Public investments in synthetic imitation of food

National level

The Netherlands: already in 2005, the Dutch government started to fund a research program to boost cellular agriculture through its investment agency, Senter Novem. The project secured around €2 millions of funding from the interdepartmental program called 'Program of Sustainable Food Systems' and included the Universities of Utrecht, Amsterdam and Eindhoven and lasted four years[1]. This initial project led to the creation, in 2013, of the first lab-grown imitation of a burger. More recently, in 2022, the Dutch government announced that it will earmark **€60 million** in its National Growth Fund into building up the cellular meat and agriculture ecosystem. The aim of the announced investment is to support the creation of an ecosystem around lab-grown imitation of animal proteins (meat and dairy). More specifically, the money will go towards education, academic research, publicly accessible scale-up facilities, societal integration and innovation.

Spain: in 2021, the Spanish government funded a **€5.2 million** project consortium[2] within the innovation cluster Food+1, and led by BioTech Foods with the aim to investigate the benefits of lab-grown imitation of meat. More specifically, the bio-science company will use the funds to boost R&D activities in the improvement of its growth serum formulation, with the support of ingredients producers and, later on, of meat processors in order to develop a more consumer-oriented product. The project is also oriented to deliver a nutritionally improved product, notably by preventing the formation of cancers (in particular, colon), and dyslipidemia (high concentration of cholesterol and lipids in the blood).

Belgium: in 2020, the Flemish government granted **€1.2 million** to the start-up Peace of Meat -specialized in the development of lab-grown imitation of animal fat cells- as part of the €3.6 million "Foieture project", and initiative (partially public funded) that aims at the development of competitive cell-grown foie gras. The Consortium, besides Peace of meat, includes Flandres' Food, Solina, Nauta, biobased Europe, KU Leuven.

France: in 2021, France's public investment organisation, Bpifrance invested (together with the European Commission and other partners) in Gourmey, a French-based start-up in the business of developing lab-grown imitation of poultry meat. The amount of the total seed funding round for the start-up reached €56 millions, but information on the amount of BpiFrance's share in the investment was not disclosed.

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[1] Stephens, Sexton and Driessen, "Making sense of making meat: key moments in the first 20 years of tissue engineering muscle to make food". Frontiers in sustainable food systems, 10 July 2019. https://doi.org/10.3389/fsufs.2019.00045

[2] The name of the project is CULTUREDMEAT and, besides the leader of the consortium, Bio Tech Foods, other actors are involved: Argal, Marinez Somalo, DMC Research, BDI Biotech, Neoalge, BTSA, Agrowingdata. More research organisations collaborate with the project: CTIC CITA, Oviedo university, Autonomous university of Madrid, Tecnalia Research and Innovation, Barcelona Science Park, the Research Foundation of the university of Seville, Vicomtech, university of Granada, the research institute Biodonostia and CIC Biomagune. The project is co-funded by the European Commission as well.

Norway: Norway started to develop synthetic imitation food industry since 2018, with its public-funded project called 'GrowPro' (2018-2021) which aimed at "finding a growth medium in which the cells thrive, and which is also sustainable". It received funding from the Research Council of Norway, and cooperated with Maastricht University, NTNU, Notura AS, Norilia, and MosaMeat for a total of around **€1 million**.
In 2019, the 'Protein 2.0' project -focused on the 'biosynthetic protein transition', and notably on the assessment of the impacts, outcomes and opportunities for the 'post-animal bioeconomy', was kicked off and managed until 2022 by Ruralias, the public institute for rural and regional research. It received public funding of **€964 635**[3].
In 2021, the Agricultural and Food Industry Research Fund, in partnership with Nofima started a second project on precision-fermentation derived eggs and milk, called 'Precision'. It will run until 2025 with a total budget of around **€675 240**.
The 'ARRIVAL' project -short for Arrival of Cellular Agriculture Enabling Biotechnology for Future Food Production- will be funded by the Research Council of Norway, a government agency with an annual budget of **€2 million**, and headed by the Norwegian Institute of Food, fisheries and aquaculture research (Nofima). The project will officially kick-off in 2023 and run until 2027 with the goal of developing cell-based agriculture technology as a mean to produce the 'food of the future'.

