

Viewpoint: With meat demand expected to grow by 50% by 2050, it's 'immoral' to oppose disease-resistant gene-edited animals

Gene editing research in livestock is advancing rapidly on a global basis, opening up major opportunities to improve the sustainability, productivity, health and welfare of farmed animals.

Genetic resistance to previously intractable diseases is a particular focus for much of this research, alongside other animal welfare and sustainability traits that can benefit the whole food chain and ultimately the general public.

Having signed the Genetic Technology (Precision Breeding) Act 2023 into law earlier this year, England is now part of a leading group of nations seeking to enable these techniques in livestock, alongside countries such as Japan and the USA, which have already authorised certain gene edited animals for commercial use.

This new legislation is ground-breaking in recognising the opportunity to capitalise on Britain's world-leading research base in animal genetics, as well as the promise of more sustainable, productive and high-welfare farming systems.

The Government's [national risk register](#) has highlighted a further key reason to unlock the potential of these technologies. Recently updated, the register includes highly infectious animal diseases such as Avian Influenza and African Swine Fever among the major threats facing the UK.



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The most recent bird flu outbreak has been the largest on record, with almost 300 separate cases of the highly pathogenic H5N1 virus confirmed in the UK since October 2021, and more than 8 million poultry birds unfortunately culled. Concerns over the potential for a future zoonotic pandemic also remain acute as the world emerges from the devastating impacts of COVID19.

In response to these threats, UK-based researchers at the Roslin Institute in Edinburgh are pioneering the use of gene editing to confer genetic resistance to both Avian Influenza in poultry and African Swine Fever in pigs. Indeed, [recent] [breakthrough research](#) by scientists at Roslin in collaboration with the Friedrich-Loeffler Institute in Germany was published, demonstrating a clear move forward in understanding the genetic basis of African Swine Fever resistance.

Roslin also previously led the successful development of gene edited pigs with complete immunity to the devastating porcine reproductive and respiratory syndrome (PRRS), a disease for which there is no effective cure or vaccine, and which costs the European pig industry £1.5bn in pig deaths and decreased productivity each year.

Authorisation to commercialise PRRS-resistant pigs is already being sought in the USA, and yet signals from the UK Government suggest that Ministers are in no hurry to press the green button which would allow these potentially transformative advances to reach livestock farms in Britain.

Instead, the UK Government is bowing to pressure from campaign groups such as Compassion in World Farming and the RSPCA, who wrongly claim gene editing would be a backwards step for animal welfare. Ministers may also have been influenced by a [2021 report](#) from the Nuffield Council on Bioethics, which characterised modern farming and food production as 'morally indefensible and unsustainable', and called for the use of gene editing in farmed animals to be tightly regulated to prevent welfare abuses.

As a result, Ministers are delaying the implementation of the Precision Breeding Act in farmed animals until new measures have been developed to check for animal welfare impacts in gene edited animals. Defra have indicated that this could take until 2026 or even longer.

But organisations such as CIWF, the RSPCA, and the Nuffield Council on Bioethics may have a lot to answer for if their relentless campaigns against the use of precision breeding technologies on animal welfare grounds result in higher regulatory hurdles applied to gene edited livestock in England, while in the meantime animals continue to suffer outbreaks of potentially preventable diseases. From personal experience I can only emphasise again that the single largest negative factor contributing to compromised welfare in livestock, and distress for their keepers, is animal disease resulting in morbidity and mortality.

Singling out gene edited animals for greater regulatory scrutiny compared to conventionally bred (or even animals bred using GMO techniques) is not supported by the scientific evidence. It could force world-leading research and investment into these technologies out of Britain.

And that could mean blocking access to genetic innovations which will undeniably improve welfare outcomes and alleviate suffering, such as immunity to PRRS in pigs, a particularly debilitating condition affecting both indoor and outdoor extensively reared animals, and believed to be endemic in around 30% of the pig herd in England.

These campaigning organisations claim that the use of gene editing will further intensify livestock production systems and be worse for animal welfare, but where is their evidence? How does the use of more precise technology change the already established and separate animal welfare regulations?

