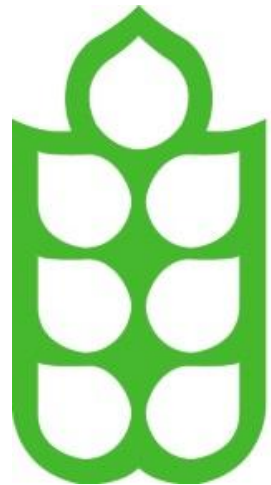




Precision Breeding
Opportunities and challenges for
UK farmers



BCPC

British On-Farm Innovation Network

- Launched in September 2020
- Represents farmers who carry out on-farm trials
- Particular emphasis on pre-commercial tech
- Current membership c3,700
>800 of whom are farmers



Farmer-led research

- For the farmer with a curious mind
- A spray miss is never a mistake, it's a learning opportunity
- The role of science
- Push the boundaries, co-create the tools of 4AR
- A culture of sharing
- Payment for on-farm trials



~~Five~~

Four Defra-funded projects



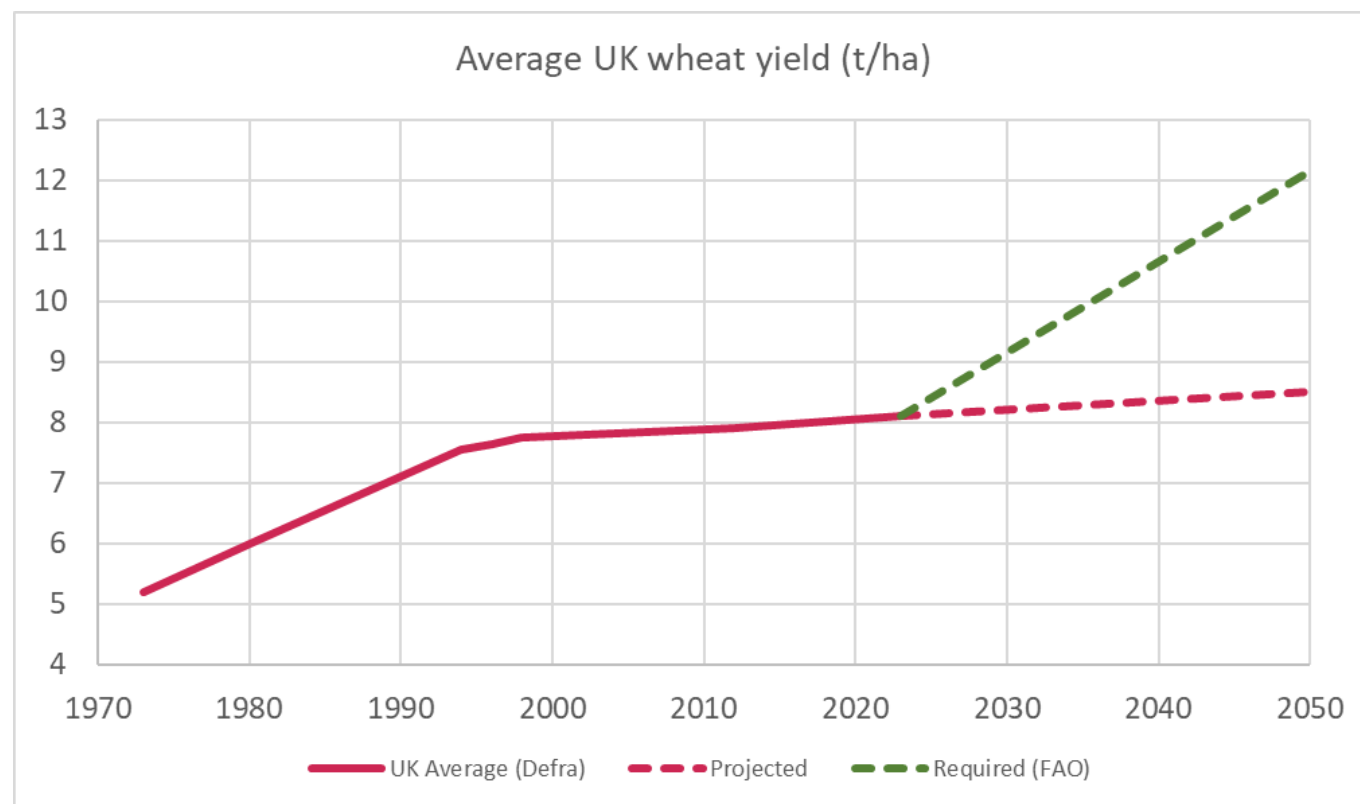


A Platform to Rate Organisms Bred for Improved Traits and Yield **PROBITY**



The Productivity challenge

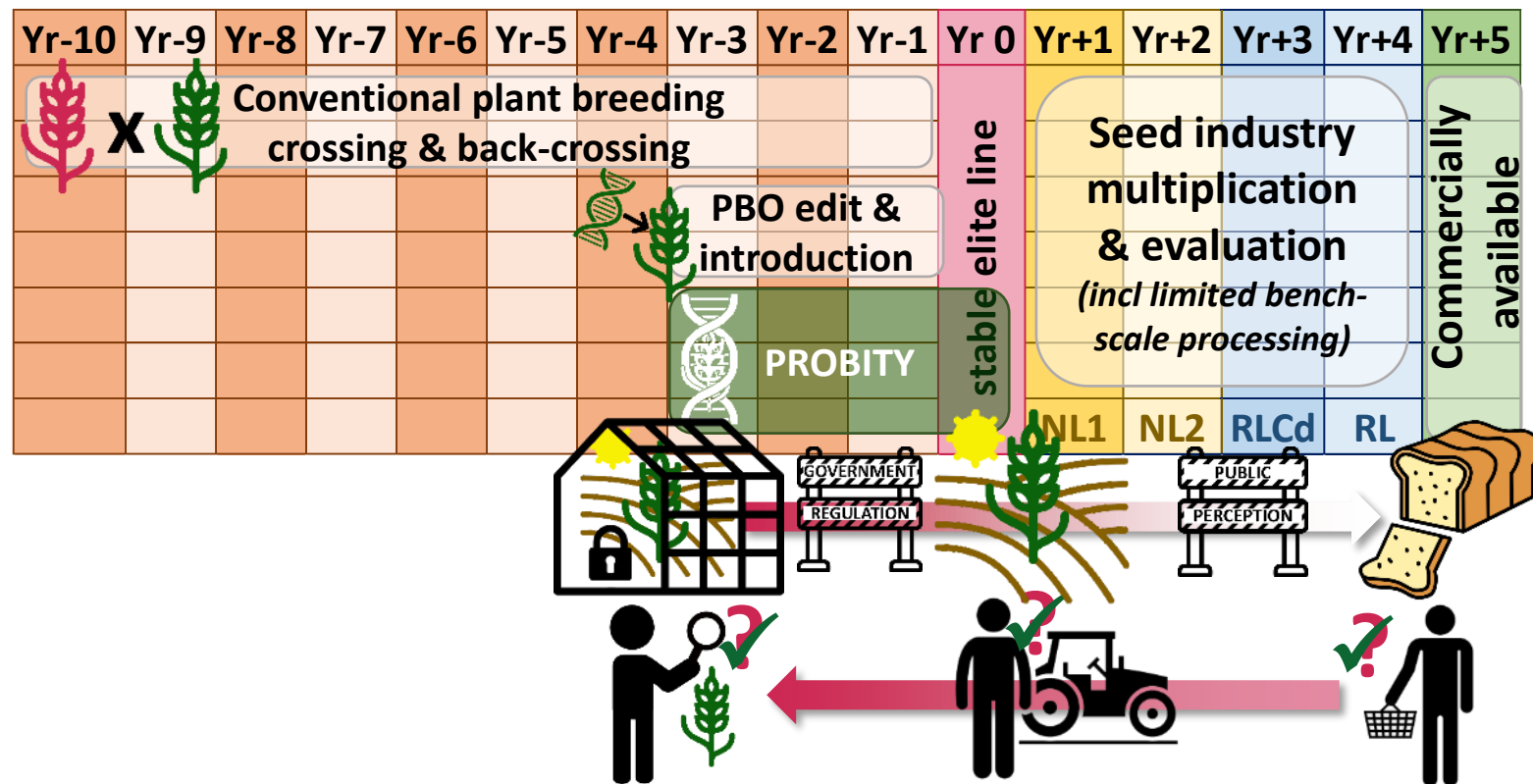
- Increase in UK agricultural productivity over next 25 years must equal previous 50.
- But wheat yields have plateaued