UK: Roslin Technologies received £1 million[4] (around **€1.2 million**) government grant to develop and commercialize stem cell lines in 2021. This action finds its place within the UK Government's Transforming Food Production program, included within the wider UK Research and Innovation body. This program intends to make food production more efficient, resilient, and sustainable, aiming at reducing the emissions linked to food production systems. Alternative proteins, among which lab-grown imitation of cells and precision fermentation, are considered by the UK government a key tool to reach the net-emission targets.

United States of America: the US government has been one of the first, together with the Dutch one, to dedicate some financing to projects related to the development of cell-cultured imitation of meat. In this case, in 1999, the US funded a project sponsored by the NASA, the US space agency, to explore possibilities to grow meat in a lab (possibly to be used in space), accounting for around €61 000.

More recently (2020), the University of California received a $3.5 million[5] grant from the National Science Foundation (an independent federal agency) to develop cell lines, improve (plant-based) growth media and nutritional outlook of the outcome and provide educational tools.
Moreover, during the same year, public action in financing the development of lab-grown imitation of meat came in the form of a USDA (US agriculture ministry) $10 million partnership with Tufts University earmarked to create the National Institute for cellular agriculture, a flagship American cultivated protein research center. The project will be developed by a consortium of US-based universities such as Virginia tech, Virginia State, University of California-Davis, MIT, University of Massachusetts-Boston.

More investments have been done by US agencies in projects aimed at developing some part of the production-chain of cultured imitation of meat. The funding lines are reported below, together with the year of the funding and the receivers:

[3] Convertion rate of October 16th, 2022: 1 NOK=0.096€
[4] Convertion rate of October 16th, 2022: 1 £=1.15€
[5] Convertion rate of October 16th, 2022: 1 $=1.01€

2012: 92 488€, awarded to Modern Meadow
2019: 750 000€ awarded to Emergy Corp
2020: 250 000€, awarded to Cambridge Corp / 2021: 250 000€ (phase II)
2021: 19 000€, awarded to Tufts university
2021: 265 000€, awarded to Boston meat
2021: 265 000€, awarded to Novel Farms
2021: 256 000€, awarded to Fybraworks Food
2022: 995 000€, awarded to University of California
2022: 604 000€, awarded to University of California
2022: 605 000€, awarded to University of Kansas, Xiuzhi Sun

China: **lab-grown** imitation of **food is mentioned as one for the sector on which the Chinese government's 14th five-years plan is investing on**, marking the first-time alt-protein has been specifically mentioned in relation to top-level economic development guidelines issued by the country's government. 20 million Yans (almost **€3 million**[6]) are supposed to be earmarked to finance alternative proteins in publicly funded R&D projects, launched under the 2020 'Green Biological Manufacturing' program and for which cell agriculture is specifically mentioned as one funding branch.
At the same time, in 2021 the government announced that it will finance the three-year project called 'High-efficiency biological manufacturing Technology of artificial meat", led by Jiangnan University.

Japan: the Japanese Centre for Rule-Making Strategy will be in charge of the organization of the Japan Association for Cellular Agriculture, a consortium that will gather as far as 70 entities working closely with some aspects related to cellular agriculture. The group will aim to investigate and advise the health ministry about safety concerns of synthetic imitation of meat.
At the same time (2020) the Japanese Authority Grant opened for a $2 million fund dedicated to national start-up in lab-grown imitation of meat called IntegriCulture Inc.

Israel: In 2022, Israel Innovation Authority announced the creation of a Cultivate meat consortium, earmarking $**17.2 million** in funding. The project aims to develop more efficient, cost-competitive production methods and pilot scale-up opportunities. The project is part of the Israeli innovation Authority's magnet Consortiums Program which advances pre-competitive generic R&D. The consortium is made up by ten academic laboratories and fourteen companies. It is led by The Good Food Institute Israel.

Qatar: in 2021 a partnership between Qatar Free Zones Authority and Doha Venture Capital was created to build the first cultured imitation of meat production facility in the Middle East and Northern Africa region. The project involves company's Eat Just cultured imitation of meat division 'GOOD meat' as a leader of operations. The totality of investment, coming from the three actors, amounts at $**200 million**.

South Korea: in May 2022, the South Korean Ministry for Trade, Industry and Energy adopted a **€15 million** research project (to be given to the receivers during a period of five years) to foster research on cultivated meat. The lab-grown imitation of meat start-up 'Space F' along with other four partners is the responsible of the consortium which objective is to

[6] Convertion rate of October 16th, 2022: 1 CNY=0.14€

investigate the development and industrialization of the synthetic imitation of meat production equipment, with a view on commercialization.

