

Technical, socio-political, and regulatory challenges in **cultured meat**

Dr Neil Stephens

University of Birmingham

[@DrNeilStephens](#)

N.Stephens@Bham.ac.uk

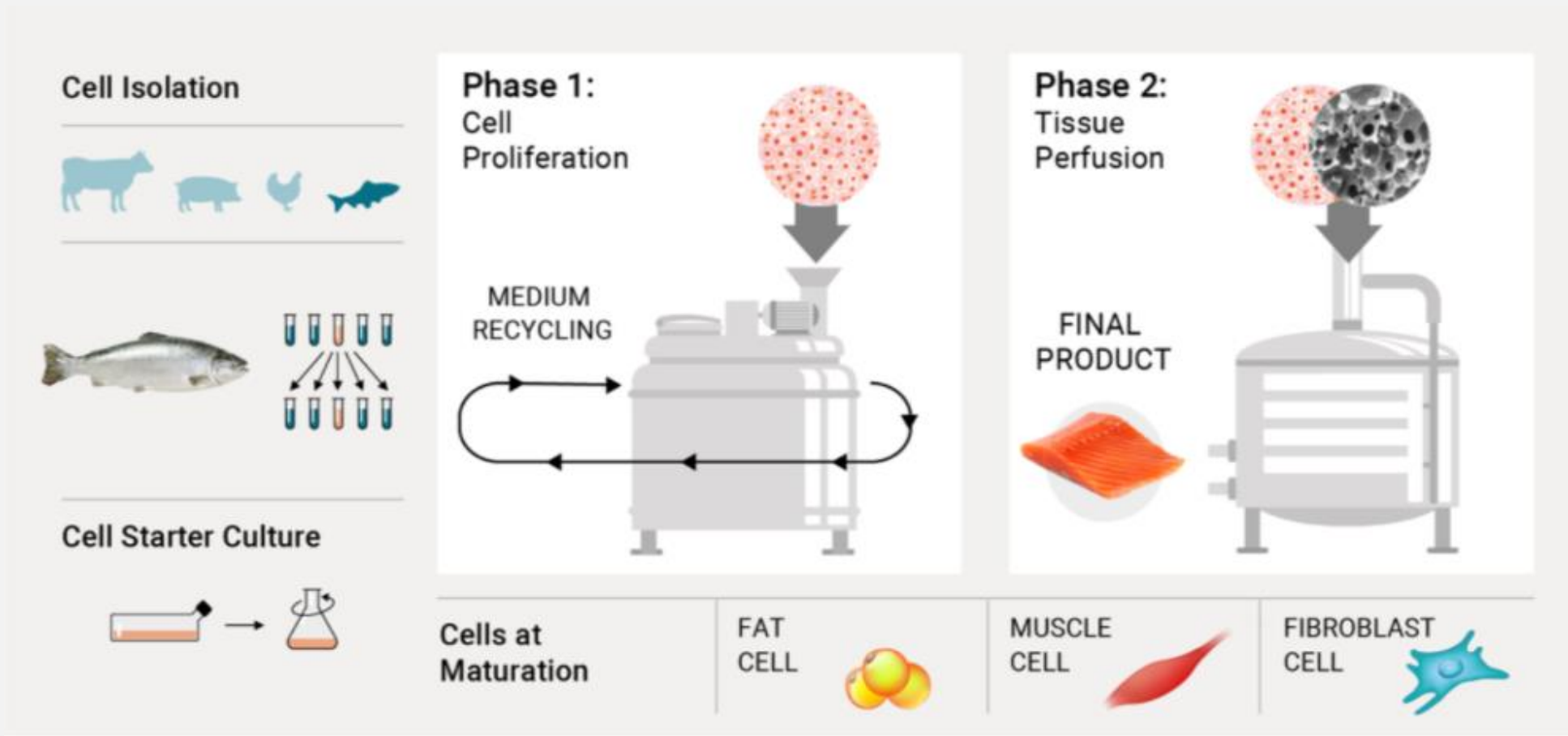
Parma Summer School 2021: Food Safety Aspects of Integrated Food Systems
28 – 30 September 2021





19th December 2020 a table of five sat down in Singapore restaurant 1880 to eat and buy the world's first commercially bought cultured meat meal, chicken nuggets produced by Eat Just Inc.