The plant-breeding challenge

- Precision Bred Organisms offer significant opportunities for novel traits and to cut time to develop new lines.
- But barriers remain, causing uncertainty in supply chain, which prevents required investment.
- PROBITY tests traits in a pre-commercial background -> Confidence





PROBITY Approach

- Take 1kg of seed & multiply to 100t batch for processing in <3 yrs.
- Field trials monitored by farmers working closely with scientists and field agronomy experts.
- Produce processed into iconic British brands or fed to livestock by end users.
- In parallel, edit 3 leading wheat varieties and 1 ryegrass with the new traits.
- Start of a pipeline of tested novel traits.
- Deliver a farmer-led platform to test novel traits as a service.

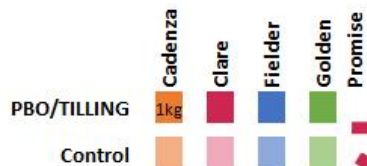




The on-farm trials platform

- Multiply up seed from 1kg to 100t
- Process at bench + batch-scale & evaluate
- Small-plot & field-scale assessments
- On-farm forage feeding trials

Harvest 2024

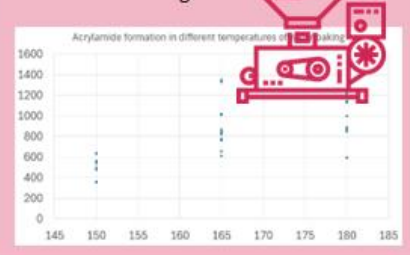


2024/2025 season

Multiplication



Work Package Two
Bench-scale testing



Work Package Four

Confirm analysis; introduce into PRG



Work Package Three

Replicated small-plot trials



2025/26 + 2026/27 seasons

On-farm trials by

BOFIN

Farm 1

Farm 2

Farm 3

Farm 10



Crop management regimes tested on PBO

Replicated small-plot trials repeated & extended



2026 + 2027

Work Package Two - Batch-scale testing



Work Package Three - Evaluation of on-farm performance



Work Package Four - On-farm feeding trials





Join the Sequence Circle



How farmers are involved

PROBITY Pioneer

25 farmers growing
c1ha of PBO wheat
or barley 2026, 27



Sequence
Circle

PROBITY Pathfinder

Thought-leaders with
credible networks to
drive discussion



Sequence
Circle

#PROBITY Pledge

Find out about
PBOs & join the
discussion



Sequence
Circle



The Sequence Circle

Sequence



THE Biologist
Royal Society of Biology

MEET OUR MEMBERS

My Lab Unlocked: Professor Nigel Halford FRSB

Above: Nigel Halford FRSB (left) with Joe Oddy and Sarah Raffan.
Professor Nigel Halford FRSB talks about his lab's research on toxins found in products made from wheat and how CRISPR can make food crops like wheat safer.

FEATURES
INTERVIEWS
COVID-19
MEET OUR MEMBERS



TECH FARMER
TECHNOLOGY FOR FARMING

What's that
seed the world

LLOYD'S BANK
Supporting Sustainable Agriculture



THE BOFIN BUZZ



Precision breeding: legislation, applications, and implications for the UK

Precision breeding, using advanced techniques like CRISPR-Cas9, is transforming agriculture by allowing precise edits to plant DNA to enhance traits such as yield, nutritional value, and resistance to pests and diseases. This method offers a more targeted and efficient alternative to traditional breeding. In the UK, the Precision Breeding Bill, introduced in 2022, aims to support the development and commercialisation of edited organisms with streamlined and clear regulations.

Professor Giles Oldroyd, Director of the Crop Science Centre, who shared their experience with the government, said "The Genetic Technology (Precision Breeding) Bill is a crucial step that opens new possibilities for science and innovation in agriculture. The UK, like many countries, is racing to climate-proof food systems, and precision breeding cannot keep pace with the rapidly changing challenges of new growing conditions. Precision breeding, through gene editing, allows scientists to accelerate what would otherwise take much longer through natural processes and conventional breeding. UK research has made extraordinary advances in this field over the last 30 years, and this law broadens the scope of scientific exploration, which can only bring benefits."

Sequence Circle

Forums ▾ What's new ▾ Resources ▾ FarmTV ▾ Farm Compare ▾ Calendar ▾ Members ▾

Notice: By taking part in this forum, you consent to your data, such as posts and reactions, being analysed by the research team. For more information on [Participant Information Sheet](#) and [full consent form](#), which are available in Forum Resources. Please use an anonymous username and do not post any personal information. If you have any questions, please contact skye@bofin.org.uk

Forums ▾ Knowledge in Farming ▾ The Sequence Circle ▾

Take the #PROBITYPledge

skye @ bofin · Friday at 1:36 PM



PRECISION INSURANCE FOR PRECISION FARMERS

BOFIN

skye @ bofin Member

Friday at 1:36 PM

#PROBITYpledge

What is the #PROBITYPledge?
The #PROBITYPledge is your commitment to engage in open, informed discussions about precision breeding in agriculture. By taking the pledge, you commit to spending a minimum of one hour to join a community of farmers, scientists, and food processors to learn about this technology, ask questions and share your views.

How to Participate

- Take the #PROBITYPledge by signing up below and share your commitment on social media
- Visit The Sequence Circle (log-in required) to connect with others and join the discussion
- Access our resources to learn more about precision breeding

Your Voice Matters
By taking part you can help ensure that the implementation of these technologies aligns with the needs and values of British farmers. Take the #PROBITYPledge and be part of shaping a sustainable, innovative future for British agriculture.