With global demand for meat protein set to increase by at least 50% by mid-century, we need to consider the ethical implications of not embracing these more precise, efficient and quicker methods of genetic improvement and selection – for food and nutrition security, for animal health and welfare, for climate change adaptation and mitigation, for ongoing antibiotic reduction, and for the risks of zoonoses leading to future pandemics in the human population.

The assumption that these techniques will be used to worsen welfare outcomes is misleading, facile and baseless. Do these organisations think livestock breeders are oblivious to public and consumer demands for more sustainable, high-welfare meat and dairy production? That we live in caves? That we are intent on committing commercial suicide for ourselves and the farmers we supply?

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Based on an improved understanding of animal biology, genomics and genetic function, modern farm animal breeding programmes now target and select for a much wider range of characteristics than was previously possible. The growing adoption of [Code EFABAR](#) as a broadly-based breeding industry standard is just one example of how British and European breeders across all farmed species and even in aquaculture have established an ongoing commitment to balanced breeding approaches, responsive to the views and concerns of multiple stakeholders.

More than ever before, modern breeding ensures that continued improvements in efficient production do not compromise health, robustness, welfare or environmental impacts.

In recent decades, the evidence points to major health and welfare improvements alongside productivity gains in animal agriculture across all species, thanks to a combination of advances in management, husbandry, veterinary inputs and genetics.

Whether in terms of antibiotic use, stocking densities, live transport, housing conditions, biosecurity or training, all the evidence indicates that standards of health and welfare on Britain's farms are high and improving, not poor and deteriorating.

And around the world, new research breakthroughs in precision breeding are emerging on a near weekly basis which could help drive further health and welfare gains in animal agriculture.

For example, US authorities recently cleared [gene edited slick coated cattle](#) for commercialisation, a trait intended to improve the performance (and comfort) of cattle under hotter conditions.

[Polled gene edited cattle](#) could follow soon, offering a major welfare benefit by avoiding the de-horning process currently used to prevent injury to other cattle or farm workers.

Israeli researchers have developed [gene edited hens](#) that lay eggs from which only female chicks hatch, potentially preventing the slaughter of billions of day-old male chicks each year, culled because they don't lay eggs.

And USDA scientists have developed the first [gene edited calf](#) with resistance to the deadly and highly infectious bovine viral diarrhoea (BVD) virus.

Through the Precision Breeding Act, the opportunity exists for the UK to pioneer and deploy developments like this, and to help transform the health and welfare of farmed animals. With its world-leading research base in animal genetics, Britain is an attractive location for global animal genetics businesses to invest and drive dissemination of these technologies.

But in such a fast-moving field of genetic science, and given the urgency of the food security and climate challenges, potential investors need regulatory clarity, proportionality, and predictability.

Europe is also now turning its attention to the issue of gene editing in livestock, with an information-gathering review under way, led by the European Food Safety Authority (EFSA). The EU has already demonstrated, through the rapid development of regulatory plans to ease restrictions on gene edited crops, that it can move at pace when challenges of conflict, climate change and cost of living pressures conspire to threaten food security.

I would therefore urge the UK Government to act sooner rather than later to bring forward the secondary legislation needed to give force to the Precision Breeding Act in farmed animals. Safeguarding animal health and welfare is critical, and blocking the potential opportunities afforded by these technologies could result in worse outcomes, particularly as population growth and a changing climate increase the threat of new and evolving livestock diseases.

The Roman Emperor Marcus Aurelius reportedly observed: "You can commit injustice by doing nothing". So, just as modern agriculture uses established technologies like vaccines for treatment of some diseases, contributing to the increased survival and welfare of millions of animals today, I hope that new breeding technologies will be given the opportunity to deliver the same or even greater outcomes.

Craig Lewis was raised on a family farm in Herefordshire. He has advanced degrees in Animal Behaviour/Welfare and Animal Breeding/Genetics, including a PhD at the Roslin Institute, University of Edinburgh. Craig currently works with pig producers from developing farmers in Africa to multinational integrated food businesses. He is also the current chair of the steering committee for the European Forum for Farm Animal Breeders (EFFAB).

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