If it was to be made a sum of globally public money already invested in projects aiming at improving the production of lab-grown imitation of meat (closed and on-going), the indicative figure would amount a bit over **€133 million** (at the $/€ exchange rate of October 16th 2022).

The Netherlands is by far the government that invested the most in cell-based agriculture with around **€62 million** of public investment (cumulative), followed by the **US** with around **€18 million**, and Israel, with €17 million. Fourth comes South Korea Korea with €15 million of public investments and then the **EU** (European Commission), with **€9 million**.

European Commission

The European Commission finances lab-grown imitation of meat through several financing programs: Horizon 2020, Eurostars, React-EU, EIT Food.

Over the past years, €194 420 492 have been invested by the Commission in alternative proteins, €9.1 millions[7] of which have been already invested by the Commission in the development of technologies that will help develop, market, scale up and industrialize the production of *synthetic -lab-grown- animal proteins*.

To this figure, it should be added the amount that the EU is planning to finance other projects in the coming years (until 2027), such as EIT Food, and the on-going expenditure for projects under Horizon Europe and the one foreseen, of over €442 000 000[8], on alternative proteins (included synthetic imitation of meat and precision fermentation projects).

Horizon2020

Between 2017 and 2022, Horizon 2020 (H2020), the EU program which finances projects aimed at boosting cutting edge research and technologies in Europe, four projects about **synthetic imitation of meat** have received EU funding:

1. "Cultured Beef" is a project that, by supporting a start up in Spain, aims at developing a production process for cell-cultured imitation of beef meat. It received **€ 50 000** from H2020.

2. "Sustainablemeat": by financing the French SME Gourmey the project targets the reduction of production costs of lab-grown imitation of foie gras, notably by developing a cost-effective and scalable method and re-risk core aspects of production. The project received **€ 50 000** worth of EU public funding.

[7] Considering the on-going Horizon 2020 projects, Eurostar's, React-EU, EIT Food (2017-21 budget).
[8] Considering the 2021-22 Horizon Europe working program (GIANT LEAPS project) and EIT financing (whose 2021-2027 provisional budget amounts at €591 million, of which €431 come from EIT).

3. "Meat4All": general objective of improving the competitiveness of the synthetic imitation of meat industry by advancing production technology, improve market acceptance, conduct safety assessments, improve industrialization and commercialization of the sector. The project works at developing skeletal muscle cells that proliferate form tissue while producing a protein-rich extracellular matrix, an animal-free culture media (fetal bovine serum free). Meat4All received **€ 1 906 961** in European public funding.

4. "CCMeat": by funding an SME in Iceland (Bioeffect), the project aims at developing affordable, endotoxin-free growth factors for meat imitations lab-grown industry. The project received **€ 2 500 000** from EU financing.

Moreover, The European Commission has financed several projects on **alternative proteins** (including insects, plant-based animal protein alternatives, microalgae, etc.), totaling **€ 40 472 116**:

- NexGenProteins (2019 – 2023), **€7 985 149** of Eu funding, focusing on microalgae, single-cell protein and insects 'as a promising source of alternative proteins', working on 'boost[ing] the acceptability and trust of consumers towards alternative proteins and processes.

- SMART PROTEIN (2020-2024), **€ 8 179 214** of Eu funding, addressing microbial biomass proteins created for edible fungi.

- ProFuture (2019-2023), **€ 7 775 109** of Eu funding, 'will evaluate advances systems to produce single-cell proteins and proteins isolates […] [that] will be incorporated in foods and feed produced at an industrial level'.

- SUSINCHAIN (2019-2023), **€ 7 952 547** of EU funding, aims to 'increase the economic viability of the insect market by overcoming existing obstacles to scaling up the insect value chain in the EU'.

- MAGNIFICENT (2017 – 2021), **€ 5 330 259** of EU funding, on microalgae

- YEASTCELL, (2013-2017), **€ 3 066 365** of EU funding, on training for researcher in the yeast biotechnology sector (thus, fermentation).

- SynBioGov, (2021-2024), **€ 183 473** of Eu funding, on the framework and responsible governance of synthetic biology.

Horizon 2020 finances, amongst others, the European Institute for Innovation and Technology (EIT)[9], a network of hubs with specific focused-areas aiming at financing research projects and innovation. Its "Knowledge and Innovation Communities" include focused groups on climate, digital, health, energy, manufacturing, raw materials, urban mobility, and food (more on EIT Food below). Only in 2023, according to the draft EU budget, **EIT communities** are supposed to receive € 351 093 932[10].