Find out more at www.bofin.org.uk/probitypledge.

Take the #PROBITY Pledge & Join the Sequence Circle

The #PROBITYPledge is your commitment to engage in open, informed discussions about precision breeding in agriculture. By taking the pledge, you commit to spending a minimum of one hour to join a community of farmers, scientists, and food processors to learn about this technology, ask questions and share your views.

How to Participate:

- Take the #PROBITYPledge by clicking here and share your commitment on social media.
- Explore the other threads here, on The Sequence Circle, and join the discussion by creating your own thread or commenting on existing ones.
- Access our resources to learn more about precision breeding by clicking here.

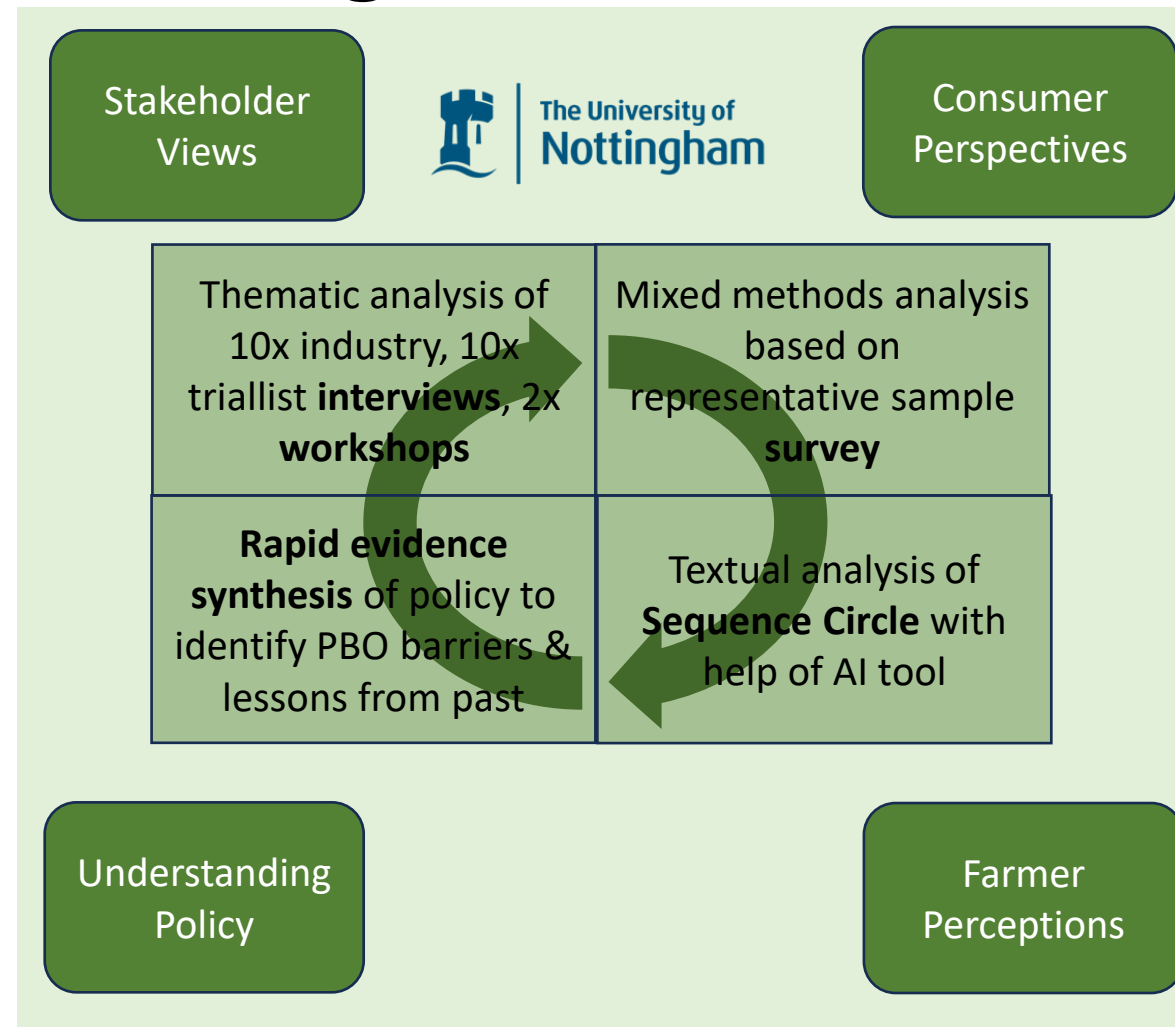
Why Take the Pledge?

Precision breeding technologies offer exciting possibilities for British agriculture: Crops that are more resistant to pests, diseases, and climate change; reduced reliance on



Precision Breeding – the challenges

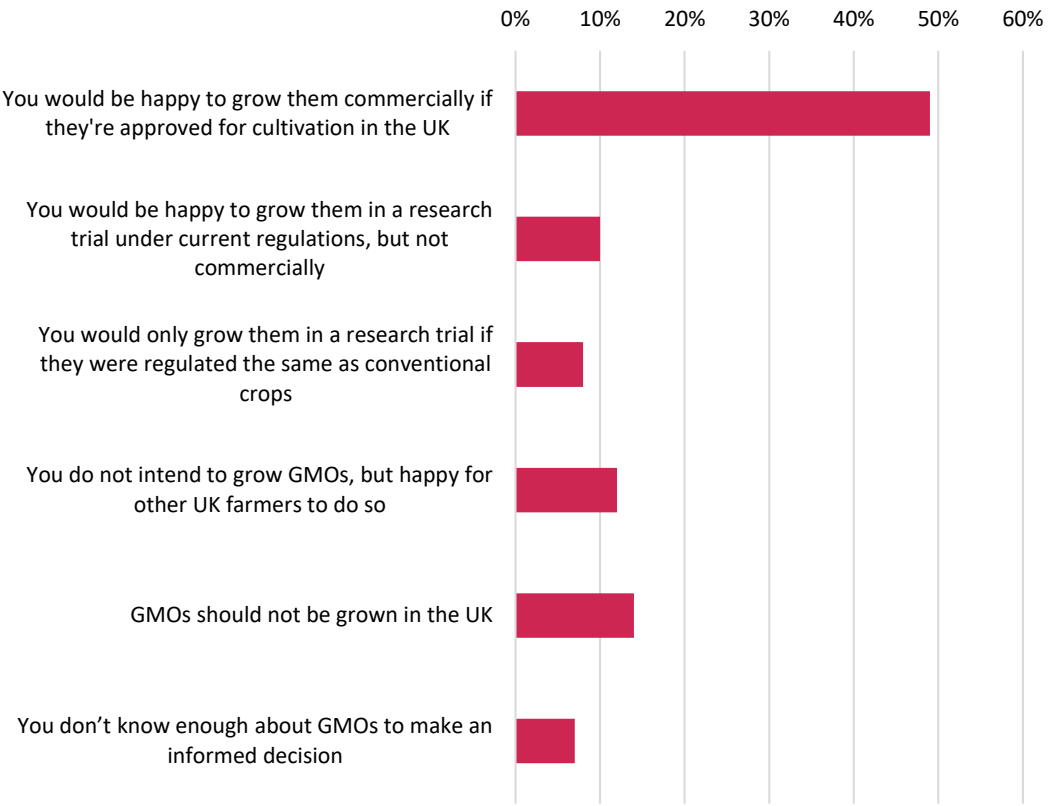
- Stakeholder acceptance
- The legislation
- Transgene-free material