Good technical review papers:

Post, M. J., Levenberg, S., Kaplan, D. L.,... & Moutsatsou, P. (2020). Scientific, sustainability and regulatory challenges of cultured meat. *Nature Food*, 1(7), 403-415.

Stephens, N., Di Silvio, L., Dunsford, I., Ellis, M., Glencross, A., & Sexton, A. (2018). Bringing cultured meat to market: Technical, socio-political, and regulatory challenges in cellular agriculture. *Trends in Food Science & Technology*, 78, 155-166.

Open access

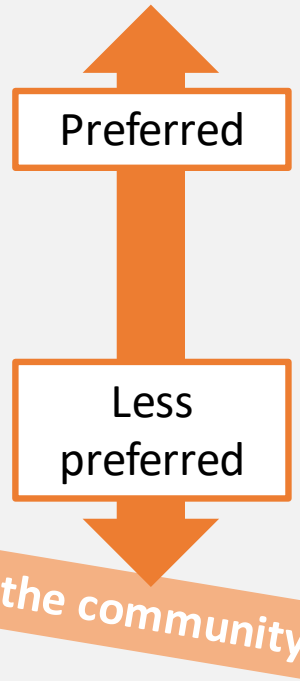
Nomenclature

Cultured meat, aka cultivated meat, aka cell-based meat, aka clean meat

aka **in vitro meat** aka **cell-cultured products**

aka **lab-grown meat, aka synthetic meat, aka Frankenstein meat**

aka **artificial muscle proteins**



Stephens, Sexton, & Driessen (2019). *Making sense of making meat: key moments in the first 20 years of tissue engineering muscle to make food*. *Frontiers in Sustainable Food Systems*. 3, 45.





Cultured meat wave 1

University based

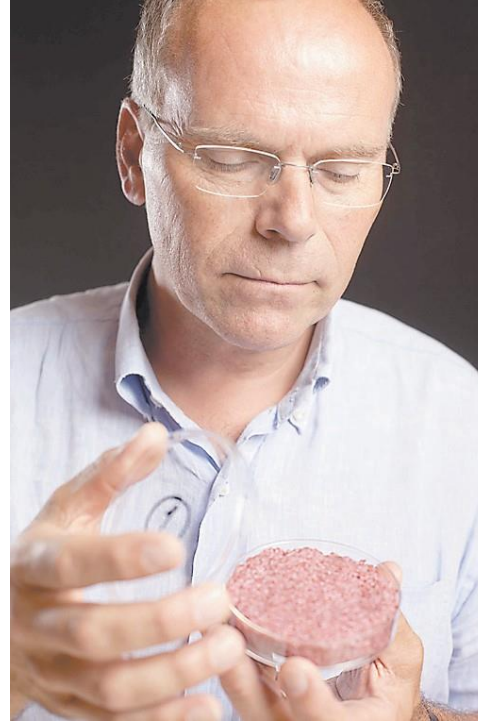
Academic institutions

'in vitro meat' – 'cultured meat'

Struggled for funding

Seen as 'strange'

2000-2013/4/5



2013

Cultured meat wave 2

Start-up / venture capital driven

'cultured meat' – 'clean meat' – 'cell-based meat' – 'cultivated meat'