[9] EIT overall mission is "to boost sustainable European economic growth and competitiveness by reinforcing the innovation capacity of the Member States and the Union".

[10]The EIT ecosystem has been created in 2008 (Regulation (EC) No 294/2008). For the financial period 2021-27, the EIT ecosystem is foreseen to receive a total of € 2 936 000 000 from EU budget, plus any financing from

Horizon Europe

Horizon 2020 financing programming terminated in 2021, even if some projects that have been financed are still running. Horizon Europe is the Eu program that replaced H2020 up until 2027, and disposes of €95.5 billion of public funding to finance research and technology development in the EU and partner countries. In its calls for proposal, Horizon Europe has made available for the whole programming period (2021-2027) **€23 million** for projects intended to improve **meat alternatives** products, scale up their production, and increase consumer acceptance.

In particular, the calls for proposals are organized in the following projects: GIANT LEAPS is supposed to receive a total of *€11 000 000*[11] for "filling the gaps in the knowledge of nutritional, safety, allergenicity, and environmental assessment of alternative protein and dietary shifts" (for which cultured imitation of meat is specifically identified as a budgetary voice) -Horizon Europe working program 2021-22-. In the same years' working program, a call for proposal aimed at 'building alternative protein-friendly sustainable and healthy food environments', for which the participants would have been asked to find ways to promote the production, provision and consumption of alternative sources of proteins, is planned for a financing amount of *€12 million*.

Eurostars Program

In 2019 the European program intended to support small and medium holdings (aka Eurostars) invested **€2 678 810** in the Dutch SME 'Meatable', through its investment arm, Blue Yard Capital, with the aim to substantiate its research on the first synthetic imitation of pork prototype.

EIT Food

Within Horizon 2020, a long-term project that aims at setting the research priorities and technological discoveries for the future is EIT (European Institute of innovation and Technology). EIT, particularly, EIT Food, is a hub for research and innovation, that gathers several partners such as universities, research labs, start up, companies to finance and give support to projects and ideas, functioning as an exchange of ideas hub.

In total, the financing that EIT Food received since its creation in 2017 (up to 2020), amounts at €567,573 million, **€142 762 515** of which (25%) were EIT contribution, i.e., Horizons funds, i.e., EU public financing.

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private partners. EIT Food has been introduced in the EIT ecosystem in 2017 (https://eit.europa.eu/sites/default/files/EIT_Strategic_Innovation_Agenda_Final.pdf)

[11] The funding is dedicated for all animal-alternatives protein sources, including plant-based replacement. However, synthetic meat is also envisaged, as the Dutch producer Mosa Meat is part of the consortium.

For the current EU financing period (2021-2027), EIT Food is foreseen to receive a total of €591,15 million, **€431 millions** of which (72,9%) will be sourced by the Commission[12].
If summed up, the EIT Food investments of the 2017-2027 decade reaches € 1 158 723 000, of which €573 762 515 coming from the Commission.

Clearly, not all of the funding will be dedicated to the development of the synthetic imitation of meat industry, but a high percentage will, as the 2022 EIT Food's initiative on "Cultivated meat innovation challenge", suggests.

REACT-EU

Recently, following the disruption that the Covid-19 pandemic brought to the markets, Member States made available additional funding to be channeled through the European Commission's traditional programs to improve the support to the poorest and the most affected sectors. Through the 'REACT-EU' (Recovery Assistance for Cohesion and the Territories of Europe) - part of the more general 'Next Generation EU' recovery package-, in fact, the European Commission channels the additional €50.6 billion through its EU Regional Development Fund, the EU Social Fund, the EU fund for aid and the most deprived, the Youth Employment Initiative.
In this context, **€ 2 000 000** have been allocated to two European companies in the imitation of meat grown in a lab industry: the Dutch Mosa Meat and the Belgian Nutreco that lead the 'Feed for Meat' project[13], whose final aim is to reduce the costs of growth media for cultured cells.