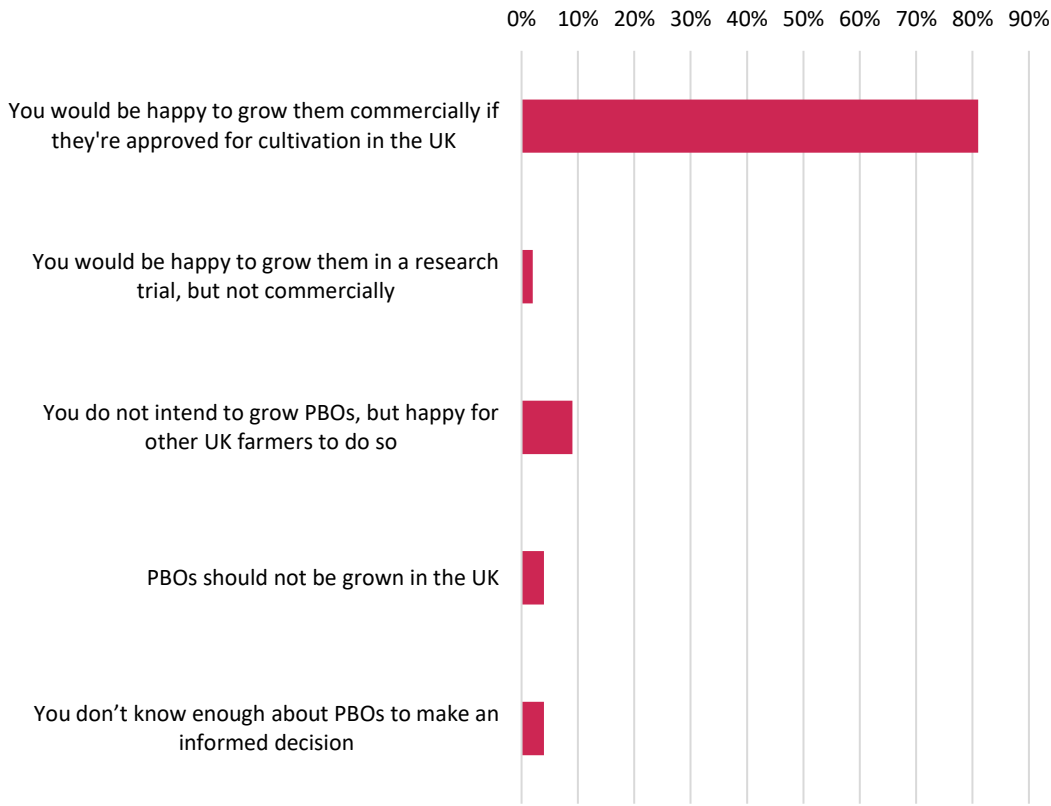


Previous survey: GMOs vs PBOs

What best describes how you feel about GMOs?



What best describes how you feel about PBOs?



Source: BOFIN member survey Feb 2023; n=85; 81% farmers



PBOs: Views from the farm

- ✓ PBOs are 'common sense' and 'science'
- ✓ Natural progression in farming
- ✓ Allows quicker and better progress to be made
- ✓ If government backs and incentivises PBOs it encourages farmers to adopt the new technology
- ✓ Offer lots of potential to improve farming and business sustainability but the research should be thorough and transparent before rolling out

Opportunities

Concerns

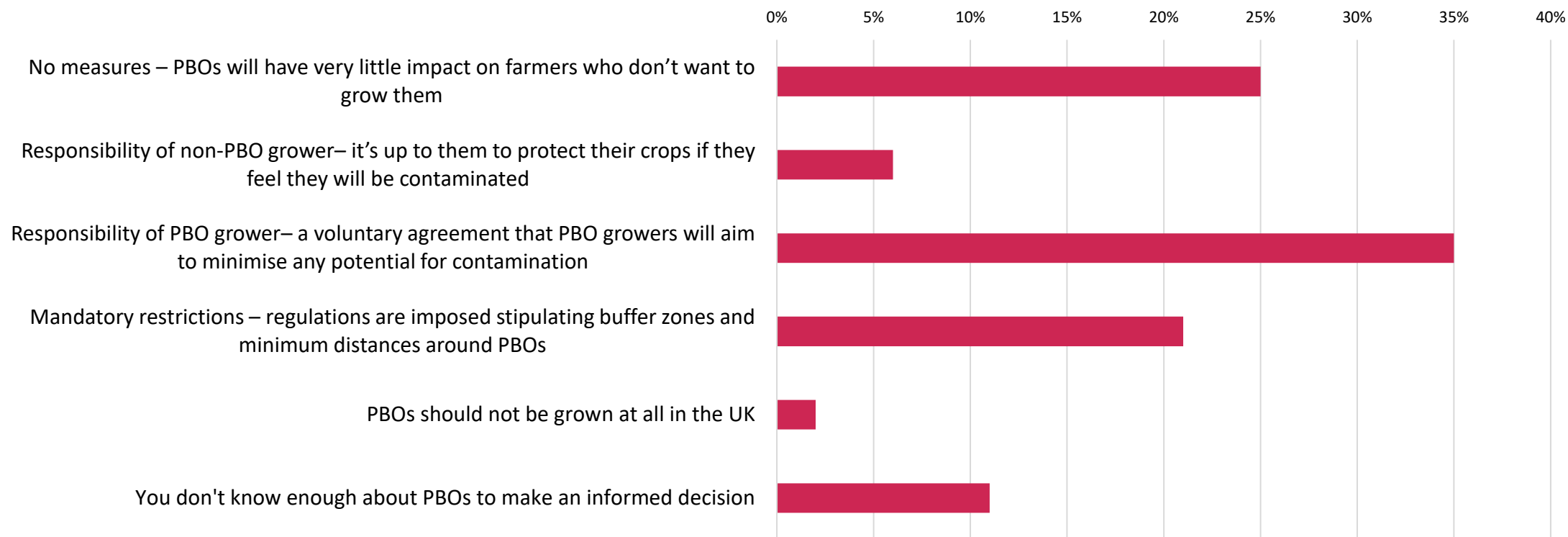
- ✗ Legislative issues with pre-commercial trials
- ✗ Business security
- ✗ Joined up approach needed to prevent resistance and biodiversity issues
- ✗ Tenancy agreements/restrictions could prevent trialling and uptake
- ✗ Public perception of these technologies may delay uptake – imperative to get the story right
- ✗ Physical setting up of trials (fencing etc) may be a challenge

