GM foods and application of the precautionary principle in Europe
House of Commons Science & Technology Select Committee – April 2014
Science Council evidence

1. The Science Council

1.1. The Science Council was established in 2004. It is an umbrella organisation of learned societies and professional bodies, and currently has 41 member organisations drawn from across science and its applications: a list of current member bodies is attached. In addition to providing a mechanism for the sector to work collectively, the Science Council develops and leads collaborative projects working with member bodies and the wider scientific community: examples include the Future Morph website[1] designed to provide young people with information about careers opportunities, and LMI analysis of the UK Science Workforce[2].

1.2. The Science Council works to advance the professional practice of science and since 2004 has awarded the professional qualification of Chartered Scientist (CSci) with 15,000 individuals registered. A current key project is the development of new professional registers (Registered Scientist and Registered Science Technician), which aims to raise the profile, aspirations and retention of scientists at graduate and technician level.

1.3. Collectively our member bodies represent almost 500,000 individual members, including scientists, teachers and senior executives in industry, academia and the public sector.

1.4. In preparing this submission we have consulted member bodies to identify areas of common interest and the issues they raised form the content of this submission. In addition, a number of member bodies will be responding individually to the inquiry.

2. Science and its application will be central to addressing global issues such as global food security. UK science can play a leading role in developing the technologies and innovative solutions in this scientific field.

2.1. Science and its applications will be fundamental to finding solutions to the most pressing problems facing global society today, such as global resource scarcity for a rapidly growing world population. Critical to this success will be basic science research which has the capacity to deliver over time wide-ranging, often unforeseen, advances of great importance to humanity. Alongside support for basic research there is a need for a greater emphasis on translational mechanisms to turn basic science research into products and processes that are beneficial for society. The UK's ability to commercialise its world-class science base is a long-running concern and was highlighted in the Committee's 2013 report, '*Bridging the valley of death: improving the commercialisation of research*'[3].

2.2. With the global population predicted to increase to nearly 10 billion by 2050[4] there will need to be commensurate investment in innovative ways of producing sufficient nutritious food to meet increased demand. Combined with increasingly frequent extreme weather events across the globe and the effects of climate change there will be an increasing global demand for more disease and weather-resistant crops from which greater yields can be harvested. UK science has a vital role to play in finding solutions to major problems the world faces. It would be wise therefore for UK science to invest in potential solutions that will avoid predicted global food shortages rather than having to confront the problem in the future.

[1] www.futuremorph.org
[2] *The current and future UK science workforce* TBR, Sept. 2011 http://www.sciencecouncil.org/content/science-workforce
[3] http://www.publications.parliament.uk/pa/cm201213/cmselect/cmsctech/348/348.pdf
[4] https://www.un.org/en/development/desa/news/population/un-report-world-population-projected-to-reach-9-6-billion-by-2050.html

2.3. The combination of these global events also highlights the fact that UK food security is subject to unpredictable events in other parts of the world. Currently the UK produces only 62% of its own food[5]. To mitigate against these global impacts the UK government must look to invest in new technologies and innovation that enables the UK to become more self-sufficient.

2.4. GM technology is developing rapidly, and is already being used to improve the application and use of a whole range of products and processes. 'Second generation' GM crops and those currently in the research pipeline have the potential to deliver yields that provide much needed nutritional benefits; crops with more effective utilisation of fertiliser; crops that will grow under drought and other adverse climate conditions; and crops that will grow on previously inhospitable land.[6]

2.5. In other areas of science it is becoming commonplace for pharmaceutical companies to use the latest scientific techniques to create more effective and longer-lasting protection against infections and diseases such as the human papilloma virus, hepatitis B and malaria. The Bill and Melinda Gates Foundation's investment in GM technology to develop an anti-malarial vaccine is a good example of where GM technology is being used for the benefit of society.[7]

How have EU and UK regulations on GM foods affected the UK's international competitiveness?

3. The UK will fail to benefit from the significant levels of international investment available from GM food technology if the EU cannot facilitate a market to develop in Europe. The UK government must continue to make the UK an attractive place to invest. Promoting the existing strength of the UK's research base, world-class facilities, and research and science skills will be key to this.