[12] 2017-2020: https://www.eitfood.eu/media/documents/EIT-StrategicAgenda-Booklet-A4-Final_disclaimer.pdf ; 2021-2027: https://www.eitfood.eu/files/EIT_Food_Strategic_Agenda_2021-2027_2022-08-09-105519_eqpx.pdf ; EIT grants: https://eit.europa.eu/our-communities/eit-innovation-communities/grants-awarded

[13] In response, Italian MEPs asked the Commission to clarify its action https://www.europarl.europa.eu/doceo/document/E-9-2021-005095_EN.html

Annex

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Future	Total	
NLD							€ 2.000.000																	€ 60.000.000		€ 62.000.000	
ESP																							€ 5.200.000			€ 5.200.000	
BEL																						€ 1.200.000				€ 1.200.000	
FRA																							N/A			€ -	
NOR																				€ 1.000.000	€ 900.000		€ 700.000		€ 2.000.000	€ 4.600.000	
GBR																							€ 1.200.000			€ 1.200.000	
USA	€ 61.000													€ 92.488							€ 750.000	€ 13.750.000	€ 1.055.000	€ 2.204.000		€ 17.912.488	
CHN																						€ 3.000.000				€ 3.000.000	*Cultured meat & alterantive protein
ISR																								17.200.000 €		€ 17.200.000	
UE																			50.000 €		2.728.810 €	4.406.961 €		2.000.000 €		€ 9.185.771	
QAT																							200.000.000 €			€ 200.000.000	*Cumulated investments with private partners
KOR																								15.000.000 €		€ 15.000.000	
	€ 61.000						€ 2.000.000							€ 92.488					€ 50.000	€ 1.000.000	€ 4.378.810	€ 22.356.961	€ 208.155.000	€ 96.404.000	€ 2.000.000	€ 336.498.259	
																							*Cumulated investments with private partners				

Figure 1: Historic public investments in synthetic proteins by State. Source: European Commission, Peakbridge, National ministries
*for Qatar, the sum is comprehensive of private venture capital; for China, the sum is comprehensive of investments in alternative proteins as well, not only synthetic food.

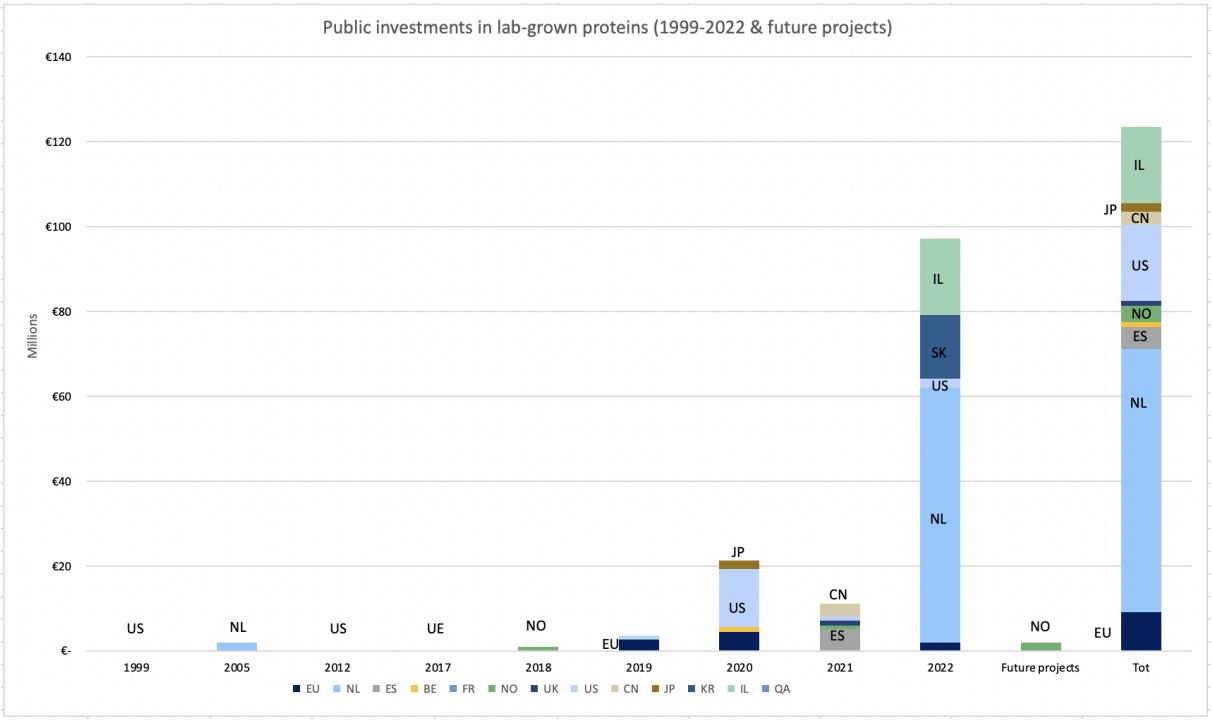

Figure 2: Historic public investments in synthetic proteins by State. Source: European Commission, Horizon 2020, EIT Food, Peakbridge, National ministries