Source: BOFIN survey and follow up calls, Feb 2023



Co-existence measures

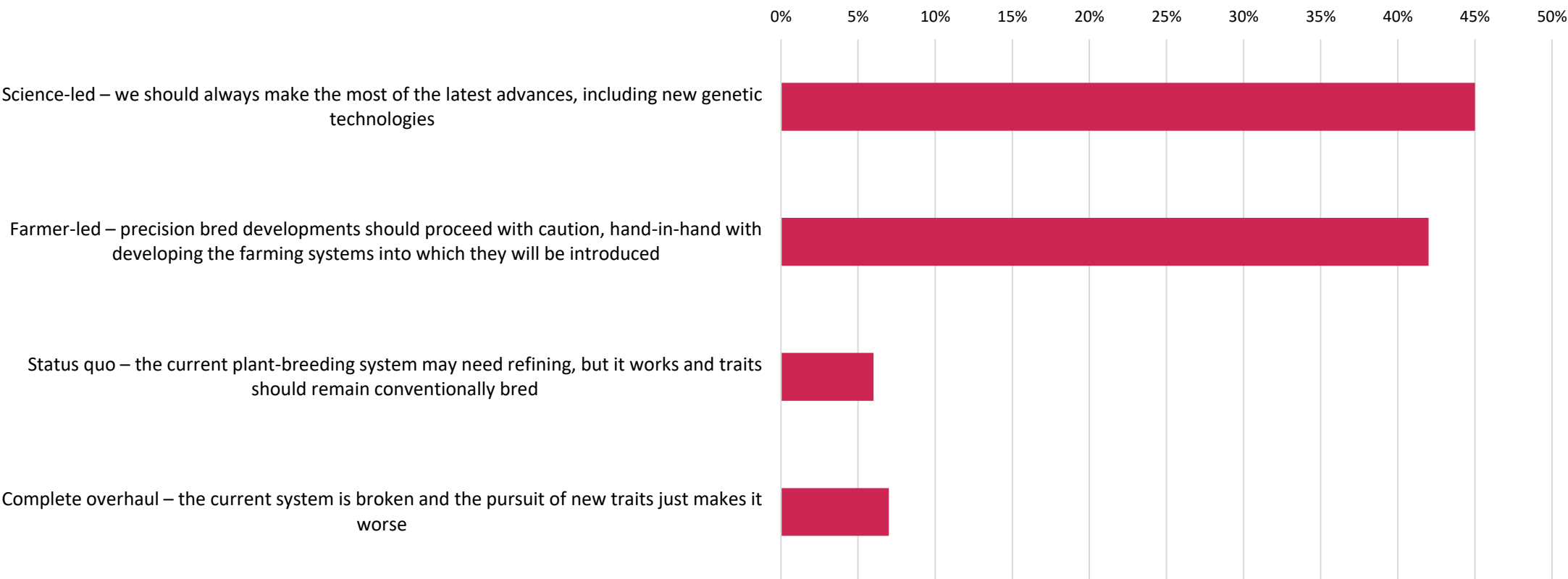
What best describes how you feel about co-existence measures to protect those farmers who do not want to grow PBOs?





The role of plant-breeding

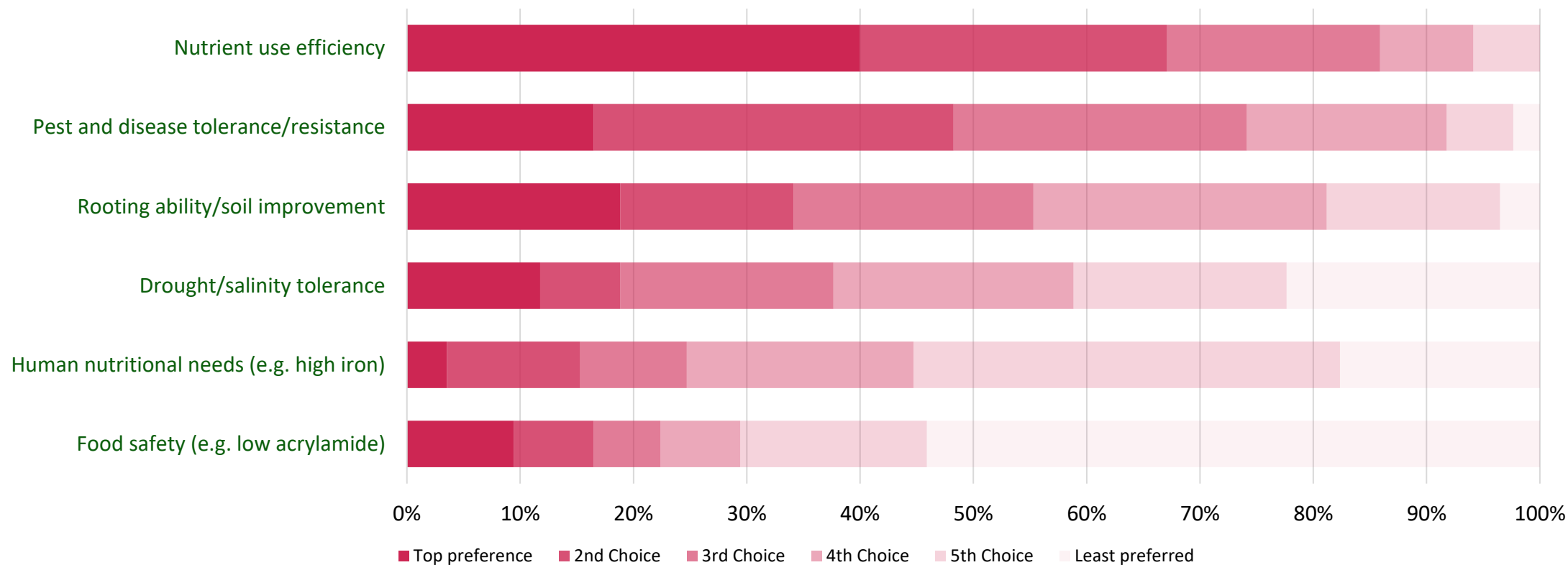
What best describes how you feel plant breeding research could be improved to develop new traits?





