All-Party Parliamentary Group on Science and Technology in Agriculture

APPG Briefing Session – Implementing the Precision Breeding Act

Notes of Meeting held on Tuesday 4 March 2025

Committee Room 21, Palace of Westminster

In attendance:
Charlie Dewhirst MP (Chair)
Baroness Hayman
Lord Krebs
Lord Taylor of Holbeach
Lord Lansley
Lord Trees
Earl of Leicester
Lord Carrington
Earl of Caithness
Lord Cameron of Dillington

Guest speakers:
Dr Penny Hundleby, John Innes Centre
Dr Louise Ball, Defra
Chris Stockdale, Food Standards Agency
Muffy Koch, Simplot Plant Science

Stakeholder attendees:
Prof Nigel Halford, Rothamsted Research; Prof Mario Caccamo, NIAB; Nancy Podevin, Corteva; Dr Anthony Hopkins, BSPB; Emily Aldridge, Defra; Perry Bateman, British Sugar; Sasha Eremina, The Sainsbury Laboratory; Ellie Vinnicombe, CropLife UK; Feodora Rayner, CropLife UK; Josh Woolliscroft, CropLife UK; Mark Buckingham, Bayer UK; Professor Susan Jebb, Food Standards Agency; Tony Moran, Cibus; Prof Johnathan Napier, Rothamsted Research; Mimi Tanimoto, John Innes Centre; Rebecca Lamb, Food Standards Agency; Dr Janet Talling, Defra; Robin Wood, Elsoms Seeds; Nigel Moore, KWS; Rosie Inwold, Newgate; Daniel Pearsall, Group Co-ordinator.

1. Chair's welcome and introduction

Charlie Dewhirst MP (CD) welcomed fellow officers, members, guest speakers and stakeholders to the meeting. He noted that the secondary legislation needed to implement the Genetic Technology (Precision Breeding) Act 2023 for plants in England had recently been laid in Parliament, and that this briefing session had been organised by the APPG to explain what the secondary legislation involves, why it is important, and the potential benefits on offer**.**

CD indicated that the All-Party Group had supported this legislation since first leading calls for regulatory reform on gene editing in 2020, during the passage of the Agriculture Act. Most recently in January this year the Group co-ordinated a joint letter signed by over 65 MPs, Peers, scientists and investors urging Ministers to set a clear timetable for implementation, and it was encouraging that the Government had now responded by laying the necessary draft regulations. If approved by

both Houses of Parliament, CD noted that the secondary legislation would free up the commercial use of new breeding techniques such as CRISPR gene editing to develop improved varieties of crops in England, with the first applications expected to be submitted from autumn 2025.

CD added that further clarity was also needed on the timetable and next steps to bring forward parallel implementing rules for the use of gene editing in farmed animals, particularly in view of mounting concerns over the spread of virulent livestock diseases such as bird flu, African Swine Fever and foot and mouth disease.

2. Guest speakers

(NB Guest speakers' slide presentations are available to download via the Meetings section of the APPGSTA website - https://www.appg-agscience.org.uk/meetings)

Dr Penny Hundleby, John Innes Centre

Penny Hundleby (PB) set the background context for the briefing by explaining the science behind precision breeding. She highlighted the huge amount of genetic variation in crops, which results in different characteristics, also known as traits, such as pest and disease resistance, improved nutrition, yield and climate resilience.

To illustrate the potential benefits of harnessing this genetic diversity, PB pointed to the many different vegetable crops developed using conventional breeding from the original wild type *Brassica oleracea*, including broccoli, cauliflower, cabbage, kale, brussels sprouts and kohlrabi.

But PB emphasised that conventional plant breeding methods – based on crossing two individual plants with desirable characteristics and selecting for desired combinations in the offspring - are slow, because the genetic variation created often involves desired as well as undesired changes, requiring lengthy backcrossing to remove unwanted characteristics.

She also pointed to radiation-induced mutagenesis, also known as mutation breeding, which was first used in the 1930s as an entirely random means of creating genetic variation in the hope of developing valuable new genetic combinations.

Over time, PB explained that our improved scientific understanding of plant genetics, and the rapid development and expansion of sequencing technologies, have transformed the ability of plant scientists and plant breeders to target specific desired characteristics with increasing precision.

