Written evidence from Alternative Proteins Association (ENB0003)

Q1. What are the UK's key strengths in the area of engineering biology?

Cellular agriculture represents an impactful and neglected field through which the United Kingdom can maximise the economic potential of engineering biology developments. Cellular agricultural proteins include cell-cultivated meat, and proteins produced via other biotechnological processes, such as precision fermentation.

Intensive animal agriculture is associated with many critical challenges facing the UK. It significantly contributes to climate change and environmental degradation, accounting for ~14.5% of global greenhouse gas emissions, causing considerable habitat loss, and serving as a leading cause of deforestation.[1] It threatens domestic food security by relying on very inefficient methods of food production. It also poses multiple public health risks, including the spread of zoonotic diseases, the promotion of antibiotic resistance, and the increase of chronic diseases such as diabetes, obesity, and cardiovascular disease. All of these impacts come with associated negative economic externalities.

Just as the energy transition is facilitating green growth and economic opportunity, the protein transition is poised to stimulate economic growth, bolster food security, and drive substantial environmental benefits.

The nascent UK cultivated meat market is expected to grow significantly - one analysis projects the market will grow to between £850 million and £1.7 billion by 2030.[2] More broadly, the global alternative proteins market is expected to be worth £226 billion by 2035 - twice the value of the UK construction sector - even under the least optimistic scenario.

A report by Oxford Economics predicts that the cultivated meat industry alone will support 9,200-16,500 jobs across the UK in 2030. They also predict an employment multiplier of 2, meaning that for every 100 jobs in the industry, a further 100 will likely be supported elsewhere in the UK economy in that year.

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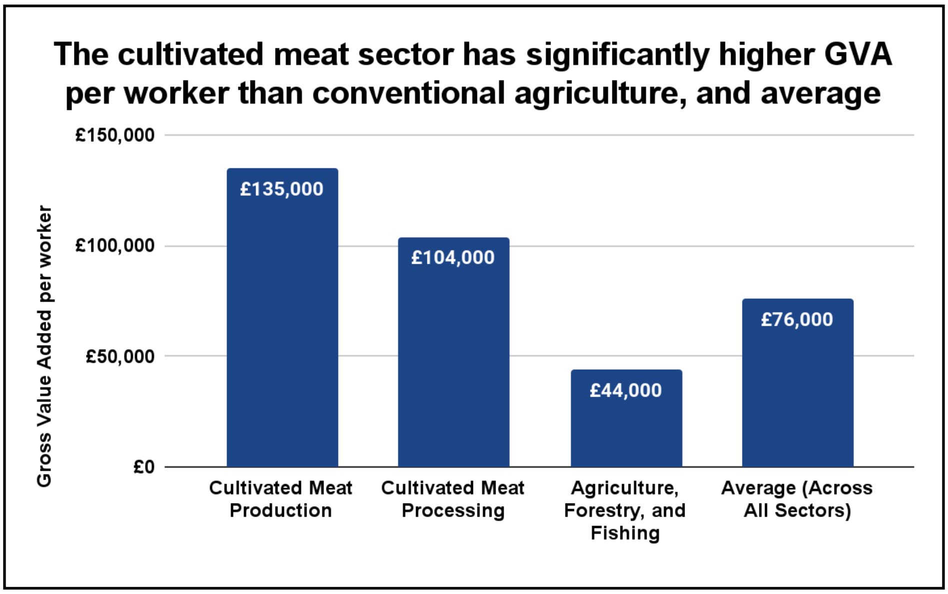
[1] https://openknowledge.fao.org/server/api/core/bitstreams/e1afd815-5a76-4b88-beac- fb9bc0e92001/content

[2] https://www.oxfordeconomics.com/resource/the-socio-economic-impact-of-cultivated -meat-in-the-uk/

Furthermore, many workers in this field will be from high productivity professions, such as science and technology. In the production and processing sectors of the cultivated meat industry, for example, workers are expected to have much higher productivity, at £135,000 and £104,000 gross value added per worker, compared to that of the average worker in the agriculture, forestry, and fishing sector, or the average UK worker, who are expected to generate £44,000 and £76,000 GVA per worker respectively. The total economic output and employment sustained by the cultivated meat sector is also expected to generate £266m-£523m in tax revenues in 2030.[3]



Whilst these figures do not account for potential displacement effects, the fact that the UK is currently heavily reliant on imports (60% of pork and 35% of beef consumed in the UK is produced overseas) implies that cultivated meat production could complement UK domestic food production, reducing our need for imports rather than displacing domestic animal protein production.[4] This implies that a protein transition that maintains farmers' job security and bolsters domestic production is achievable.

Whilst there has been some concern over recent indications that market growth is slowing, it is rare for new technologies to experience uninterrupted growth. In fact, growth rate data from Green Alliance shows a clear S-curve, typical of the adoption of new products.[5]

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[3] https://www.oxfordeconomics.com/resource/the-socio-economic-impact-of-cultivated -meat-in-the-uk/
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Moreover, the alternative protein industry can significantly reduce the negative economic externalities associated with animal agriculture. For example, if the UK population ate meat-free lunches on weekdays, improved health outcomes could save the NHS £2.2 billion annually. Implementing meat-free defaults - a low-cost and unobjectionable intervention - would save the NHS £74 million annually.[6]

Cellular agriculture therefore has significant direct and indirect economic potential. This industry's current growth rate provides a unique opportunity to ensure that this growing industry benefits the UK. Government policy at this juncture will determine how much of this growth accrues to the UK.

