiries and applications submitted for GC referee cases analysis, where the correct analytical tests were not always applied
- The UK NRL provided comments and advice to the EURL-GMFF regarding DNA extraction from meat pate samples for a forth coming EURL Comparative Test. The NRL responded with advice on using a modified manual CTAB approach, extended incubation times, additional buffer and further sample treatment steps
- Responded to a UK ENGL member, providing UK NRL views on the efficacy of the EURL-GMFF Comparative Test conducted earlier that year (GMFF-20/01). This followed on from official written queries over the efficacy of the approach taken to analyse the results, submitted independently both by the UK NRL and UK ENGL laboratory
- Communicated with other previous ENGL UK labs that Defra had officially announced an open consultation regarding the UK definition of products of gene editing and GMOs (https://consult.defra.gov.uk/agri-food-chain-directorate/the-regulation-of-genetic-technologies/)
- Provided assistance and input to discussions on detection of GM ornamental fish “GloFish” between a Hungarian GMO NRL and a previous ENGL UK lab

OBJECTIVE 03 - PRODUCTION OF STANDARD OPERATING PROCEDURES, CODES OF PRACTICE AND GUIDANCE DOCUMENTS - (CORE FUNCTION C)

Task:

- **Contributing to the development of standardised operating procedures, relevant codes of practice and guidance documents for use by OCLs and other relevant laboratories, as requested by the FSA.**

Activities in relation to these Tasks:

- The UK NRL is an author on the 3rd edition of the EC publication "*Guidance document on Measurement Uncertainty for GMO Testing Laboratories*" https://ec.europa.eu/jrc/en/publication/guidance-document-measurement-uncertainty-gmo-testing-laboratories-3rd-edition
- The UK NRL is a task leader within the ENGL Working Group on DNA extraction. The Working Group aims to provide a guidance document on the selection of DNA extraction methods and their scope for specific food and feed matrices in the frame of official controls. LGC is responsible for leading on the task associated with webspace development, including drafting a searchable online table of experiences associated with DNA extraction from experts, as well as drafting guidance for the maintenance and curation of the table, a guide on how to use it and to identify any trends
- Attended the 39th ENGL Steering Committee meeting, which was held via teleconference, as an invited speaker. Provided an update on the progress associated with the ENGL Working Group on DNA extraction, which the UK NRL is a task leader on
- Member of the ENGL Working Group on "*Method Performance Requirements (2)*", mandated with providing guidance on method acceptance criteria and performance requirements associated with distinct and emerging technological areas for GMO analysis
- Participated in multiple teleconference meetings for the ENGL Working Group on "*Method Performance Requirements (2)*" as follows:
    - Digital PCR (dPCR)
    - Detection of GM animals
    - Detection of products arising from gene editing (GE)
- Collaboration with BVL (Federal Office for Consumer Protection and Food Safety Department - Germany) on available GMO bioinformatic resources as well as exploring how NGS resources can tap into this and provide ways to augment GMO screening. These communications will contribute towards continued development of best measurement practice in the areas of using NGS for GMO analysis.
- Provided direct input into the ENGL evaluation statement regarding the Chhalliyil *et al.*, 2020 paper. In isolation, the approach does not appear to provide unequivocal identification of a product arising from gene editing
- Attended an online webinar provided by the authors of the Chhalliyil *et al.*, 2020 paper, who explained the rationale and thinking behind the paper on detection of GE canola
- The NRL was invited to join an ENGL working group to help address the challenges of detecting genetically modified microorganisms (GMM) in food and feed materials. A range of foods contain enzymes produced by GMM as an aid during the fermentation process, but the presence of GMM in the final food product is non-compliant with UK and EU legislation. It is expected that the final output from the working group will be the publication of an EC guidance document for the detection of GMM. The NRL attended two online workshops on detection of impurities in food enzyme preparations (SPECENZYM) and a Sciensano workshop on detection of GMM in food enzymes.

- Following the end of the EU transition period on 1st January 2021, Dr. Malcolm Burns, the main NRL project lead, received a number of communications from the ENGL, acknowledging him as an international independent scientific expert in GMOs and inviting him to continue participation in selected ENGL initiatives and working groups. This has facilitated continued input into 16 different meetings from 1st January 2021 to 31st March 2021 on GMO analytical topics inclusive of digital PCR, Next Generation Sequencing, DNA extraction, detecting GMO animals, detecting products as a result of synthetic biology (gene editing), and detection of genetically modified microbes (GMM). Continued participation in ENGL working groups will enable UK input into the production of specific guidance documents.
- The NRL provided input and views to the Defra open consultation regarding the UK definition of products of gene editing and of GMOs (https://consult.defra.gov.uk/agri-food-chain-directorate/the-regulation-of-genetic-technologies/).