In the 1980s, a technique was developed where a genetic sequence, or piece of DNA, can be introduced directly into an organism, giving it a new trait. This DNA could originate from the same species (cisgenic) or come from a different, non-sexually compatible species (transgenic). The term Genetically Modified Organism (GMO) applies to both situations. Genetic Modification allows researchers to introduce gene(s) of interest much more quickly than using traditional or mutation breeding.

More recently, precision breeding techniques such a gene editing have been developed. These allow scientists to make a specific edit to DNA in a targeted way – without adding in a new genetic sequence. Specific genes can be removed or changed, with small, targeted changes at a known location in the genome. This produces the same outcomes as traditional breeding, but more quickly and without the need for lengthy backcrossing.

PB explained that precision breeding covers a range of different technologies. CRISPR-Cas9 is the most well-known gene editing method, particularly after its invention won the Nobel Prize in 2020. However, PB also emphasised that not all uses of gene editing result in a precision bred organism (PBO), since some applications could introduce new genetic sequences which would not be possible using traditional breeding methods, and which would therefore be regulated as GMOs.

PB highlighted examples of precision breeding research taking place at Norwich Research Park, which is home to world-leading research establishments such as the John Innes Centre, the Earlham Institute, The Sainsbury Laboratory, the Quadram Institute and the University of East Anglia, as well as innovative gene editing companies such as Tropic Biosciences, TraitSeq, and Alora.

These include:
- tomatoes fortified with vitamin D, which could help millions of people with vitamin D deficiency (John Innes Centre);
- gene edited wheat with an increased amount of slowly digested and resistant starches (Quadram Institute);
- mildew-resistant tomato plants (Sainsbury Laboratory);
- disease resistant, non-browning and longer shelf-life bananas (Tropic Biosciences).

In conclusion, PB emphasised the opportunities presented by passing the secondary legislation to support growth and investment, to keep the UK competitive in international markets, to encourage scientific research and innovation, and to reinforce the UK's position as a global leader in agricultural technology.

Dr Louise Ball, Defra
Louise Ball (LB) explained that the draft Regulations would implement the new regulatory framework for precision bred plants in England provided for by the Genetic Technology (Precision Breeding) Act 2023, which established 'precision bred organisms' (PBOs) as a new class of regulated products, distinct from genetically modified organisms (GMOs) and defined as plants and animals which have been produced by the application of modern biotechnology, such as gene editing, but which only contain genetic features that could have resulted from traditional breeding.

LB explained that under the current framework, all plants produced by modern biotechnology and the marketing of food and feed derived from these plants must be regulated as GMOs. This process-based approach is over 30 years old, was adopted before precision breeding techniques were developed and is no longer deemed appropriate for newer genetic technologies.

Instead, modern biotechnology, such as gene editing, can now be used to achieve genetic changes that could have occurred through traditional breeding more precisely and efficiently. The aim of the new framework is therefore to shift the focus from the technology used to the outcome, enabling a regulatory approach that is more proportionate to risk, and is in line with scientific advice and regulatory approaches adopted internationally.

LB noted that a simplified notification system for R&D trials involving precision bred plants was introduced in England in 2022. The draft Regulations would replace the 2022 rules, and have the same effect in relation to research trials but go further to allow a route to market for precision bred plants outside the current GMO framework.

Specifically, LB explained that the draft instrument proposes new processes for:

- Notifying the Secretary of State/Defra of the deliberate release of precision bred plants into the environment for non-marketing purposes, such as field trials.
- Applying to the Secretary of State/Defra to enable precision bred plants to be marketed for commercial cultivation.
- Applying to the Secretary of State/Food Standards Agency (FSA) for a food and feed marketing authorisation to allow food and feed produced from confirmed precision bred plants to be placed on the market.
- Establishing a public register of information on precision bred plants which will include information on release and marketing notices, such as the name and address of the company and a general description of the PBO.
- Establishing a public register of precision bred plants authorised for food and feed use.

- Establishing a local authority-led inspection and enforcement regime to secure compliance with the legislation, including civil sanctions such as compliance notices, stop notices and monetary penalty notices.

Chris Stockdale, Food Standards Agency (FSA)
Chris Stockdale (CS) introduced the FSA as an independent non-Ministerial government department, working to protect public health and consumers' wider interests in relation to food. He explained that the FSA's role, with a fundamental mission of "food you can trust", covers food safety and consumer interests in food, which include price, availability, and aspects of food production standards like environmental concerns and animal welfare. He explained that the FSA's work is underpinned by the latest science and evidence, and emphasised that the FSA recognises the benefits to consumers of an innovative food system.