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[5] https://green-alliance.org.uk/wp-content/uploads/2023/08/Appetite_for_change.pdf

[6] https://bryantresearch.co.uk/wp-content/uploads/2024/02/2billion-NHS-Windfall-CAWF. pdf

Q3. How can Government policy support the development of engineering biology?

The cellular agricultural industry is still in its infancy, and primarily requires increased funding and government backing to support its development.

The majority of this industry's funding to date has come from private sources, such as venture capitalists and impact investors. While a dynamic industry is a crucial part of the alternative proteins ecosystem, public investment fills a very different role compared to private sector investment. Unlike companies, which are bound by short-term profit-making margins and often wish to protect their innovations, public funds can be invested into long-term, forward-looking R&D questions that catalyse progress and maximise public benefit.

Government policy can support the development of engineering biology through relatively small interventions in the regulatory system. Currently the FSA takes an average of 2.5 years to approve regulated products including new cultivated or fermentation based foods. In comparison to other jurisdictions such as the USA, Canada, Singapore, Australia and New Zealand, where average approval times are 9 - 12 months. This means that many businesses are deciding to move to other jurisdictions and avoid the UK due to these delays. The long approval process is due to a lack of resources in key areas of the FSA. Through DSIT, innovative approaches to tackling these bottlenecks are being explored, such as 'regulatory sandboxes' ; however the proposals are for £1-2m funding pots for 2 year projects. A £10m investment in alleviating these bottlenecks in wider 'regulatory sandboxes' would unlock potential in engineering biology. Particularly given the backdrop of £90m invested in alternative proteins R&D through UKRI, which heavily supports early stage companies but fails to enable access to market for these products.

In recent years, alternative proteins have begun to receive considerable public investment from governments worldwide. It is estimated that the total level of public investment in alternative proteins to be over $1 billion, with $635 million being invested in 2022.[7] However, to fully realise the economic potential of this industry, much more is needed.

For example, a Global Innovation Needs Assessment commissioned by the UK government found that the alternative protein sector could support 9.8 million jobs and $1.1 trillion in economic value by 2050, but only if governments worldwide commit $4.4 billion to R&D and $5.7 billion to commercialisation on an annual basis.[8]

Compared to the $1 billion of public investment to date in alternative proteins, governments have allocated over $1.34 trillion towards clean

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[7] https://gfi.org/resource/alternative-proteins-state-of-global-policy/

[8] https://www.climateworks.org/wp-content/uploads/2021/11/GINAs-Protein-Diversity.pdf

energy initiatives since the start of this decade alone. Alternative proteins are now the most effective investment to achieve climate impact, offering the highest CO2eq savings per dollar of invested capital of any industry - three times higher than the comparable return in the cement, transport, or aviation industry.[9] As with other sustainable technologies, the UK government must invest now to maximise this industry's economic and environmental potential.

The UK also has several sources of competitive advantage, including a burgeoning domestic industry and significant consumer demand for alternative protein products. If the UK government capitalises on this growing market and provides appropriate investment and regulation, the UK industry could be worth up to £6.8 billion annually.[10] Government support, however, is crucial; without intervention, it is likely that most alternative protein products bought in Britain will be made elsewhere.

Many governments are embracing this growing market. The Canadian government has invested $100 million into developing alternative proteins through their Protein Industries Supercluster.[11] In 2020, Singapore established itself as a global leader in food biotechnology, becoming the first country to approve the commercial sale of cultivated meat. The US has since followed suit in 2023.

To ensure the UK reaps the benefits of this burgeoning industry, increased funding is therefore key. Currently the UK has a strong track record at supporting early stage companies in R&D, however falls short in financing for infrastructure and simple and robust paths to market.

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[9] https://www.bcg.com/publications/2023/taking-alternative-protein-trends-mainstream

[10] https://green-alliance.org.uk/publication/appetite-for-change-why-the-uk-should-lead -the-emerging-alternative-proteins-market/

[11] https://torontosun.com/news/local-news/feds-kick-in-100m-to-help-plant-based-food -industry -sprout

Q7. What are the possible barriers and limitations to good and effective use of engineering biology?

Supporting positive public perceptions of cellular agriculture is crucial to realise the industries economic and environmental potential. The UK government can facilitate this in a number of ways.

Firstly, to remain internationally competitive, novel food regulations should be modernised and streamlined. A formal process should be established for pre-application consultations to increase information and reduce risk for companies. An expedited approval process should also be established for products which are already approved overseas. This will prevent unnecessary delays which could stymie industry growth and diminish the UK's current competitive advantage.

Secondly, novel proteins such as cultivated meat must be protected from unnecessarily burdensome labelling regulations. While some seek to preserve labels such as 'meat' or descriptors such as 'steak' solely for animal-based products, this risks damaging public perceptions of cellular agricultural products and spreading consumer misinformation. Regulations should allow for common-sense labelling that prevents negative perceptions or confusion.

More broadly, further barriers in cellular agriculture include a demand for high worker skill sets, and significant investment to effectively develop and grow these technologies at scale. Here, the UK has a valuable competitive advantage. The UK has a well-established presence in the cellular agriculture sector and, compared to many countries, possesses substantial public funding mechanisms that could be leveraged to support this industry. Building on this foundation, the UK could develop cellular agriculture technologies domestically, refining them for global markets, particularly in low and middle income countries where meat consumption is rising. By investing in and exporting these sustainable biotechnologies, the UK is well-positioned to become a global leader in this emerging field.

The UK government is therefore well-placed to tackle the barriers and limitations currently facing the cellular agricultural sector.

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