



Defra Science Advisory Council (SAC)

Minutes of meeting, 12 October 2022

Actions arising

Action number	Action	Owner
No actions arising	-	-

1. Welcome and apologies

The Chair welcomed attendees, apologies are recorded in Annex A.

2. Organic fertilisers

Defra provided an overview of a task and finish group's work on organic fertilisers¹, between March and June 2022. Following instruction from Secretary of State (SoS) George Eustice, who acknowledged that fertiliser trade is a competitive international market, the task and finish group were exploring alternative sources of fertilisers, such as products derived from organic materials like household food waste and livestock slurries. Following the [Farming Moment](#) announcement at the end of March 2022 the task and finish group assessed utilising organic nutrients as alternatives to conventional fertilisers in future, including looking more closely at how sustainable fertilisers may be included in the Sustainable Farming Incentive (SFI), and their relationship to product use through End of Waste criteria.

The task and finish group:

- considered issues of domestic fertiliser supply following a rapid increase in the price of artificial fertiliser imports,
- investigated what Defra might be able to do to mitigate and manage this,
- scoped opportunities for novel solutions, innovation, and assessing the scope of upscaling organic fertilisers to displace inorganic fertilisers,
- assessed the policy and regulatory landscape,
- worked with evidence and policy experts for Defra and its arm length bodies (ALB) alongside industry steering groups.

Defra concluded that the approach, in this instance, was to assess nutrient management across the entire farm in a holistic way by taking a full system approach; investigating from what crops are in the ground and how they affect soil

¹ For this work fertiliser (or fertiliser-like) products were those derived from organic materials, including sludge and biosolids, household 'green' waste (incl. food waste), as well as livestock slurries and manures and other crop wastes.



composition (i.e. nitrogen fixing crops/ break crops etc.), livestock nutrition and housing systems, through to what quantities and how nutrients are applied across the farm (from both organic and artificial fertiliser products). It was noted that Defra's future farming programme is already undertaking work at a land use scale. The SAC noted that in some contexts there is already over application of fertilisers.

Market failure was discussed by the SAC with the CSA noting that this was not the sole driver of the work, however, Defra's SoS did consider Defra to have a duty to help UK farmers who might struggle with increased inorganic fertiliser costs and thus the market assessment was an integral factor. The CSA also noted the government's concerns that if farmers reduced the amount of produce grown, owing to less fertiliser availability, then it might further impact on food availability or prices.

The SAC raised issues of diffuse pollution attributed to fertiliser use, which was noted as being particularly chronic and widespread in some areas which is, in turn, impacting on other parts of the system such as freshwater ecology. The SAC wanted to get a better understanding of Defra's thoughts on the future economic and environmental consequences of increased organic fertiliser usage. Additionally, the SAC noted that some sectors (e.g. grassland systems) even where sufficient organic fertiliser is available, use of inorganic fertilisers as an insurance mechanism to mitigate concerns that organic fertilisers might not provide the expected return can be widespread. Although addressing pollution impacts was beyond the initial scope of the task and finish group it is included as a key item for the projects next steps.

The SAC suggested other options to be considered such as legume-based fertilisers, legume intercropping in cereal systems, more efficient and better timing in the use of fertilisers, improved crop rotations, and/or better utilisation of food waste; some of which would address multiple environmental goals. The use of long-term nutrient imbalances was also raised by the SAC who agreed phosphorus is a key nutrient that could limit food production and/or be the critical nutrient in environmental degradation; phosphorus should therefore be addressed alongside nitrogen going forward.

The SAC highlighted ongoing work in Belgium on waste recycling and the drive to change the way organic municipal and agricultural waste is used. A specific example of the work on composting at [ILVO](#) (the Flanders Research Institute for Agric, Fisheries and Food) was provided to highlight trials on the process and effectiveness of composts. Furthermore, while it was noted that metals and pathogens can be an issue (especially with slurries and biosolids), alongside concerns around antimicrobial resistance, a focus on composting at a large scale, linked with requirements for local authorities, has been productive in Belgium. As such, the SAC considered ongoing work in Belgium to be a good case study for Defra to review going forward.



Using regenerative farming to help bypass fertiliser issues was also suggested by the SAC; for example by rotating crops in a specific way it becomes possible to balance the soil nutrients and improve soil health without the need for added fertilisers. Defra officials recognised that regenerative farming, as a form of holistic farm management, can be one part of the solution going forward but cautioned that in terms of overall food supply there are some limitations with regenerative or organic systems (i.e. in terms of the volume of food that can be produced). Defra officials made note that investigating a mix of different farming methods should be a next step, as it was outside of the initial project aims.

The SAC raised the topic of unintended consequences when considering full life cycle carbon implications of the various items presented. Noting some of the technology will be carbon intensive (e.g. converting slurry to pellets), in the long-term Defra needs to make sure it does not trigger unintended consequences for wider issues such as greenhouse gas emissions. Defra officials acknowledged a lot of care in this area is needed, emphasising the fact that with novel technologies a greater understanding is needed to assess the full life cycle of environmental impacts and economic viability. Defra officials did, however, advise that comprehensive life cycle assessments were considered but can be challenging due to the limited amount and accessibility of data, especially for particularly unique and novel technologies. This has resulted in some evidence gaps and therefore it was decided not to include within this work package. The CSA highlighted that when assessing life cycles it is not just energy and carbon that need to be considered but other resources such as chemicals and water.

