

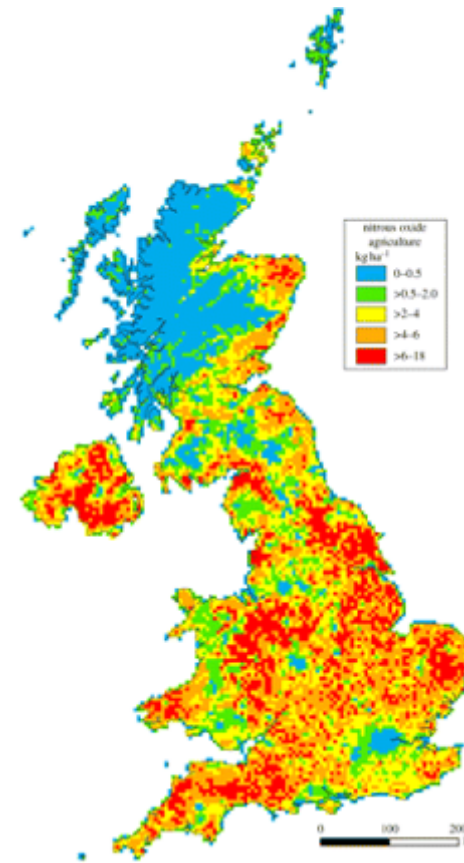


Oxford Farming Conference

Sir Mark Walport
CEO UKRI
03 January 2019

Agri-food sector at a glance

- Supports 3.9m jobs, utilises 71% of land and has GVA of £112bn¹
- But gross productivity only slightly changed since the early 1980s & varies significantly across the UK
- Policy changes as UK leaves EU
- Innovation is critical to ensure a competitive and prosperous sector...



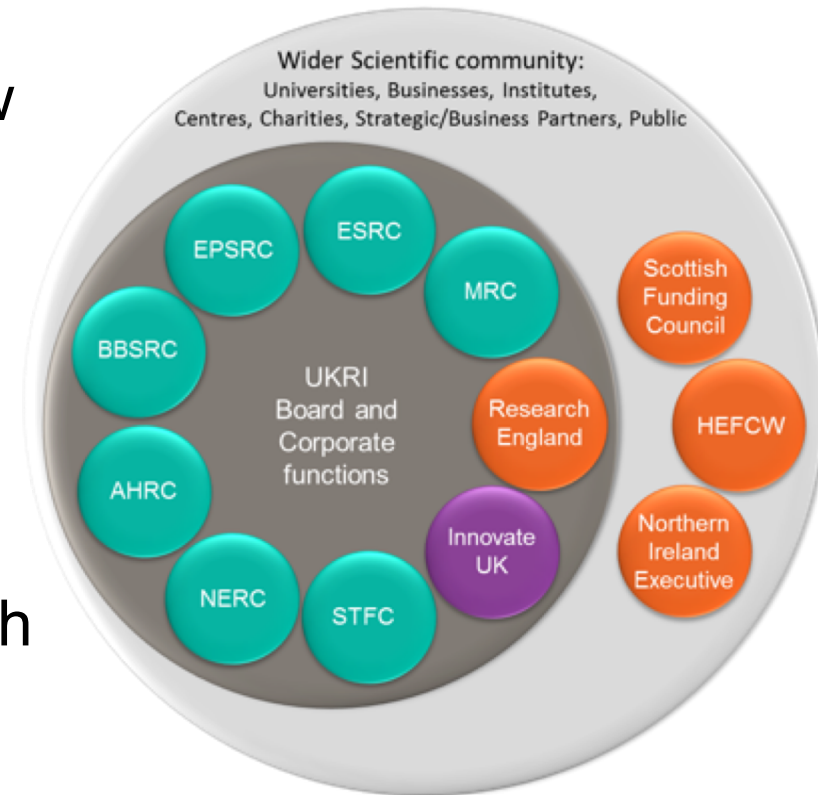
N₂O variation in agriculture-
Source:
The Royal Society , Jan 2018

Challenge: realise sector potential while minimizing our environmental footprint

What is UK Research & Innovation?

