

Future of Farming Review

The Royal Society of Chemistry is the largest organisation in Europe for advancing the chemical sciences. Supported by a network of 47,000 members worldwide and an internationally acclaimed publishing business, its activities span education and training, conferences and science policy, and the promotion of the chemical sciences to the public. This document represents the views of the RSC. The RSC has a duty under its Royal Charter "to serve the public interest" by acting in an independent advisory capacity, and it is in this spirit that this submission is made.

This response from the RSC will concentrate on the specific area of *wider agriculture*, and more particularly on the role that chemical sciences research plays in agriculture. Where it is relevant to chemical sciences, the response also touches upon some of the other areas listed for consideration, specifically *image of the sector* and *education and skills*. Farmers face a huge challenge in feeding a growing population sustainably. Scientific research has a key role in providing tools that can help to meet the challenge of sustainable intensification. Many of the points below were included as part of the RSC's response to the Department of Business, Innovation and Skills (BIS) consultation on *Shaping a UK Strategy for Agri-Tech*.¹

Q. What are the key challenges that the farming industry faces in attracting and keeping the right number and calibre of people to work, manage and own agri-businesses in the future?

Wider agriculture – beyond direct farming e.g. engineering, research, agronomy - what are the challenges that these sectors face and what actions can be taken?

The UK has strength in many of the specific key disciplines that contribute to the development of new tools to improve agricultural productivity. Biology, chemistry, physics, geosciences and engineering make contributions to fields as diverse as soil science, plant breeding and veterinary health. Biosciences research in the UK [ranks amongst the best in the world](#). Organic chemistry, which is a key aspect of research in the invention of new crop protection chemicals, was recently identified in a [BIS Economics Paper](#) as the area where the UK has the greatest revealed technological advantage. These areas of scientific endeavour cover some of the same skill sets as those needed for healthcare research (e.g. drug discovery). The challenge then, is to ensure that such skills are in sufficient supply to support the agricultural sciences, as well as the healthcare and other diverse sectors which benefit from these skills. In addition, ensuring that farming in the future is sustainable will require the development and application of environmental science. Maintaining a scientific understanding of the effects of new technologies in land, air and water is essential in managing impacts on the environment. Analytical and environmental chemistry have key roles in achieving this.

It is essential that there are suitable opportunities, with respect to training, funding and networks, to attract the best researchers to apply their skills to agricultural challenges. Cross-research council networks such as [AGRI-net](#) are a positive approach. AGRI-net aims to develop new tools and technologies for end-users in agri-sciences, using chemical biology techniques in partnership with other disciplines. In addition to this, supporting specialist training courses at postgraduate level in more niche areas such as soil science will help to stave off a potential skills gap. A recent report published by the Royal Society of Chemistry, *Securing Soils for Sustainable Agriculture*², discussed this type of approach in the area of soil science. The report notes that "Given the age profile of many of the active researchers in this area, we could soon lose our global leadership position in soil science".

¹ - [RSC response to the Department for Business, Innovation and Skills consultation on Shaping a UK Strategy for Agri-Tech, November 2012](#)

² - [Securing Soils for Sustainable Agriculture, A Science-Led Strategy, the Royal Society of Chemistry, the NERC Biological Weathering Consortium and the Environmental Sciences Knowledge Transfer Network, October 2012](#)

Improving the image of farming as a profession is essential, but advertising that careers in farming and agriculture go beyond working on a farm is also important. Agriculture and farming presents a rich and varied career option both on-farm and away from the field. The [Careers in Agriculture Research](#) survey found that only 4 % of 12-19 year-olds would consider a career in agriculture. Promoting and recognising the value of the wide range of opportunities that agriculture can offer can help to change this perception. However, this must be supported by appropriate specialist training and research funding that recognises the wealth of areas within agriculture that fundamental science can contribute to.

The report, *Securing Soils for Sustainable Agriculture*, goes on to say that **“An improvement in the recognition and reputation of soils security and global agricultural sustainability as a career specialism for highly-talented science students currently in further and higher education is also needed”**. This is an area where learned societies, including the RSC have an important role to play by raising the profile of agricultural research and communicating the opportunities that a career in such research can provide. The RSC looks to do this *inter alia*, through tools such as [educational resources](#). However, government recognition of the importance of this area is essential to help raise the profile of agricultural research in the public domain.

Another challenge for researchers in this area is the ‘valley of death’ between research outputs and technological applications (although this is not exclusive to agriculture). The [development of an agritech product can take ten years or more](#); as a consequence, at the early stages, it can be extremely challenging to encourage investment to support the translation of research into a new technology. Government measures to de-risk early stage investment could help to encourage investment. For example, research and development tax credits, public procurement policies and improvement of the tax system to incentivise private investors offering seed funding.³

A specific challenge for the UK agricultural sciences sector is the low numbers of small and medium-sized enterprises (SMEs) compared with, for example, the pharmaceuticals sector. A comparison of numbers of businesses with 249 employees or fewer using the [Standard Industrial Classification \(SIC\) system](#), indicates that in the UK there are more than four times as many SMEs in the pharmaceuticals sector as in agricultural sciences. As a result, the opportunities for researchers to work with industry in the commercialisation of new technology are more limited. Initiatives to support management and business planning skills for chief executive and chief financial officers could help to encourage the creation of new small businesses in this and other areas, ensuring that those who are eager to develop new technologies receive appropriate support to succeed.⁴

³ [RSC response to the House of Commons Science and Technology Committee inquiry into *Bridging the “valley of death”*: improving the commercialisation of research](#)

⁴ [Chemistry: We Mean Business, The Chemical Sciences in the UK Growth Agenda, Royal Society of Chemistry, March 2013](#)