According to consumer research commissioned by FSA, CS noted that awareness and understanding of precision breeding is low – 75% of people have not heard of precision breeding. However, low levels of understanding not just linked to precision breeding, and extend to food production methods generally, including conventional breeding methods.

Research also shows that consumers have strong confidence in current UK food regulations – 83% trust that the food available to them is safe. Consumers want to see an appropriate level of regulation of precision bred organisms, and want access to information about precision bred organisms approved for use in food. Consumers also recognise the benefits that precision breeding can bring.

In relation food and feed marketing authorisations for confirmed PBO plants, CS explained that the new framework provides for a two-tiered approach to authorisation: a "rapid" Tier 1 route for precision bred plants about which there are no safety concerns or for which safety issues are understood and accepted in traditionally bred food and feed; and a Tier 2 route for precision bred plants about which there are safety concerns, for example in relation to increased allergens, and which would be subject to bespoke safety assessments as part of the authorisation process.

CS indicated that the draft regulations would implement a proportionate new framework providing consumers with the assurance and safeguards they need to trust precision bred products. Key features of this new framework included:

- Science and evidence led – underpinned by the advice of independent scientific experts on the Advisory Committee on Novel Foods and Processes;

- Complete transparency – including a public register of all PBOs that have been authorised for use in food and feed.

CS added that the draft regulations were supported by comprehensive technical guidance for potential applicants setting out in further detail the procedures involved in submitting and processing applications for food and feed marketing authorisations, and the requirements to be met for a food and feed marketing authorisation.

Muffy Koch, Simplot Plant Sciences
Muffy Koch (MK) introduced JR Simplot Company as a private US company, headquartered in Idaho, with global food and agriculture activities 'from mine to plate' employing 15,000 people worldwide.

With a focus on clonally propagated crops such as strawberries and potatoes, Simplot Plant Sciences covers innovation in conventional breeding, genetic modification and genome editing,

with the company's GM 'Innate' potatoes heading into their 11th crop year and third generation with traits including blight resistance, low bruising and reduced browning.

MK explained that Simplot's portfolio of gene edited products includes:

- high-yield baby potatoes, commercialised in the US in 2023, with a bunched tuber set allowing more production on less land;
- longer-harvest strawberries, brought to the US market in January this year;
- low-browning potatoes, scheduled for launch in 2026.

Focusing on the S4A strawberry, likely to be the first Simplot precision bred product to come to market in England under the new Precision Breeding Act regulations, MK explained that this involves a highly successful parent strawberry variety, with good flavour, colour and aroma, as well as an extremely long shelf-life (18 days) which significantly reduces wastage during shipping and storage. The edited trait gives earliness and increased yield, converting short season fruiting plants to long season fruiting plants and enabling year-round cultivation in the US, offering production and sustainability gains.

MK indicated that the gene edited S4A strawberry has been approved for cultivation and food use in the US and Canada, was planted commercially for the first time in California in November 2024, with the first berries harvested from January 2025.

MK showed examples of the packaged products ready for distribution to the fresh produce market. While mandatory labelling of gene edited products was not required in the US and Canada, she emphasised the importance of supply chain transparency, for example via the US FDA inventory of voluntary pre-market meetings, the Health Canada Transparency Initiative site, and the Seeds Canada Commercial Variety site. MK noted that these were similar in approach to the planned Defra and FSA pubic registers of approved PBOs.

Turning to Simplot's plans for England, MK noted that the 'excellent' Precision Breeding Act makes growing the S4A strawberry in England feasible in collaboration with breeding partner Plant Science Genetics (PSG) which already sells strawberry planting material to UK growers. Initial trials would be needed to test the performance of 8 lines (3-7 edits) under local growing conditions, as well as working with value chain partners to assess consumer acceptance and demand.

MK emphasised that precision bred products would only be commercialised in England once they had been properly tested and shown to perform better than existing products, once they had been approved as safe for commercial release and marketing, and where there was clear market demand.

Concluding the meeting, Charlie Dewhirst MP thanked guest speakers, members and stakeholder attendees for their contribution to an informative session which he hoped would encourage MPs and Peers to support the successful passage of the implementing regulations.