The CSA commented that besides the potential overemphasis of a market failure there are other compelling reasons why the UK should look to reduce the cost and the use of inorganic fertilisers. As such there should be a move for Defra to think more widely about the ways in which innovation and new markets can drive the conversation. The CSA also asked the SAC to reflect on ways to try and grow more with less. For example, by making nitrate more bioavailable, packaging nitrate in a better way, or using precision breeding to enable crops to take up nitrate more efficiently, and more targeted applications and timing of nitrogen applications to land. The CSA also added the caveat that while inorganic fertilisers remain cheap, it might stifle innovation around organic fertilisers.

On innovation, the SAC Chair reflected on whether there has been innovation within this space over the last 10-15 years. The SAC also added that few of the listed technologies are ready enough for widespread rollout and/or have enough information around them to be certain about what risks are associated with their usage. Defra agreed with this assessment of a limited range of technologies with varying readiness levels.

The SAC also discussed language noting how organic fertilisers are generally referred to as waste streams, thus a shift in terms of how we talk about 'waste' could place greater value on them as a valuable fertiliser. Viewing organic fertilisers as such and using them with greater care or more sparingly would be beneficial. The



SAC were respectful of the challenges a widespread shift in language and behaviour within the farming sector would present.

Concluding the discussion the SAC reviewed issues of data accessibility. The SAC highlighted the independent, non-profit [Icebreaker One](#) whose work trying to connect financial, industry, and environmental data might prove a useful contact/case study for Defra. The Icebreaker One approach might provide an opportunity to improve data sharing principles.

3. Chief Scientific Adviser (CSA) update

The CSA highlighted some cross cutting pieces of science in government:

1. The coast and ocean applied systems thinking (COAST) committee has been established which aims to link together the science and technology interests of various government departments.
2. The [Climate Adaptation Research and Innovation Board \(CARIB\)](#) has been established, co-led by a GO-Science Secretariat and Defra Delivery Team. The board will be co-chaired by Sir Patrick Vallance and Gideon Henderson and will act as a high-level cross-government board to ensure the coordinated development of R&I activity through the development of the Climate Adaptation Research and Innovation Framework (CARIF).
3. UKRI have now published their [strategy](#) with five thematic themes that span across the research councils. There is interest in UKRI themes from government which could prompt closer working to think about the big strategic challenges, where novel thinking would be most helpful.
4. A multi-million co-funded program on agriculture and land use decarbonization has been agreed, reducing emissions from agriculture.

Reflecting on government's new growth priority, the CSA considered a (re)focusing on growth might mean research weighted towards innovation, pushing new ideas to market to prompt new products in the environmental and food sectors.

Concluding their update the CSA presented the SAC a list of some areas where they consider Defra might be able to use the strength of UK science to feed into innovation and prompt growth:

- Aquaculture developments (e.g. to keep pace with other countries developments within this market).
- Using the Farm Innovation Program to address future challenges (e.g. nutrients).
- Environmental monitoring and measurement (e.g. contributing to the environmental management sector worth an estimated £6.4 billion in England alone).
- Forestry and wood products (e.g. enabling developments in this area easier).



- The circular economy (e.g. working to circularize plastic use).
- Bioengineering (e.g. innovative uses of bioproducts or other biomaterials).

Responding to the CSA's concluding thoughts the SAC suggested that there may be considerable innovation possibilities using fungi, especially in agricultural systems, where fungi were considered underexploited given their diversity and role as decomposers and in carbon storage. Noting the more recent role of fungi in precision fermentation and developing meat alternatives, the SAC saw potential for large scale innovation in this area.

Additionally, the SAC saw environmental management and stewardship being a sector with substantial growth and investment opportunities; bringing together economics, environmental science, and sociology could help meet nature and carbon objectives and drive changes in consumer behaviour to prompt growth.

Finally, the SAC briefly discussed hybrid systems for carbon capture and improving methane capture, which was acknowledged as being harder to achieve but with greater benefits that link to other issues such as air quality.

5. Work plan and any other business

No workplan items were raised and no other business was raised.



Annex A: Attendees and apologies

SAC Members

Louise Heathwaite (Chair)

Marian Scott

Lisa Collins

Rosie Hails

Peter Cox

Felix Eigenbrod

Lin Field

Defra Chief Scientific Adviser's Office

Gideon Henderson – Chief Scientific Adviser

Rob Bradburne – Deputy Chief Scientific Adviser

SAC Secretariat

Devolved administration observers

Caryl Williams – Welsh Government Observer

Defra officials in relation to specific agenda discussion

Agriclimature & Fertilisers G6

Agriclimature

Farming Science G6

Farming Science

Fertilisers

Defra observers

Food and farming climate adaptation evidence

Apologies

Susan Owens – SAC member

Rowland Kao – SAC member

Alistair Carson – Northern Irish Government Observer

Matthew Williams – Scottish Government Observer