Trait discovery

Put the following trait discoveries in order of priority for R&D



HOWEVER, despite priority order many, many farmers believed all are important



Precision Breeding – the challenges

- Stakeholder acceptance
- The legislation
- Transgene-free material

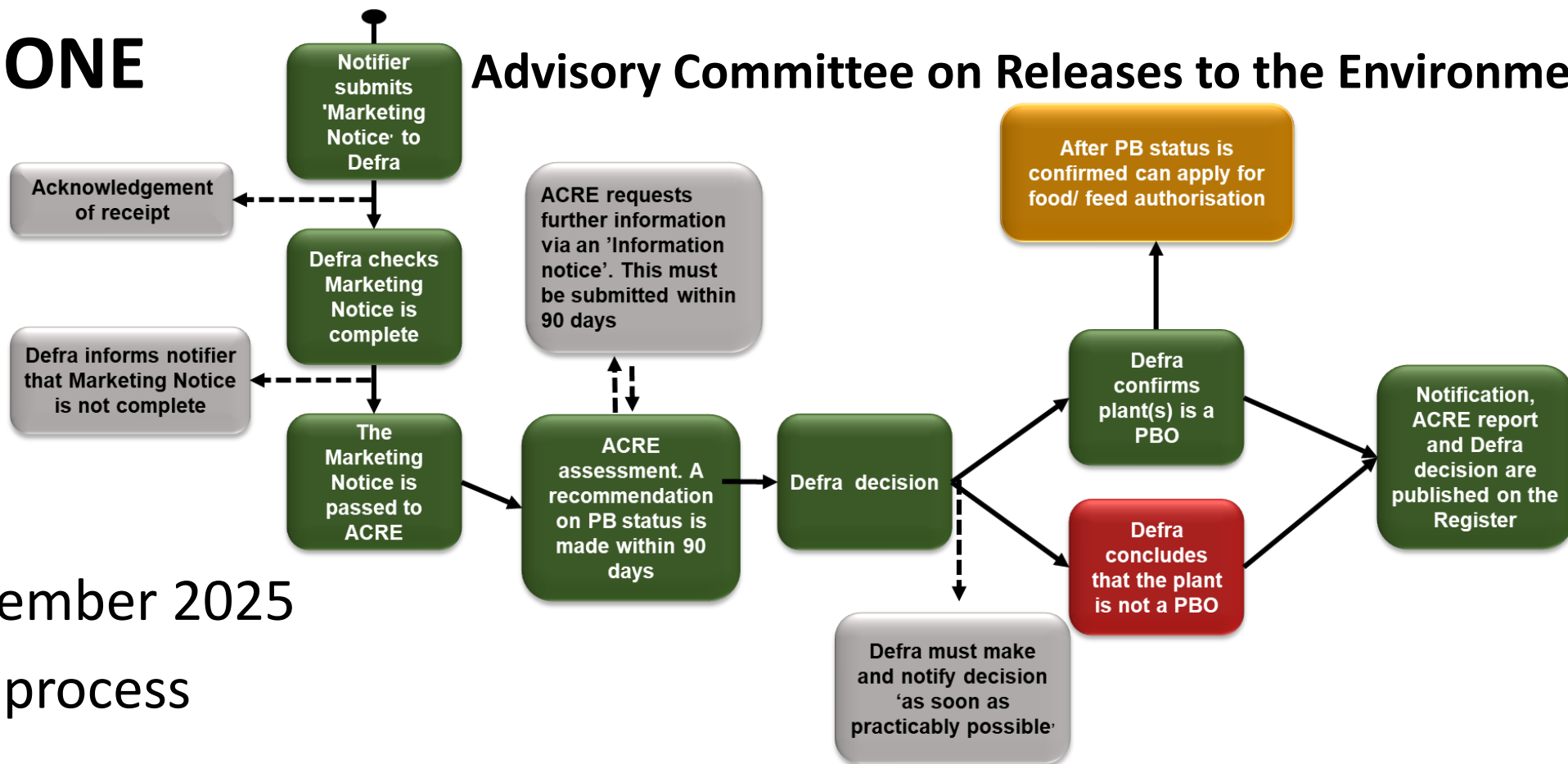




Genetic Technology (Precision Breeding) Act 2023 – the approval process

STAGE ONE

Advisory Committee on Releases to the Environment



- 13 November 2025
- 90-day process

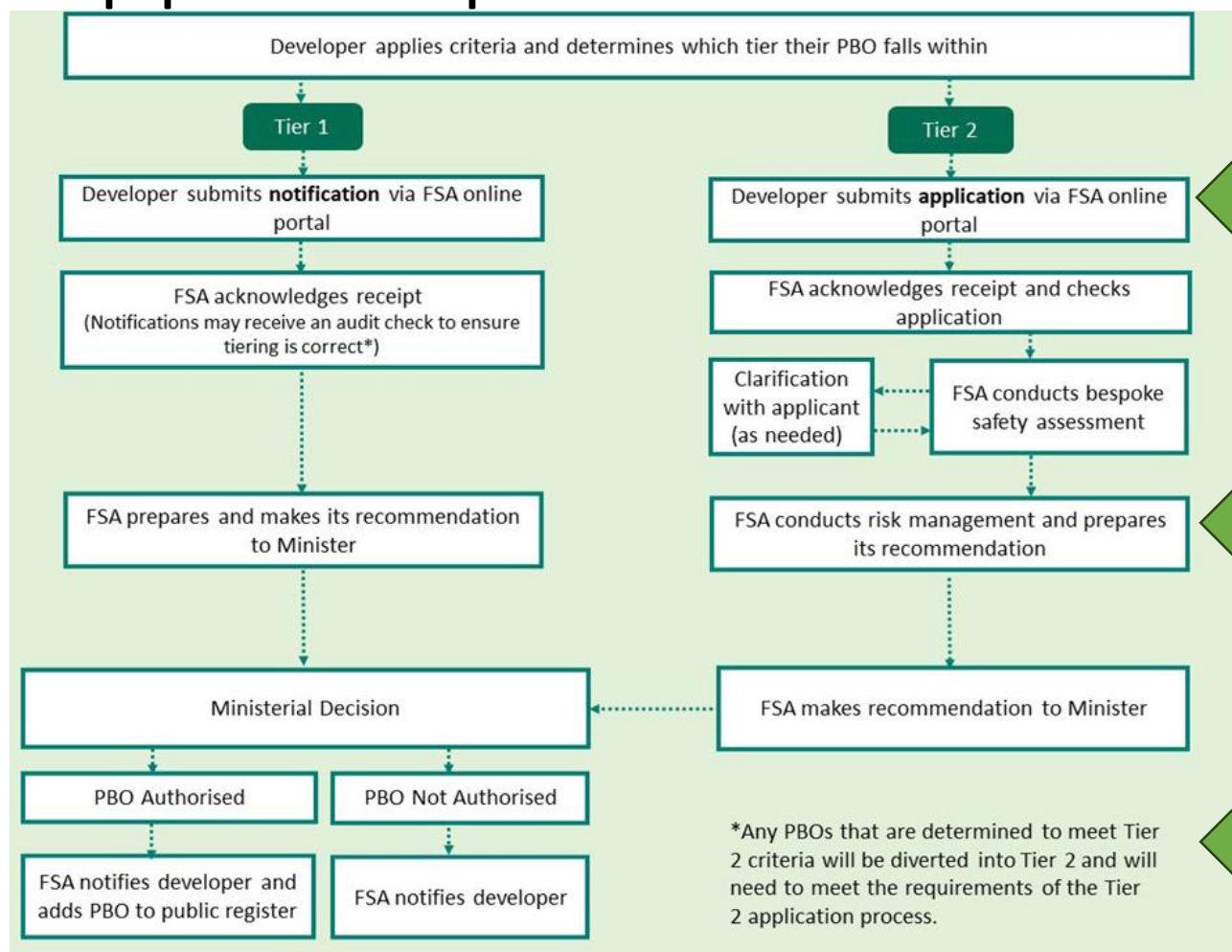


Genetic Technology (Precision Breeding) Act 2023 – the approval process

STAGE TWO

Food Standards Agency

- Not yet open
- Open-ended



Applicant led triage

Two regulatory routes ("Tiers").

