State of the European alternative protein research and innovation ecosystem

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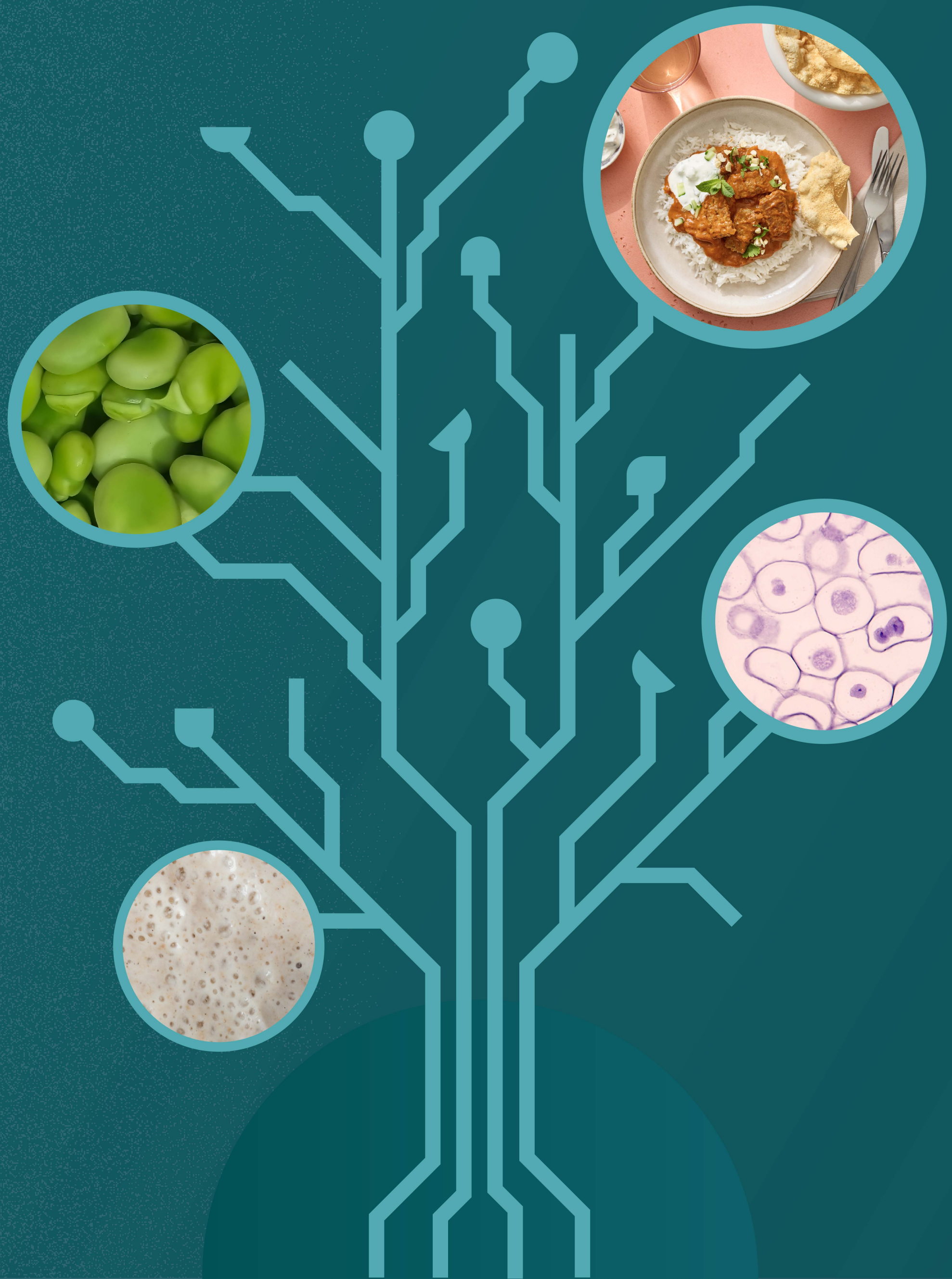

