

## Genetic Technology (Precision Breeding) Bill

### Briefing for Report Stage on 31 October 2022

#### Executive summary

- 'Precision breeding' through the editing of the genes of living animals and plants will have complex consequences that are impossible to fully predict.
- As well as potential economic and environmental benefits, there are highly credible risks associated with gene editing. The Bill should be amended to better safeguard against them.
- We support **amendments 1 and 5**, which would respectively:
  - Remove animals from the scope of the Bill to address threats to animal welfare.
  - Require the Secretary of State to consider environmental impacts when making regulations under the Bill.

The Genetic Technology Bill creates a new regulatory framework for the release, marketing and risk assessment of plants and animals produced through 'precision breeding', delivered through the editing of genes. The proposed framework is much less robust than current regulations around Genetically Modified Organisms, which include plants and animals produced by inserting genes from different species. The precision breeding process also inserts external genetic material, but this is usually removed at a later stage of development, leading to the general understanding that gene edited organisms do not include genetic material from other species. Nevertheless, precision breeding raises significant environmental and ethical concerns - and welfare concerns, in the case of animals.

The long-term consequences of the deregulation contained in the Bill are difficult to determine. Even small changes to individual genes can have wide-ranging and unpredictable consequences for an animal or plant's entire genome.<sup>1</sup> The testimony of expert witnesses interviewed for committee stage of the Bill made it clear that consequences of deregulating gene editing cannot be predicted. Whilst it was plausible there might be some economic and environmental benefits, the testimony also suggested that new animal welfare problems and ecological threats could arise.<sup>2</sup>

We propose that these potential benefits and risks be balanced by robust safeguards within the legislation, specifically covering animal welfare and ecological health. In this briefing we set out our support for amendments that would help deliver these safeguards.

The complexity inherent in genetic science means that legalisation in this area is something of a leap into the dark. If the Government is prepared to act in pursuit of possible policy gains, it must also be prepared to apply precautions to respond to equally credible risks.

<sup>1</sup> See Bill Committee evidence submitted by GM Freeze: <https://www.gmfreeze.org/wp-content/uploads/2022/07/GM-Freeze-evidence-to-Genetic-Technology-Bill-Committee.pdf>

<sup>2</sup> [https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011\\_GeneticTechnology\\_1st-8th\\_Compilation\\_08\\_07\\_2022.pdf](https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011_GeneticTechnology_1st-8th_Compilation_08_07_2022.pdf)



## The risk to animal welfare

Although it is possible that precision breeding will lead to advances for animal health and welfare, it is important to consider each application critically. This includes reviewing whether there might be alternative approaches to addressing animal health and welfare problems and recognising that the fundamental motivation behind the extension of gene editing to animals is to increase the profitability of livestock farming. Precision breeding has been developed by the livestock industry as a faster form of selective breeding; any welfare benefits will be a by-product of this commercially focussed process.

This was highlighted by witnesses who appeared before the Bill Committee. Penny Hawkins, Head of the Animals in Science Department at the RSPCA set out how *“animal welfare applications are ultimately for human benefit”*, using the example of producing cattle without horns (known as polled cattle), which is sometimes cited as a welfare focussed breeding intervention. Horned cattle can be co-housed, but this is more expensive than co-housing polled cattle. As such the production of polled cattle that would naturally have horns is ultimately for human benefit.

Joanna Lewis, Policy & Strategy Director at the Soil Association told the committee that:

*“We know that conventional animal breeding trends have been to prioritise greater yield, litter size and fast growth over the welfare of sentient animals, and we know that the argument for gene editing is partly that it speeds things up and is likely, therefore, to accelerate those trends.”<sup>3</sup>*

The Government itself has said that the Bill will enable the development of *“Precision-bred plants and animals [that] will bolster food production”* and *“drive economic growth”*.<sup>4</sup>

The primary economic motivation behind the precision breeding of animals opens up the possibility that adverse welfare impacts could follow from the application of gene editing technology. Precision breeding could be used to accelerate the breeding of farmed animals for fast growth and high yields, with damaging impacts on their welfare.