3.1. The UK is a global leader in many areas of scientific research. In 2010 UK researchers published 123,600 articles, accounting for 6.4% share of world publications, and its share of the top 1% of most-highly-cited papers was second only to the US, at 13.8%[8]. Additionally, the Finch Report found that UK researchers are more likely than those in almost any other competitor nation to collaborate with colleagues overseas, finding that 46% of the articles published by UK authors in 2010 included a non-UK author.[9] This highlights the fact that scientific collaboration is a global endeavour of which UK scientists are a vital component. The UK Plant Science Federation[10] has pointed out that the UK is internationally recognised for its excellence in plant science; it is second only to the USA in terms of publication impact.

3.2. It is the Science Council's view that the capacity of the European Union to foster cooperation and collaboration between Member States has led to a wide range of positive initiative across many areas of science and research, and the UK has benefited from a number of collaborative partnerships as a result of EU membership. But while EU Directives require member states to achieve a particular result without dictating the means to achieve that result, they do little to recognise individual member states' scientific and political cultures, and public attitudes to the adoption and application of new science and technologies.

3.3. The real or perceived legal and regulatory constraints with regard to GM crops passed down from the EU to member states have put the UK and the EU in general at a competitive disadvantage. International companies will increasingly consider investment in UK and EU markets high-risk due to a lack of commercial opportunities. For the UK economy to grow it must provide attractive investment opportunities to

[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/208436/auk-2012-25jun13.pdf
[6] Institute of Food Science & Technology
[7] http://www.gatesfoundation.org/Media-Center/Press-Releases/2008/09/Bill-Gates-Announces-168-Million-to-Develop-NextGeneration-Malaria-Vaccine
[8] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/142814/bis-13-689-open-access-economic-analysis-of-alternative-options-for-the-uk-science-and-research-system.pdf
[9] http://www.researchinfonet.org/wp-content/uploads/2012/06/Finch-Group-report-FINAL-VERSION.pdf
[10] https://s3-eu-west-1.amazonaws.com/sbwebsite/pdf/UK_Plant_Science-Current_status_and_future_challenges.pdf

domestic and overseas businesses. Without sufficient commercial attraction the UK and European states will be deprived of potential jobs and growth opportunities and deprive consumers of greater product choice. The UK and EU will also lose out on increased investment in its skills and knowledge pipeline, and infrastructure. This will mean the UK ceases to be competitive in a growing global market and may miss the opportunity for significant growth in this area of research.

What are the particular barriers to the conduct of research on GM foods in the UK?

4. In recent years science has made significant advances in GM technology, testing and monitoring which have outpaced national and international legislation. GM technology will continue to be an important area of science in the future. The UK government should push for good, proportionate regulation at the EU level that provides science with the flexibility to continue to search for new knowledge.

4.1. Regulation across Europe can act as an enabler as well as a barrier to innovation. Getting the right balance between too little and too much regulation is vital to enable innovation to flourish. Excessive caution however regularly works as a brake on the pace of innovation. This has been particularly true for genetically modified organisms where the application of the precautionary principle has discouraged research, and the examination and assessment of new technologies.

4.2. Compared to national legislation requirements the EU regulatory process can be cumbersome and lengthy. In the food sector for example it can take at least 3 years for a new food ingredient or additive to be approved and in practise it is often considerably longer. According to the European Patent Office the European grant patent procedure it takes between 3 to 5 years from the date an application is filed to be completed.[11] In other countries like the USA the time from patent application to completion can be as little as 2 years.

4.3. The lengthy approval process impedes companies from investing in research and development (R&D) of new, innovative technologies because they know that the time delay before approval is granted makes any financial investment economically unviable. This in turn deters companies from putting new products on the market in Europe. The burden will be felt disproportionately by small and medium-sized businesses because they are unlikely to have the resources to fund short-term loss-making R&D to the same extent that larger companies can and regularly do.