Ministerial decision making



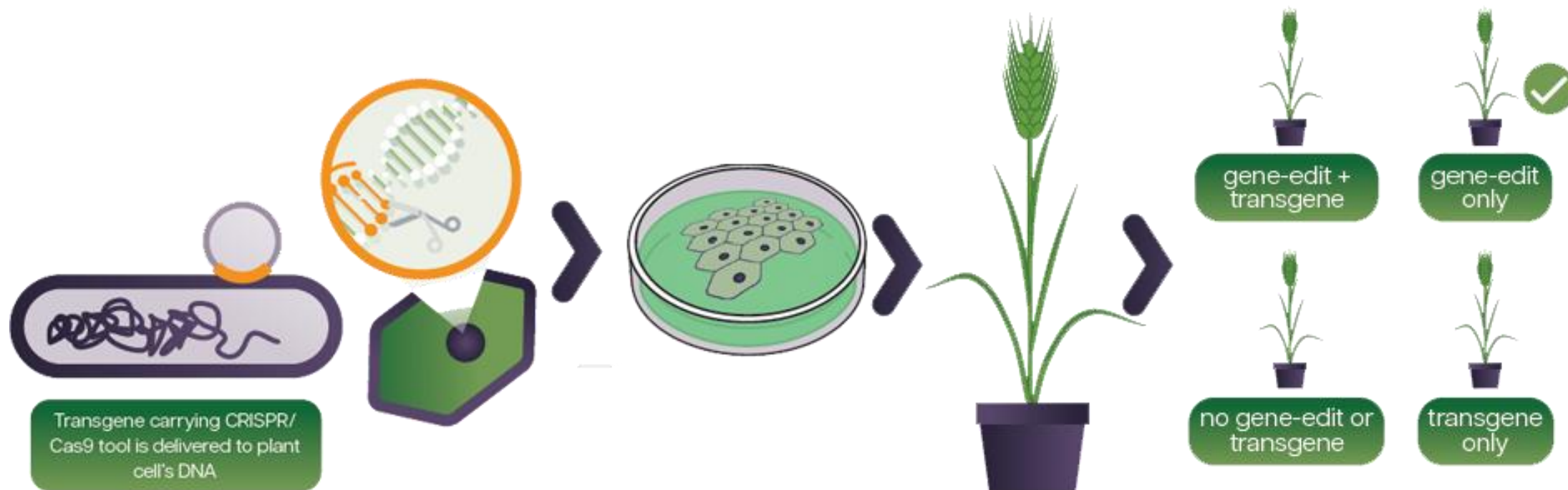
Precision Breeding – the challenges

- Stakeholder acceptance
- The legislation
- Transgene-free material



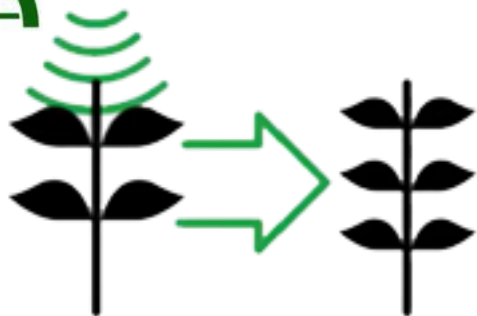


CRISPR and the transgene

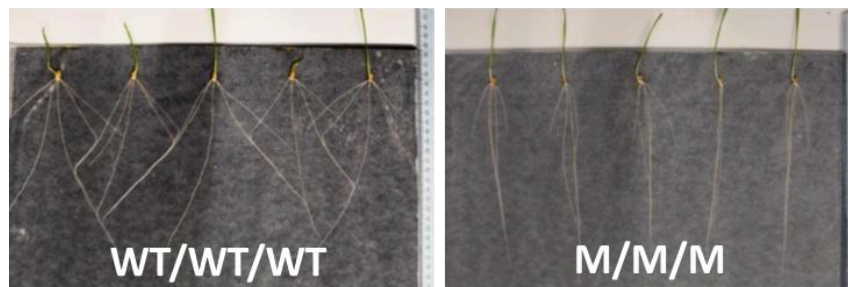




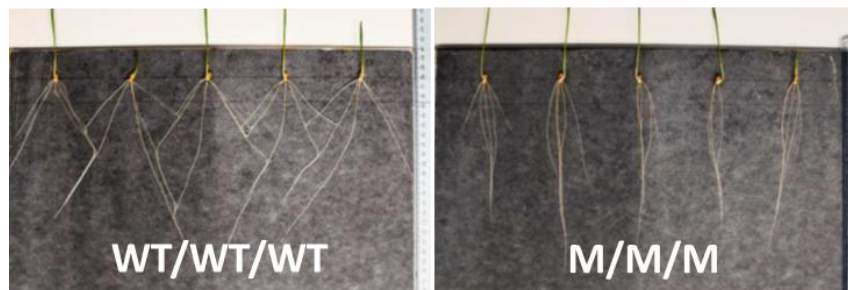
The 2025/26 TILLING trial



CADENZA *egt1* (6ABD)