There is a clear precedent for this. Irresponsible application of selective breeding has inflicted considerable suffering on farmed animals in order to deliver increased profitability for farmers. As Peter Stevenson, Chief Policy Advisor at Compassion in World Farming, told the Bill committee:

*“If you look at the last 50 years, selective breeding has caused immense health and welfare problems for farmed animals. Meat chickens have been bred to grow so quickly that millions suffer from painful leg disorders each year, while others succumb to heart disease. We have bred dairy cows to produce such high milk yields that many are suffering from lameness, mastitis and reproductive disorders, and the cows live with these welfare problems for a large part of their lives. We have bred hens to produce 300 eggs a year. As a result, many suffer from osteoporosis, making them highly susceptible to bone fracture.”*

<sup>3</sup> [https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011\\_GeneticTechnology\\_1st-8th\\_Compilation\\_08\\_07\\_2022.pdf](https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011_GeneticTechnology_1st-8th_Compilation_08_07_2022.pdf)

<sup>4</sup> <https://www.gov.uk/government/news/genetic-technology-bill-enabling-innovation-to-boost-food-security>



These traits and breeds already slip through existing animal welfare regulations. Precision breeding however, is like a highly concentrated version of selective breeding, intensifying human interference with the biology of sentient animals in order to increase their profitability. The existing problems associated with selective breeding could be multiplied in precision breeding, because there is even less time and transparency to spot problems as they arise through the generations.

Whilst precision breeding theoretically offers a way to attempt 'fixing' many of these existing problems, the commercial reality is that the cost of doing this may well exceed the commercial benefit. This is particularly the case for welfare concerns that cannot easily be de-linked at a genetic level from profitability gains (so performance gains could be lost by fixing the welfare issues).

Even some of the apparent direct welfare advances from precision breeding pose problems. Conferring improved resistance to disease on animals by precision breeding, superficially beneficial for the animals concerned, could perpetuate the use of intensive farming systems which cause avoidable animal suffering on a large scale.

This risk has been highlighted by the Nuffield Council on Bioethics, a leading independent body advising on ethical issues arising from developments in bioscience. In the words of the Nuffield Council's Bioethics working group chair, Professor John Dupré:

*"Whilst some applications of genome editing—such as disease resistance—sound great for animals in theory, if they were to lead to further intensification of farming then that may well be harmful to the quality of animals' lives in other ways. Under no circumstances should new breeding technologies be brought in to perpetuate unsustainable food and farming systems."*<sup>5</sup>

Precision breeding through gene editing is a commercially driven technology, a radically accelerated version of the selective breeding process which has a track record of animal welfare issues. Deregulating precision breeding could lead to increased animal suffering.

### **Addressing animal welfare risks through amendment 1**

Clearly, existing animal welfare regulations already fail to prevent new breeds from having significant welfare concerns. It is to this already concerning baseline, that precision breeding poses additional welfare risks.

The Government has taken some steps to try to address these risks through Clauses 10 to 15 of the Bill. This part of the Bill proposes a regulatory system for precision bred animals, with the Secretary of State only making a decision on applications for precision breeding after receiving advice from a dedicated animal welfare advisory body.

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<sup>5</sup> <https://phys.org/news/2021-12-animal-welfare-heart-genome.html>

These measures are insufficient to prevent significant risks to animal welfare. Detail on the face of the Bill is light, with the full regulatory system due to be set through secondary legislation, vastly reducing the ability of parliamentarians to scrutinise it. What is set down in the Bill is of concern, with Clause 11 giving the person applying for authorisation for precision breeding primary responsibility for assessing any animal health and welfare risks. The animal welfare advisory body simply then expresses a view, before passing the decision onto the Secretary of State. This weak, secondary advisory role for the animal welfare body suggested that welfare considerations will carry very limited weight within decision making. It also reflects the wider weakness in the skeleton regulatory framework, which concentrates too much process making and decision making powers in the person of the Secretary of State.

The disparity between the significant risks to welfare that precision breeding through gene editing presents, and the paucity of the safeguards in the Bill, mean that a fundamental rethink is required. **We support amendment 1 from Caroline Lucas MP, which would remove animals from the scope of the Bill.**<sup>6</sup> This would allow a fresh look at the likely harms and potential benefits of precision breeding animals, informed by further evidence, and allow safeguards more commensurate with the risks to be drawn up and fully considered. This amendment is strongly supported by a range of animal welfare organisations.<sup>7</sup>

The RSPCA have proposed that the creation of precision bred farm animals be regulated by the Animals (Scientific Procedures) Act 1986<sup>8</sup>, currently the main regulatory framework for such projects. It is not at all clear how the proposals in the Bill relate to the Act. This relationship and the wider harms and benefits assessments need to be thoroughly considered before legislating to deregulate the precision breeding of animals.

Amendment 4, tabled by Jim McMahon MP and others, would also represent an improvement on the current Bill. It would strengthen the Bill's animal welfare protections by requiring the Secretary of State to consider a series of specific animal welfare factors before approving a precision breeding proposal. Amendment 12, tabled by Sir Roger Gale MP, would also provide a helpful welfare safeguard, by preventing approvals of precision breeding products whenever scientific evidence indicates that the precision bred traits are likely to have adverse welfare impacts for the animal concerned.