4.4. A particular concern articulated by our members has been the lack of communication between the EU and the food industry. The European Food Safety Authority (EFSA) has the potential to help industry put new improved ingredients on the market with benefits for all stakeholders. However it is perceived more as a barrier, introducing disincentives to industry and thereby preventing technological advances. Confidentiality and robust intellectual property rights are also important components of a strong innovation system. The elimination of confidentiality and intellectual property rights for potential new products to be evaluated deters innovation as the information has to be made available to the competition which has borne none of the development costs.

4.5. There are myriad examples of where countries with less rigorous intellectual property and regulatory safeguards have meant the proliferation of products onto the market that are potentially unsafe for human consumption.[12] In China for example there is evidence that pharmaceutical manufacturers have been granted marketing approvals for generic drugs by the State Food and Drug Administration prior to the approval of the original patent.

4.6. A robust and appropriate regulatory framework does however provide space for businesses to innovate and reduces confusion about liability and business risk. Therefore the Science Council would advise a re-examination of the regulatory and statutory obligations on GM research and development to ensure that the regulatory

[11] http://www.epo.org/service-support/faq/own-file.html#faq-274
[12] http://www.ustr.gov/sites/default/files/05012013%202013%20Special%20301%20Report.pdf

framework is still appropriate. This would serve to reduce unnecessary burdens on UK business and ensure that there is a competitive space for them to operate in.

4.7. As well as a regulatory and scientific issue, GM food is also a public issue. Although the Public Attitudes to Science 2014[13] found that more people (36%) who had heard of GM crops felt that their benefits outweighed the risks than vice versa (28%), there is still a significant proportion of the public uncomfortable and resistant to the proliferation of GM foods in the food chain. The Government's recent announcements on small-scale GM plant trials[14] as well as other statements on GM foods[15] is a strong indicator that it considers research into GM foods to be important. However if it is the Government's intention to welcome GM foods as part of the UK's food portfolio in the long-term, it will have to take public opinion into consideration. Public support for GM foods and other products will be essential.

4.8. Government, scientists and industry must be open and transparent with the public about the benefits and risks of GM foods, and continue to engage with the public about their concerns as well as communicate science's commitment to eliminate risks so far as is possible. Only through increased dialogue about the purpose and nature of GM research and science, transparency and openness through good quality information will the public be confident enough to accept the wider use of GM technology in food and commercial availability of GM products.

4.9. The 2012 Don't Destroy Research campaign led by Rothamsted Research is an example of good engagement and communication of science. In light of the threat of destruction of its publicly-funded GM wheat crop trial, Rothamsted Research's open dialogue with the public about the trial led to over 6,000 people signing a petition in support. Dialogue with the public was less successful in the Royal College of Obstetricians and Gynaecologists' advice to pregnant mothers about the potential risks from chemical exposures during pregnancy. The campaign drew criticism for being alarmist, confusing and not based on sound science.

Is the EU's application of the precautionary principle in relation to GM foods appropriate? Does the EU recognise and handle properly the concepts of hazard and risk?

5. No two problems hold the same degree of risk. As each problem holds its own unique set of risks and benefits, and scientific and political challenges, it is incoherent to apply a one-size fits all precautionary principle to all challenges. The UK government should push for the application of the precautionary principle at the EU level to be made on a case-by-case basis.

5.1. Science[16] aims to provide a better understanding of the natural and social world, and be a tool to improve and advance society, also developing the knowledge upon which risk can be best mitigated. However, science and scientists cannot provide society with certainties upon which risk can be entirely eliminated, and it can be the case that the misapplication of technologies can have far-reaching consequences even when the technology itself is deemed safe. Decision and actions taken for the benefit and improvement of society cannot therefore be based on total certainty of outcome. They can only be based on the use and application of the best knowledge available at the time in the context of the importance or need for the proposed application. For this reason the Science Council recommends that the focus of the precautionary principle is shifted from the science of GM foods to their application.