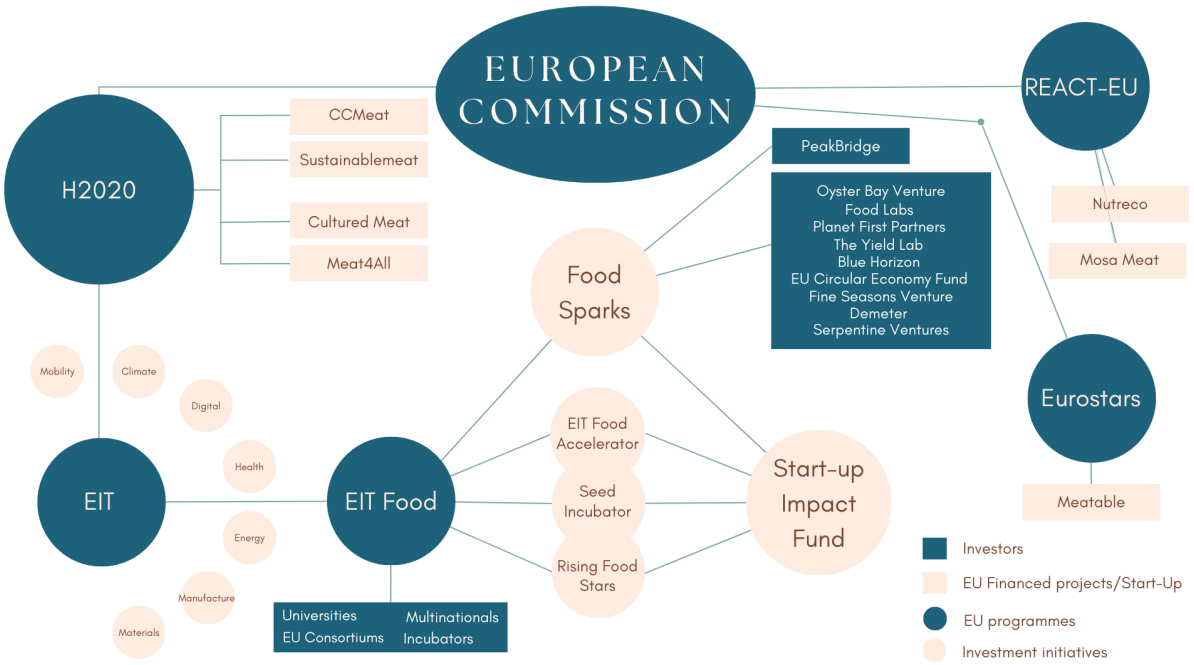

Figure 3: EU public investments in synthetic meat.
Source: European Commission, Horizon 2020, EIT Food, Peakbridge

Public actors			
INVESTOR	CORE BUSINESS	COUNTRY	FINANCE DIRECTED TO
European Commission	Public institution	Belgium	Suprême, GreenFoods Network, Mosa Meat, Nutreco, CCMeat, Meat4All, EIT Food; Mewery; Gourmey Meatable,
Government of Belgium	Public institution	Belgium	Peace of Meat, Flandre's food, Solina, Nauta, Biobased Europe, KU Leauven
Government of China	Public institution	China	Part of five-years economic programming
Government of France	Public institution	France	Gourmey
Government of Israel	Public institution	Israel	Cultivated meat consortium
Government of Japan	Public institution	Japan	Japan Association for cellular agriculture; IntegriCulture Inc.
Government of Qatar	Public institution	Qatar	Good Meat
Government of Spain	Public institution	Spain	CulturedMeat project (BioTech Foods)
Government of The Netherlands	Public institution	The Netherlands	National Growth fund
Government of UK	Public institution	UK	Transforming Food Production program

Government of USA	Public institution	USA	University of California, National institute for cellular agriculture

Table 2: Public Investors in lab-grown meat companies. Source: IPES Food, Forbes, ioanalytics, Just Food; Big Idea Ventures, Dailyalts 1, 2, websites of investors & national governments, Golden, Pitchbook