OBJECTIVE 04: COMPLIANCE ASSESSMENT VIA AUDITS AND RING TRIALS - (CORE FUNCTION D)

Tasks:

- **Ensuring consistency and quality of testing approaches applied by UK OCLs and other relevant laboratories, including advising on corrective action following adverse reports on OCLs from UKAS**
- **Co-ordinating training exercises to promote best laboratory practice in respect of analysis**
- **Participating in proficiency tests and method validation studies organised by the EURL, informing the FSA of the results and implementing any corrective measures required**

Example activities in relation to these Tasks:

- Participated in and submitted results for the 21st EURL Comparative Test (GMFF_20/01). Received Z-scores of 0.25 and -1.44 for the events of Maize MON 88017 (Sample T1) and Maize GA21 (Sample T2) respectively, which were both successfully detected and quantified in the samples. Results were communicated to the FSA
- In June 2020 the UK NRL procedures were subject to a full UKAS audit according to ISO 17025 flexible scope of accreditation for GMO analysis. The audit was passed successfully with no minor or major non-compliances.
- Participated in the GeMMA U89 proficiency test round for the detection and quantitation of Roundup Ready Soya (40-3-2). Received a Z-score of -0.5, submitting an estimated value of 0.63 (m/m) %GM compared to the assigned value of 0.76 (m/m) %GM.

OBJECTIVE 05 - CO-ORDINATION WITHIN THE UK OF EURL INITIATIVES - (CORE FUNCTION E)

Task:

- **Archiving of Standard materials (Control Materials) provided by the EURL**

Example activities in relation to these Tasks:

- The NRL continues to maintain a dedicated physical and electronic register for control materials held in a secure cold room
- No additional control materials were received from the EURL during the 2020 to 2021 financial year
- A full list of the registered ENGL plasmid control materials is provided in Annex 2

OBJECTIVE 06 - COMMUNICATION OF RESULTS AND DATA USE - (CORE FUNCTION F)

Tasks:

- **The Contractor shall ensure that the FSA receives regular updates of any developments related to the core functions of the NRL.**
- **The Contractor shall notify the FSA immediately by email of any deviations which may affect the cost, specifications and timing of the annual work programme.**
- **The Contractor shall notify the FSA immediately by email of any unusual occurrences resulting from any of the core functions of the NRL.**
- **The Contractor shall provide interim reports during the annual work programme.**
- **Provide an internal report of meetings with other organisations (such as Official Control Laboratories, the EU-RL and ENGL) within 10 working days.**
- **Any results or reports arising from the work of the NRL will not be communicated to any external parties without the written permission of the FSA.**
- **The use of the data for presentations and / or papers will not be permitted unless written permission has been sought and given by the FSA.**
- **The Contractor will maintain records for a period of 3 years from the end of the contract.**
- **In other work related to the core functions of the NRL the specified deadlines agreed between the FSA and the Contractor should be met.**
- **If necessary, at the end of the Contract all information and data gained from, and required for, NRL function over the course of the Contract will be handed over to the FSA. This will include assisting with transfer of archived reference materials.**
- **The Contractor will keep the NRL website up to date on developments, relevant information (especially to the OCLs) and the work of the NRL.**

Example activities in relation to these Tasks:

- The UK NRL is in constant contact with the FSA by E-mail and phone in relation to queries, updates, developments and deliverables
- The UK NRL is available for provision of advice on GMO analysis to all UK OCLs by E-mail, phone and face-to-face meetings where appropriate
- Summaries on all ENGL plenary meetings that the UK NRL attends are supplied to all UK OCLs and the NRL is fully contactable in order to provide further details on each meeting as is necessary
- Full meeting reports for the ENGL plenary and NRL annual meetings and summaries of the ENGL SC meetings are provided to the FSA
- The NRL routinely organises, hosts and chairs the annual National Reference Laboratory Liaison Meeting with the FSA

ADDITIONAL TASKS

OBJECTIVE 07:- ADDITIONAL SERVICES AND TASKS (as detailed in Annex I of the invitation to tender)

Tasks:

- **If required, assist the EURL in testing and validating the methods of detection for GMOs, when necessary.**
- **Participate and contribute to the scientific input at meetings, e.g. the European Network of GMO Laboratories (ENGL) meetings, and working groups in a manner which supports UK policy on GMOs based on best available scientific knowledge.**

Example activities in relation to these Tasks:

- Attended the 39th ENGL Steering Committee meeting, which was held via teleconference, as an invited speaker. Provided an update on the progress associated with the ENGL Working Group on DNA extraction, which the UK NRL is a task leader on;
- The NRL attended the 31st ENGL plenary meeting, organised by the JRC (Ispra) using virtual teleconferencing services in September 2020
- The NRL attended an FSA NRL interview meeting in January 2021 in order to seek views on the scope of NRL activities

Annex 1: Additional links to NRL annual reports and Newsletters

Copies of previous GMO NRL annual reports and Newsletters are freely available to download from the UK GMO-NRL webpages at: https://www.lgcgroup.com/what-we-do/national-laboratory-and-government-roles/national-laboratory-roles/national-reference-laboratories/ .