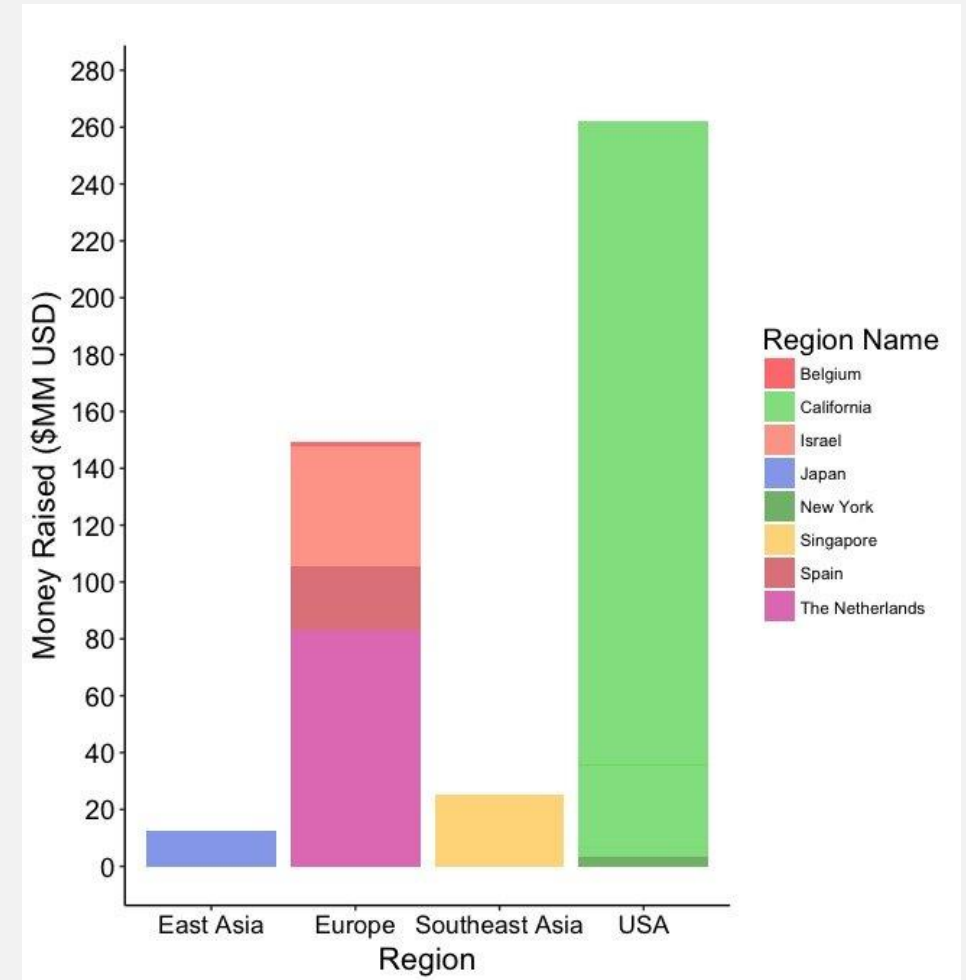
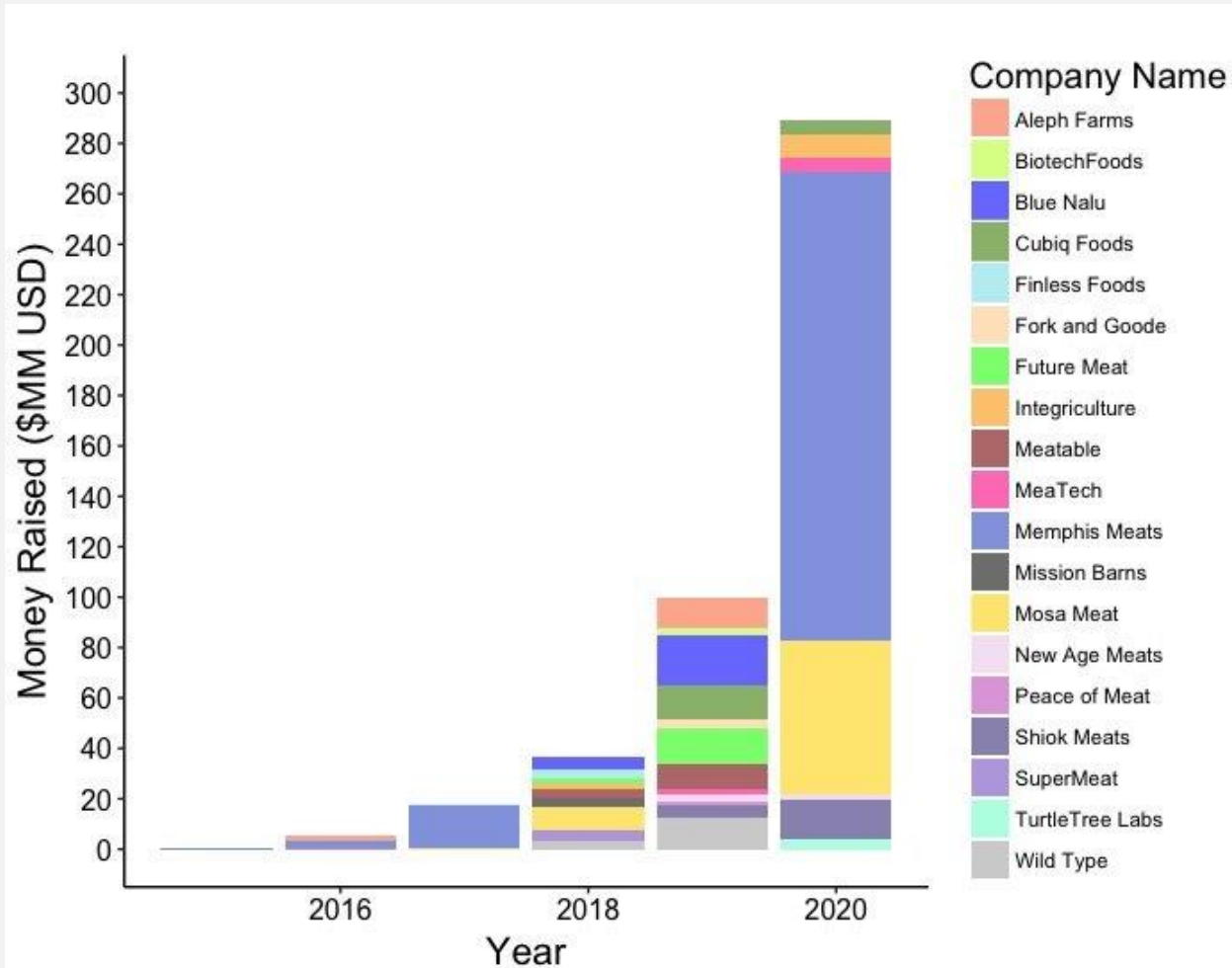
Well funded