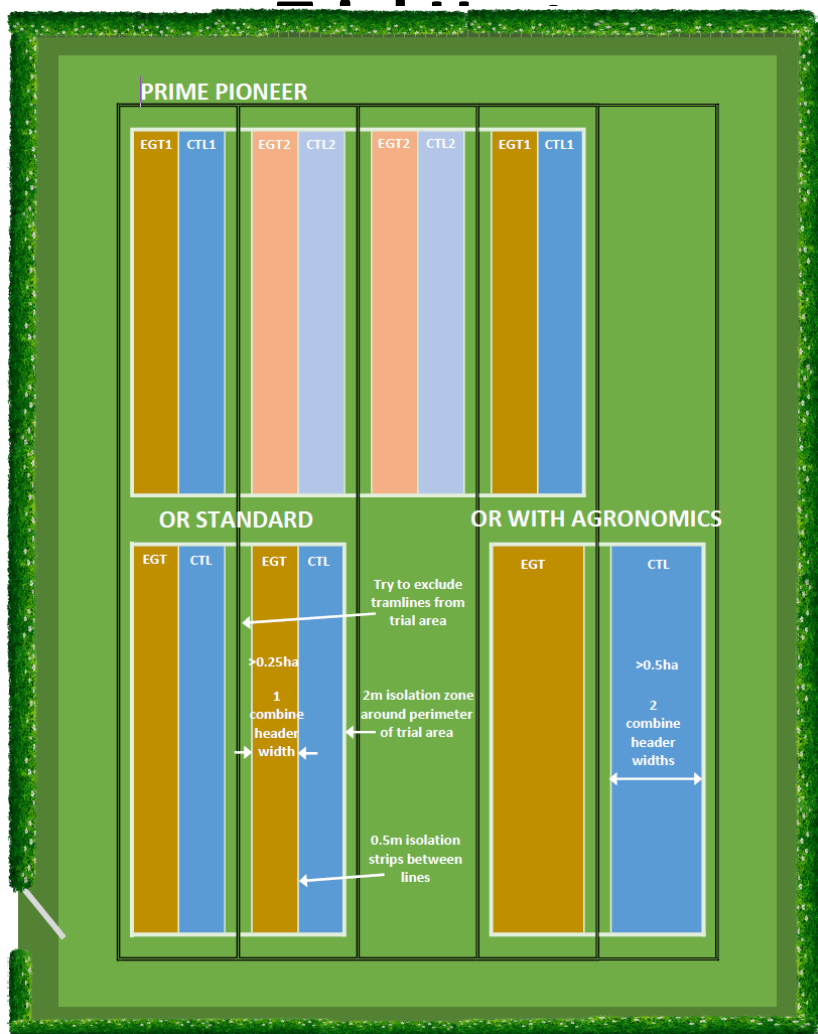


CADENZA *egt2* (5ABD)





PROBITY Pioneers – three roles

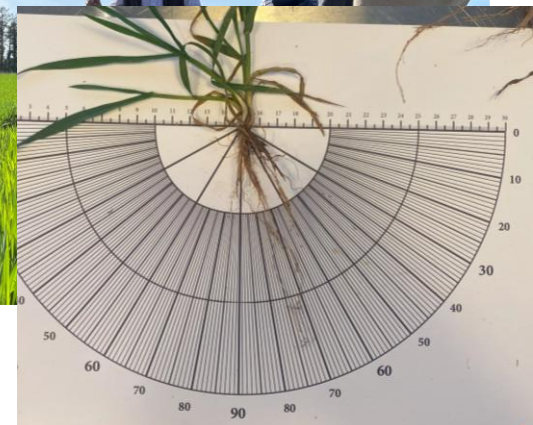


Trial Monitor
Data recording
and operation

Project Ambassador
Provides information
and gives discussion



PROBITY Pioneer Handbook 2025-26
Led by farmers, backed by science



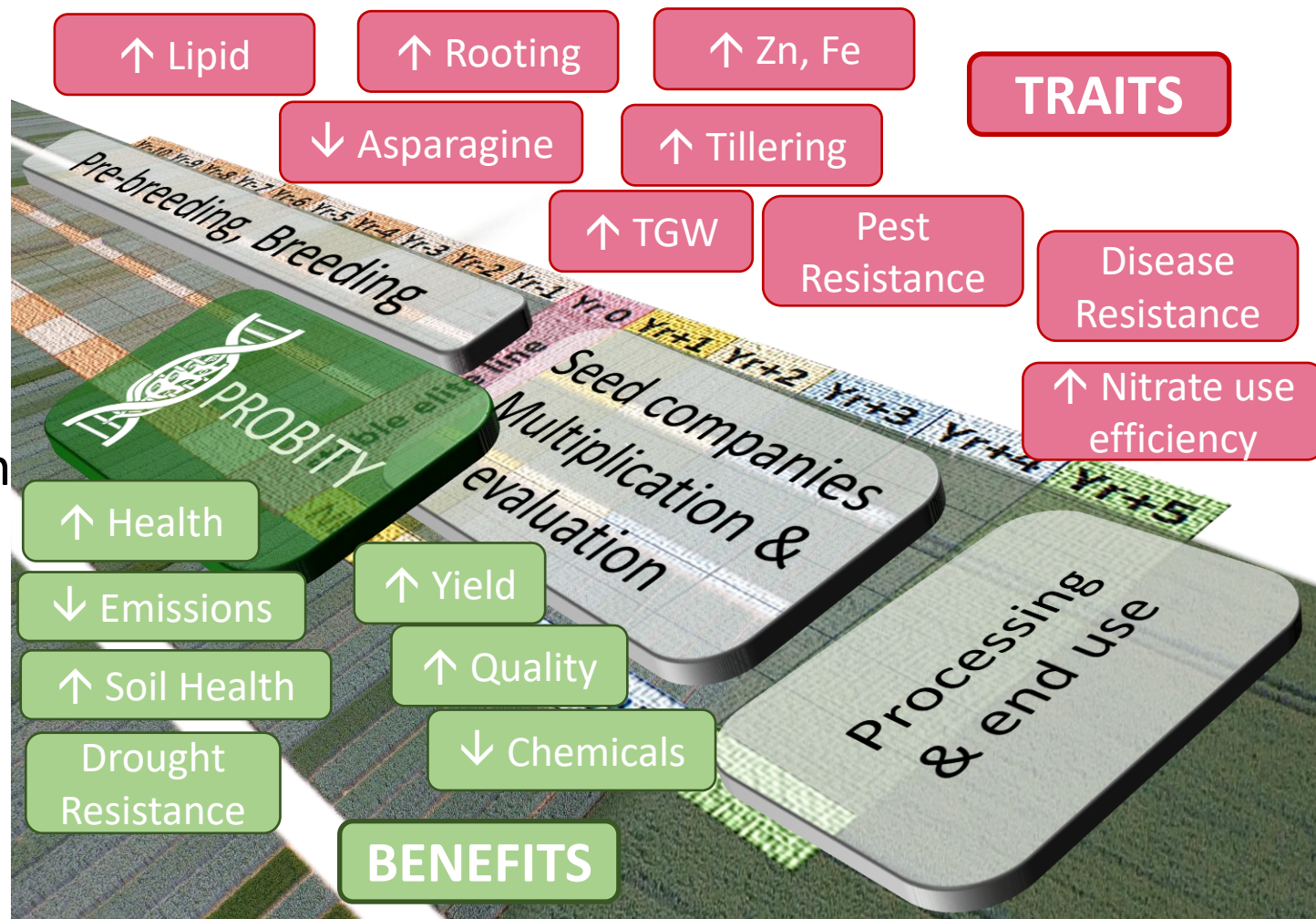


A pipeline of new traits

Primary purpose of PROBITY is to test novel **traits** in **non-commercial** lines.

Why?

1. Clarify benefit of a trait before commercial introduction
2. Stimulate farmer interest in traits with end-user benefits
3. Refine application/understanding of traits destined for export markets
4. Springboard to Europe for imported traits from US, Asia, Australasia





Thank you



Join the Sequence
Circle



tom@bofin.org.uk, laura@bofin.org.uk,
skye@bofin.org.uk, Clemmie@bofin.org.uk



www.bofin.org.uk



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