Annex 2: List of ENGL Control materials housed by the NRL

GM	Species	ENGL plasmid no.
Event 558 (GMM)	Bacillus Subtilis	pENGL-00-EM-01/18-01
281-24-236	Cotton	pENGL-00-14/05-01
3006-210-23	Cotton	pENGL-00-14/05-01-B
COT102	Cotton	pENGL-00-05/16-01
DAS 81910-7	Cotton	pENGL-00-06/16-01
GHB119	Cotton	pENGL-00-04/11-01
GHB614	Cotton	pENGL-00-14/07-01
GHB811	Cotton	pENGL-00-04/18-01
LL25	Cotton	pENGL-00-13/04-01
MON1445	Cotton	pENGL-00-15/04-01
MON15985	Cotton	pENGL-00-24/04-01
MON531	Cotton	pENGL-00-16/04-01
MON88701	Cotton	pENGL-00-01/13-01
MON88913	Cotton	pENGL-00-05/07-01
T304-40	Cotton	pENGL-00-05/11-01
GM Strain AG3139	E.coli	pENGL-00-04/08-01
GM Strain 19E	E.coli K-12	pENGL-00-06/08-01
3272	Maize	pENGL-00-03/06-01
5307	Maize	pENGL-00-07/11-01
59122	Maize	pENGL-00-03/05-01
Bt11	Maize	pENGL-00-10/07-01
Bt11	Maize	pENGL-00-12/05-01
BT176	Maize	pENGL-00-18/04-01
DAS-40278	Maize	pENGL-00-10/10-01
DP-4114	Maize	pENGL-00-02/14-01
GA21	Maize	pENGL-00-15/05-01
GA21	Maize	pENGL-00-29/04-01
LY038	Maize	pENGL-00-01/06-01
MIR162	Maize	pENGL-00-08/08-01
MIR604	Maize	pENGL-00-04/05-01
MON810	Maize	pENGL-00-25/04-01
MON863	Maize	pENGL-00-01/04-01
MON87403	Maize	pENGL-00-02/15-01
MON87411	Maize	pENGL-00-01/15-01
MON87419-8	Maize	pENGL-00-02/17-01
MON87427	Maize	pENGL-00-03/12-01 MON87427
MON88017	Maize	pENGL-00-16/05-01
MON89034	Maize	pENGL-00-06/06-01
MZHG0JG	Maize	pENGL-00-04/16-01
MZIR098	Maize	pENGL-00-04/17-01

GM	Species	ENGL plasmid no.
NK603	Maize	pENGL-00-27/04-01
T25	Maize	pENGL-00-08/04-01
T25	Maize	pENGL-00-08/04-01
TC1507	Maize	pENGL-00-02/04-01
VCO	Maize	pENGL-00-07/12-01
DP73496	Oilseed rape	pENGL-00-02/12-01
MON88302	Oilseed rape	pENGL-00-09/11-01
Ms1	Oilseed rape	pENGL-00-11/04-01
Ms11	Oilseed rape	pENGL-00-03/16-01
Ms8	Oilseed rape	pENGL-00-06/04-01
Oxy-235 genomic DNA	Oilseed rape	Oxy-235 oilseed rape
Rf1	Oilseed rape	pENGL-00-09/04-01
Rf2	Oilseed rape	pENGL-00-10/04-01
Rf3	Oilseed rape	pENGL-00-07/04-01
RT73	Oilseed rape	pENGL-00-26/04-01
T45	Oilseed rape	pENGL-00-14/04-01
Topas 19/2	Oilseed rape	pENGL-00-12/04-01
EH92-527-1	Potato	pENGL-00-09/05-01
Bt63	Rice	pENGL-00-EM02/06/01
40-3-2	Soybean	pENGL-00-08/05-01
A2704-12	Soybean	pENGL-00-13/05-01
A5547-127	Soybean	pENGL-00-01/08-01
CV127	Soybean	pENGL-00-01/09-01
DAS44406-6	Soybean	pENGL-00-01/12-01 DAS44406-6
DAS-68416-4	Soybean	pENGL-00-11/10-01
DAS81419-2	Soybean	pENGL-00-03/13-01 DAS81419-2
DP-305423-1	Soybean	pENGL-00-07/07-01
DP-356043-5	Soybean	pENGL-00-04/07-01
FG72	Soybean	pENGL-00-04/10-01
GMB151	Soybean	pENGL-00-01/18-01
MON87460	Soybean	pENGL-00-04/09-01
MON87701	Soybean	pENGL-00-05/09-01
MON87705	Soybean	pENGL-00-01/10-01
MON87708	Soybean	pENGL-00-02/11-01
MON87751	Soybean	pENGL-00-03/14-01
MON87769	Soybean	pENGL-00-07/09-01
MON89788	Soybean	pENGL-00-05/06-01
SYHT0H2	Soybean	pENGL-00-04/12-01
H7-1	Sugar beet	pENGL-00-28/04-01
MON71200	Wheat	pENGL-00-EM-02/18-01