Shortage of skilled labour

2013/4/5 +

Stephens, Sexton, & Driessen (2019). *Making sense of making meat: key moments in the first 20 years of tissue engineering muscle to make food*. *Frontiers in Sustainable Food Systems*. 3, 45.

Publicly announced **money raised** in B2C companies strictly focused on cultured meat (October 2020) .



The promissory narratives of cultured meat



Environmental reasons: less greenhouse gases, energy, water, land



Significantly reduced use of live animals and thus reduced **animal suffering**



Healthier meat free from animal-borne diseases and anti-biotic build up



More opportunity for **food innovation** creating novel meals



Producing a reliable source of meat during long distance **space travel**



To produce **money**, both for the benefit of corporations and national economies







Cultured
bacon
and pork
belly



Hs
Higher Steaks



Cellular Aquaculture Food Facility Design



Exterior Rendering

BlueNalu has developed the first comprehensive plan for commercial production of cell-based seafood products.

Our 150,000 sq. ft. food facility is designed to serve a population of 10-20 million people, and we plan to build facilities around the world that meet the needs of consumers in each market.

<https://www.bluenalu.com/pr-82219images>



Cellular Aquaculture Food Facility Design

In the BlueNalu process, we will grow large volumes of natural fish cells in food production tanks, and then combine them into seafood products that consumers love, in a way that is healthy for people, humane for sea life and sustainable for our planet.



Interior Renderings

Our facility design incorporates three production lines, in which an array of value-added seafood products will be produced and then distributed to restaurants, retail supermarkets, and consumers at home.

What are the technical issues for cultured meat?

Cell selection

Medium

Scaling up, bioreactors, automation

Biomaterials

Post, M. J., Levenberg, S., Kaplan, D. L.,... & Moutsatsou, P. (2020). Scientific, sustainability and regulatory challenges of cultured meat. *Nature Food*, 1(7), 403-415.

What might the impact of cultured meat be? – some indicative talking points

Will it be **successful** in the market? (be good, safe and cheap enough?)

What will the **environmental** impact of cultured meat be?

- (micro level) Kilo by kilo comparison to meat and plant-based proteins
- (macro level) system wide impact on food production (addition vs substitution effects, unintended consequences)

What will be the impact on the **food system**?

- In rural economies
- On concentration of power
- On global trade patterns

What will be the impact upon **publics** and **consumers**?

- Identity
- Inequality and social justice

How should cultured meat be regulated?

Key issues usually listed as:

Safety: What safety standards and testing regime is required?

- eg: one big uncertainty: will it be genetically modified or not?

Labelling: What can it be called? What should be on the packaging? What health/environmental claims can be made?

Stephens, N., Di Silvio, L., Dunsford, I., Ellis, M., Glencross, A., & Sexton, A. (2018). *Bringing cultured meat to market: Technical, socio-political, and regulatory challenges in Cellular Agriculture*. *Trends in Food Science & Technology*. 78, 155-166

Thank you for your attention

Happy to take any questions

Neil Stephens

Wellcome Trust Research Fellow

University of Birmingham

N.Stephens@Bham.ac.uk

 **@DrNeilStephens**