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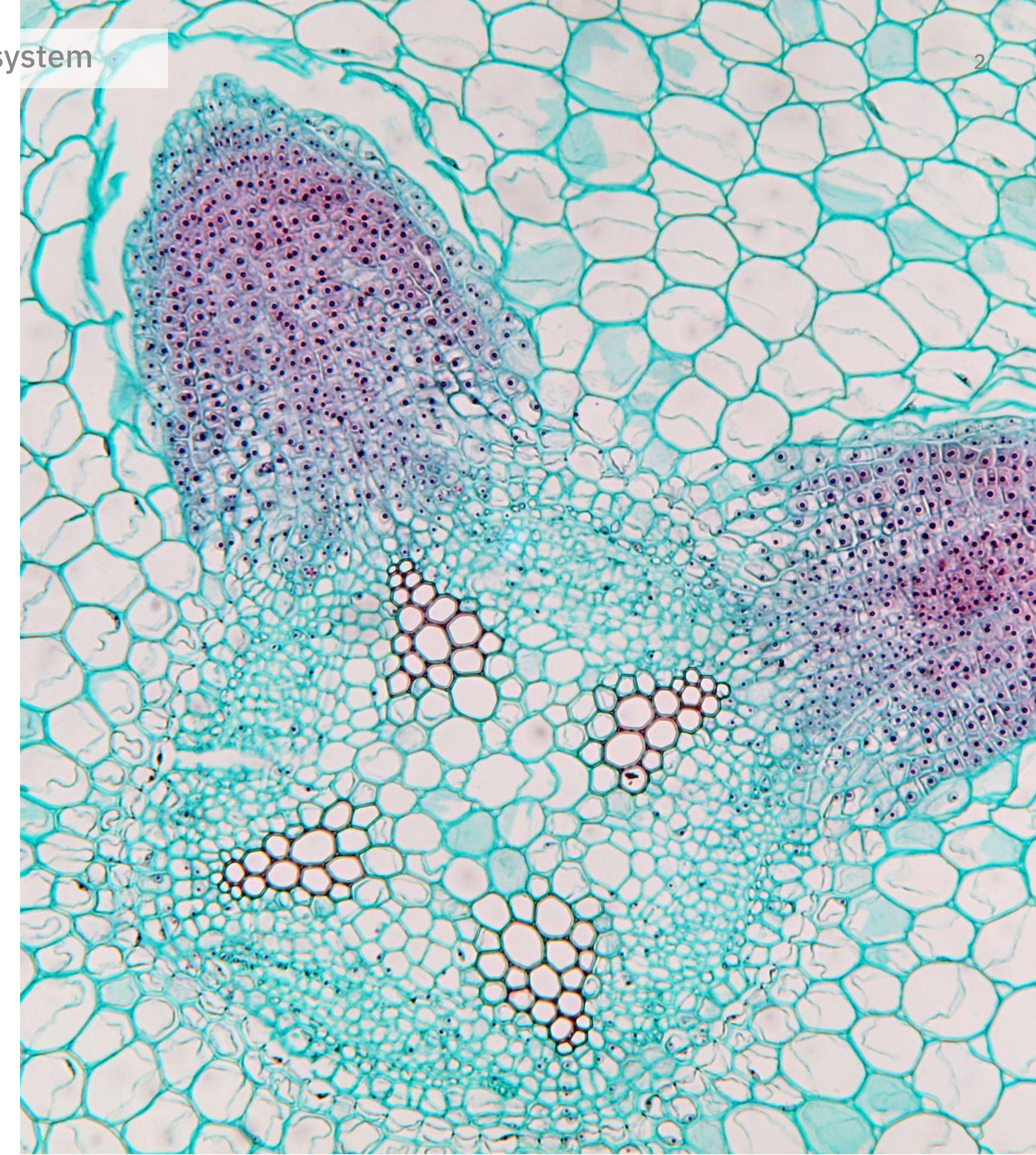


Introduction

The scientific research ecosystem for alternative proteins has shown tremendous growth in recent years.

However, the field is still early in its development, and critical attention must be paid to ensure a consistent funding outlook, a truly interdisciplinary and collaborative research community, and clear prioritisation of the most pressing technical bottlenecks for achieving taste and price parity.

Image: University of Hohenheim

Aims

This report seeks to:

- Present a thorough overview of the European alternative protein funding and research landscape, including overall growth, key actors, and research priorities.
- Help current and future scientists understand how they can best contribute to the development of this field and identify future collaborators for their work.
- Provide insights for how stakeholders, including public research funders and governments, can best support the further development of the field.