UK Research and Innovation, launched in April 2018, is the new funding organisation for research and innovation in the UK.

It brings together the seven UK research councils, Innovate UK and a new organisation, Research England, working closely with its partner organisations in the devolved administrations.



The numbers

- **More than £6.5 billion** in combined budget per year
- **3,900** research and business grants issued every year
- **2,400** business-led collaborative projects and over 200 Knowledge Transfer Partnerships
- **151** universities receiving research funding
- **38** institutes, laboratories, units, campuses and innovation catapults
- – inc. Rothamsted, John Innes Centre (Norwich), Rosalind Franklin Institute (Didcot) and Centres for Agricultural Innovation

Our objectives

Delivering UKRI's vision and target of 2.4%



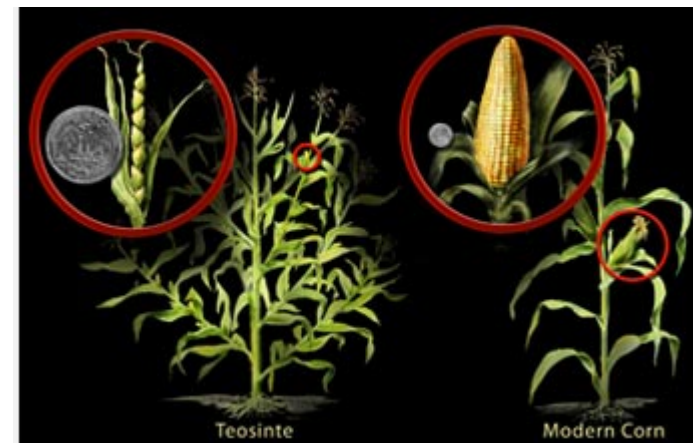
UKRI in the farming/agri-sector

- Science – research and its application
- Platforms for specialist skills development
- National and international collaboration
- Multidisciplinarity
- Scale up ideas and help them to market



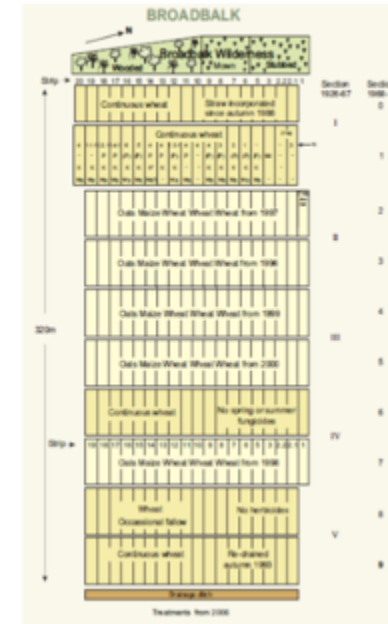
Farming today

- Modern farming - product of centuries of research & innovation
- Crops today very different to crops of the past: e.g. modern maize descended from wild teosinte (12 kernels; modern maize 500+ kernels)
- Global crop harvests estimated to be double what they would be without invention of nitrogen fertiliser in 1908