5.2. GM crops have already shown that there can be significant improvements in the quantity and quality of food produced while also reducing economic cost, energy, pesticide, fuel usage, soil erosion and carbon emissions with no scientifically-

[13] http://www.ipsos-mori.com/Assets/Docs/Polls/pas-2014-main-report.pdf
[14] https://www.gov.uk/government/news/gm-camelina-trial-to-go-ahead-at-rothamsted
[15] https://www.gov.uk/government/speeches/opportunity-in-agriculture
[16] The Science Council has defined science as "*the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence*".

documented evidence of harm to human health.[17] There is an increasingly strong international body of scientific research which says that GM crops are safe for human and animal consumption. The independent European Academies Science Advisory Council has stated that "[*T*]*here is no validated evidence that GM crops have greater adverse impact on health and the environment than any other technology used in plant breeding*".[18] The European Commission's Chief Scientific Advisor, Anne Glover has also said that there is no substantiated case of any adverse impact on human health, animal health or environmental health from the consumption of genetically modified foods, and that "*the precautionary principle is no longer relevant with GMO foods or crops*".[19] Finally a report to the UK Council for Science and Technology concluded that "[A]s *there is no evidence for intrinsic environmental or toxicity risks associated with GM crops, it is not appropriate to have a regulatory framework that is based on the premise that GM crops are more hazardous than crop varieties produced by conventional plant breeding*."[20]

5.3. The Science Council considers that government needs to display confidence in the scientific consensus around the safety of GM foods and develop a GM food policy based on the best available evidence. This should also take account of the environmental and reputational risks of the misapplication of GM technologies and should be aimed at users as well as science and research organisations.

5.4. Despite the robust evidence to suggest that GM crops are safe for human and animal consumption, it seems that the application of the precautionary principle has become prescriptive and routine. Precaution is often built into legislation because the implications and consequences of the policy are unknown at the time. The precautionary principle is therefore usefully applied when there remains uncertainty or no scientific consensus about the level of risks around a product or process. But when there is strong scientific consensus that the same product or process is considered to be low-risk then the precautionary principle is logically obsolete. Once scientific evidence is available it should be up to individual member state to further determine the levels of risk of any given product or process.

5.5. One major weakness of the EU's application of the precautionary principle is that it fails to consider the consequences of inaction. Risk assessment should properly take account of the consequences of the failure to act or address the issues faced. The precautionary principle must do likewise otherwise it becomes a rationale for inaction rather than a useful tool for addressing the global issues we face. The precautionary principle must go back to being a useful tool to protect society and the environment where the science is uncertain rather than a shield to hide behind when making difficult and challenging policy decisions.

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April 2014

[17] http://www.ifst.org/gm-and-food
[18] http://www.easac.eu/fileadmin/Reports/Planting_the_Future/EASAC_Planting_the_Future_FULL_REPORT.pdf
[19] http://www.euractiv.com/innovation-enterprise/chief-scientifc-adviser-policy-p-interview-514074
[20] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292174/cst-14-634a-gm-science-update.pdf

Member Bodies of the Science Council

February 2014

Association for Clinical Biochemistry and Laboratory Medicine
Association of Neurophysiological Scientists
Association for Science Education
British Academy of Audiology
British Association of Sport and Exercise Science
British Computer Society
British Psychological Society
British Society of Soil Scientists
Chartered Institution of Water and Environmental Management
College of Podiatry
Energy Institute
Geological Society of London
Institute of Biomedical Science
Institute of Brewing and Distilling
Institute of Corrosion
Institute of Food Science and Technology
Institute of Marine Engineering, Science and Technology
Institute of Materials, Minerals and Mining
Institute of Mathematics and its Applications
Institute of Measurement and Control
Institute of Physics and Engineering in Medicine
Institute of Physics
Institute of Science and Technology
Institute of Water
Institution of Chemical Engineers
Institution of Environmental Sciences
London Mathematical Society
Mineralogical Society
Nuclear Institute
Oil and Colour Chemists' Association
Operational Research Society
Physiological Society
Royal Astronomical Society
Royal Meteorological Society
Royal Society of Chemistry
Royal Statistical Society
Society for Cardiological Science and Technology
Society for General Microbiology
Society of Biology
Society of Dyers & Colourists
The Organisation for Professionals in Regulatory Affairs