### **The risk to ecological health**

Farming is a part of nature, not an island isolated from it. Precision bred plants and animals will find their way into wild ecosystems. Studies in the USA have demonstrated that genetically modified crops introduced there in the 1990s now have "*feral populations that are large and widespread*".<sup>9</sup> This has

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<sup>6</sup> [https://publications.parliament.uk/pa/bills/cbill/58-03/0011/amend/genetic\\_rm\\_rep\\_1007.pdf](https://publications.parliament.uk/pa/bills/cbill/58-03/0011/amend/genetic_rm_rep_1007.pdf)

<sup>7</sup> See briefing coordinated by Compassion in World Farming  
<https://docs.google.com/document/d/1tkSMTx9llfuDAhoOgeoTGegBZvlgEvvU/edit>

<sup>8</sup> <https://www.rspca.org.uk/documents/1494939/7712578/RSPCA+response+-+Genome+Editing+and+farmed+animals.pdf/77d17c92-0bc5-6eb0-1837-1bc430fbd97f?t=1584525808480>

<sup>9</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3187797/>



implications for nature, as both genetically modified and precision bred plants and animals will in many cases have been produced to have growth advantages compared to un-manipulated counterparts.

The insertion of species with an in-built evolutionary advantage into wild ecosystems will have consequences for existing species, including closely related species occupying a similar ecological niche. Other species may be directly or indirectly affected by habitat loss and other factors.

The Nuffield Council on Bioethics have raised concerns about the Bill on these grounds, stating in their written evidence to the Bill Committee:

*“On our reading of the Bill, this means that precision bred animals that are not transgenic organisms may be released without further authorisation, without even a ‘precision bred confirmation’. Such releases could have significant effects on existing ecosystems (for example, if they should have a reproductive advantage over wild organisms of the same species). This may be a matter of significant concern to other UK and wider jurisdictions as such animals may travel freely across jurisdictional boundaries.”<sup>10</sup>*

In her verbal evidence to the Committee, Penny Hawkins of the RSPCA agreed with these concerns, highlighting that:

*“At the moment, for example, projects are under way to look at gene editing grey squirrels to result in fewer females being born or male infertility. Presumably, their breeding will also be covered by the Bill. And when they are released, they really will be released into the wild.”<sup>11</sup>*

The impact of such releases cannot be fully assessed. Skewing sex ratios and fertility rates in one species will have unforeseen impacts on other species.

Tilting inter-species balances in complex and unpredictable ways is a highly risky activity, particularly at a time of sustained environmental decline. The State of Nature report (2019) highlighted the accelerating decline of nature, with significant reductions experienced by two fifths of UK species since 1970 and 15% now facing extinction.<sup>12</sup> The impact of invasive species on native populations are listed by the report as one of the five major causes of this decline, with separate figures suggesting that globally invasive species threaten 14% of endangered terrestrial vertebrates.<sup>13</sup> The introduction of new species to ecosystems already threatens biodiversity; the insertion of populations with an in-built evolutionary advantage may have even more serious ramifications.

Releases into UK ecosystems could be on a significant scale. Each year in the UK, on conservative estimates, 40 million game birds are released from human control into the wild.<sup>14</sup> Should a future

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<sup>10</sup> <https://bills.parliament.uk/publications/47146/documents/2077>

<sup>11</sup> [https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011\\_GeneticTechnology\\_1st-8th\\_Compilation\\_08\\_07\\_2022.pdf](https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011_GeneticTechnology_1st-8th_Compilation_08_07_2022.pdf)

<sup>12</sup> <https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf>

<sup>13</sup> <https://www.sciencedirect.com/science/article/pii/S2351989421000263>

<sup>14</sup> <https://link.springer.com/article/10.1007/s10344-021-01508-z>



precision breeding project to edit the genes of a game bird species be consented, the impacts would be considerable, given the numbers involved.

Similarly, given the precarious health of our ancient woodlands the introduction of precision-bred products intended to increase timber profitability could have unforeseen consequences. Artificially introduced species already “*cause a direct change to the composition and structure of ancient woodland by replacing native trees and shrubs and their unique functions*”.<sup>15</sup> Precision breeding could further increase the severity of these impacts.

Precision breeding also enables traits that could have pronounced indirect effects on ecosystems. The most common genetically modified trait in the world is herbicide tolerance. In countries where herbicide tolerant GMO products are allowed, such as Brazil and the USA, they are arguably changed the face of agriculture, with huge negative implications for ecosystems and farmers, including rising weed resistance. Precision breeding through gene editing technology could be used to deliver similar products, with similar adverse effects.

Overall, the precision breeding of animals and plants will leave its mark on nature.