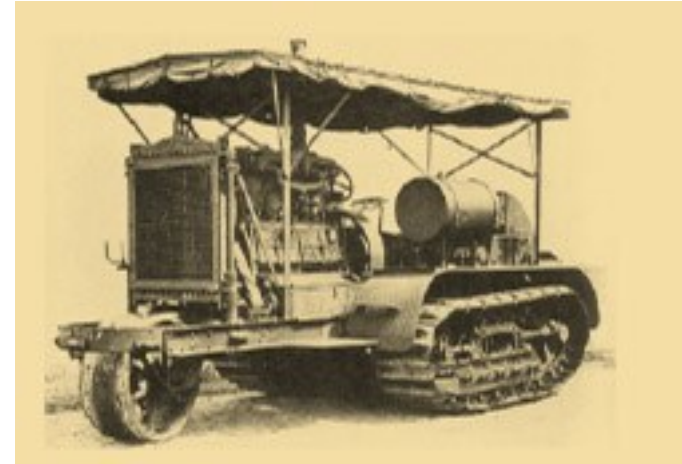
Broadbalk Experiment

- Started in 1843 – one of the oldest continuous agronomic experiments
- Aim: test the effect of different organic manures and inorganic fertilizers on the yield of winter wheat
- Included discovery and development of systemic herbicides and insecticides
- Led to introduction of modern, short-strawed cultivars: increase in grain yields and decrease in straw yields
- Contributions to virology, nematology, soil science and pesticide resistance



Historical changes

- History of humanity closely related to history of farming
- Steam and internal combustion engines – petrol then diesel – followed Industrial Revolution
- Development of combines – grain stalks cut, threshed and separated while moving continuously through fields
- Breeding: Since 1982, plant breeding 90% of contribution to yield gain in cereal crops
- Driven by understanding of the genetics underlying crop traits



Technology acceleration

- Precision agriculture and remote monitoring
- E.g. Earlham Institute (Norwich) CropQuant: phenotyping platforms using AI to track crop performance
- Provides affordable solution to automated crop phenomics, preventing crop losses and contributing to food security
- Improves understanding of how crops perform in real farming systems



CropQuant. Source:
<https://earlham.ac.uk>

Breeding technologies

- From traditional genetics through to gene editing
- E.g. Researchers at University of Edinburgh's Roslin Institute using gene editing to create pigs resistant to Porcine Reproductive and Respiratory Syndrome
- 'Designing Future Wheat' at John Innes Centre, Rothamsted: screens existing and new wheat varieties for genetic traits e.g. disease resistance & drought tolerance



Source: BBSRC website



Source: <https://jic.ac.uk>

4 Centres for Agricultural Innovation

- Led by Innovate UK
- Supporting adoption, development and commercialisation of agri-tech
- Turning innovation into commercial opportunity, encouraging co-investment
- Multiple partners across UK, industry & academia
- Skills, training and sharing best practice
- Getting ideas to market quickly



ISCF Transforming Food Production

- Up to £90m investment led by UKRI
- Aim: transform food production so UK productivity is market leading by 2030
- Reduce environmental impacts by 40%; minimise waste
- UK to be leading exporter of data-driven food production solutions



Impact of UK research

- UK wheat genetics research: contributed to UK and global increases in wheat yields by creation of new wheat varieties
- UKRI & DFID-funded researchers from University of Warwick helped cut number of lame sheep in the UK flock by half, saving industry £700M over 10 years & preventing 7.5M sheep from becoming lame
- Central to developing rapid modern testing techniques for bluetongue, reducing testing times from 3 weeks to a single day.



Global Food Security programme

- £14.5m programme between UKRI, Defra and others, led by Global Food Security
- Focus on resilience of UK food system in global context
- Interdisciplinary projects bring together natural and social sciences
- Testing UK food system to a variety of shocks
- Committed to engaging with industry (inc. farmers)



Image source: <https://foodsecurity.ac.uk>

Environmental factors

- From carbon, excess nitrogen, eutrophication
- Around quarter of global CO₂ caused by agriculture. But need to feed 9-10 billion people by 2050
- ‘Cool Farm Tool’ software developed by University of Aberdeen reduces greenhouse gas emissions from supply chains and delivers savings for farmers
- Used by 18 countries and leading food companies, inc. PepsiCo



Image source: <https://coolfarmtool.org>

Challenges and next steps

- Better diffusion
- EU exit – for trade and labour
- Trade barriers: food manufacturers don't want produce stuck at borders
- Policy questions e.g. around introduction of new types of crop/GMOs
- Regulation, e.g. on chemicals
- Sustainability



UK Research
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Thank you



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