The attempted assurance contained in the Bill on these points is far from sufficient. Whilst the Bill does restrict precision breeding to changes that ‘could have resulted from’ ‘traditional techniques’ or ‘natural transformation’, these are legally vague concepts. The barrister, Dr Michael Edenborough who specialises in intellectual property law, gave evidence on this at committee stage and said: *“could have resulted from” is staggeringly imprecise. Is that “likely”? Is that “very possible”? What level of probability is it?...because of the breadth of the way in which things have been defined—in a cascading way—you have uncertainty built on uncertainty...*”

Just as with animal welfare, the potential environmental risks from precision breeding need to be given equal consideration to the potential environmental benefits. A focus only on potential gains, such as in the Defra press release on the introduction of the Bill in May<sup>16</sup>, hinders comprehensive assessment of the impacts of gene editing technology used for precision breeding.

### Impacts on farmers

It should also be noted that these ecological impacts could have negative consequences for farmers themselves. Feral crop populations and cross-pollinations between different crops could negatively impact the delicate ecosystem balance that farmers rely on to produce food. Organic farmers may no longer be able to achieve certification, due the diffusion of precision bred crops across farmed

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<sup>15</sup> <https://www.woodlandtrust.org.uk/media/49731/state-of-the-uks-woods-and-trees-2021-the-woodland-trust.pdf>

<sup>16</sup> <https://www.gov.uk/government/news/genetic-technology-bill-enabling-innovation-to-boost-food-security>



landscapes and the wider natural environment, causing direct financial harms. The high cost of patents for gene edited crops may cause financial problems for farmers across the board.<sup>17</sup>

Traceability issues will also cause problems for consumers. However safe government claims these products to be, there will still be many people who do not wish to eat them, either because of outstanding concerns about safety, or wider concerns about the kind of food and farming system they are a part of. In the absence of labelling and traceability requirements, it is unclear how government intends to facilitate consumer choice and enable traceability so that gene edited organisms can be recalled in the event that something goes wrong.

### **Addressing ecological risks through amendment 5**

The threat to nature will require mitigatory environmental measures, currently absent from the Bill.

At committee stage Daniel Zeichner MP proposed that the Bill be amended to require all regulations under it to be made in accordance with environmental principles required by section 17(5) of the Environment Act 2021.<sup>18</sup> These environmental principles have not yet been adopted by the Government. At committee the Minister said environmental principles would be published in their final form this autumn, and that section 19 of the Environment Act would require Ministers making regulations to have regard to them.<sup>19</sup>

This assurance is not sufficient. The Government's intention to publish environmental principles is not a legislative guarantee that environmental impacts will be considered when gene editing regulations are made.

**We support amendment 5, tabled by Jim McMahon MP and others, which would prevent the exercise of any powers granted by the Bill until the Government's policy statement on environmental principles is in place, providing a guarantee of environmental consideration.** It would also provide a slightly stronger duty on Ministers, requiring them to act in accordance with environmental principles when making precision breeding regulations, as opposed to just having regard.

This assured, built-in consideration of environmental impacts is necessary for regulations which could have a direct, adverse impact on nature's recovery.

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<sup>17</sup> <https://www.swissinfo.ch/eng/genome-editing-s-patent-problem-fuels-concern-for-the-future-of-food/47287668>

<sup>18</sup> <https://www.legislation.gov.uk/ukpga/2021/30/section/17/enacted>

<sup>19</sup> [https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011\\_GeneticTechnology\\_1st-8th\\_Compilation\\_08\\_07\\_2022.pdf](https://publications.parliament.uk/pa/bills/cbill/58-03/0011/PBC011_GeneticTechnology_1st-8th_Compilation_08_07_2022.pdf)



The precautionary principle should also be applied directly in law to any consents or regulatory powers under the Bill and associated guidance and secondary legislation.<sup>20</sup> This would ensure that robust safeguards for nature are built into the detail of the precision breeding regulatory regime, requiring precision breeding projects to demonstrate that they would not have adverse impacts for nature in order to be consented. A hazard-based approach to decision-making founded on the Precautionary Principle is essential for technologies as new as precision breeding through gene editing.

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*Wildlife and Countryside Link (Link) is the largest nature coalition in England, bringing together 67 organisations to use their joint voice for the protection of the natural world.*

*For questions or further information please contact:*

*Matt Browne, Head of Policy & Advocacy, Wildlife and Countryside Link*

*E: [matt@wcl.org.uk](mailto:matt@wcl.org.uk)*

*27.10.22*

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<sup>20</sup> The fundamentals of effectively applying the precautionary principle for nature can be found in this Greener UK briefing: [https://greeneruk.org/sites/default/files/download/2019-01/Briefing\\_on\\_the\\_precautionary\\_principle.pdf](https://greeneruk.org/sites/default/files/download/2019-01/Briefing_on_the_precautionary_principle.pdf)