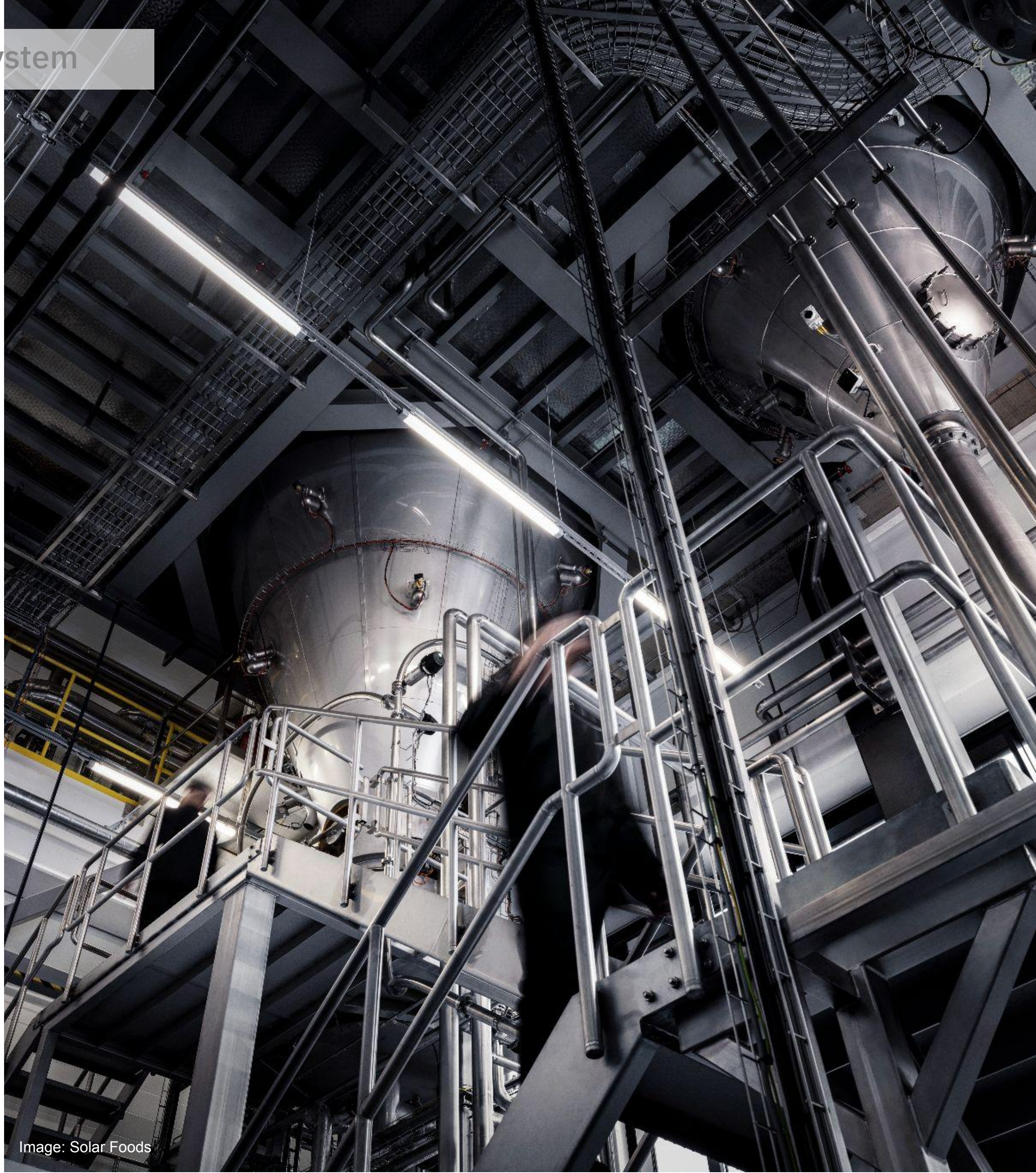


Image: Solar Foods

What do we mean by alternative protein pillars?

The fields of research that are the focus of this report are split into three main ‘pillars’, described below. In some instances, research projects combine techniques from across these disciplines. These are referred to as ‘cross-cutting’ throughout the report.

Plant-based

Produced directly from plants but look, taste, and cook like conventional animal products. For the purposes of this report, traditional fermentation techniques that use yeast or other microorganisms to modify the flavour, texture, or other characteristics of plant proteins will be considered within the plant-based pillar.

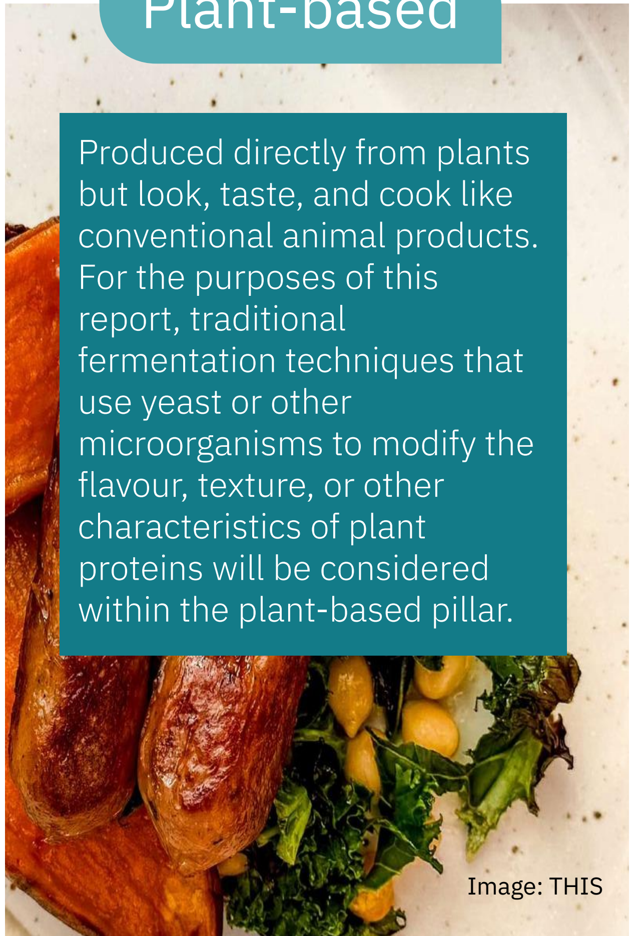


Image: THIS

Fermentation

Used in two primary ways: ***Biomass fermentation*** leverages the fast growth and high protein content of microorganisms to produce large quantities of protein. ***Precision fermentation*** uses microbes to produce specific functional ingredients important for the manufacture of alternative protein end products.

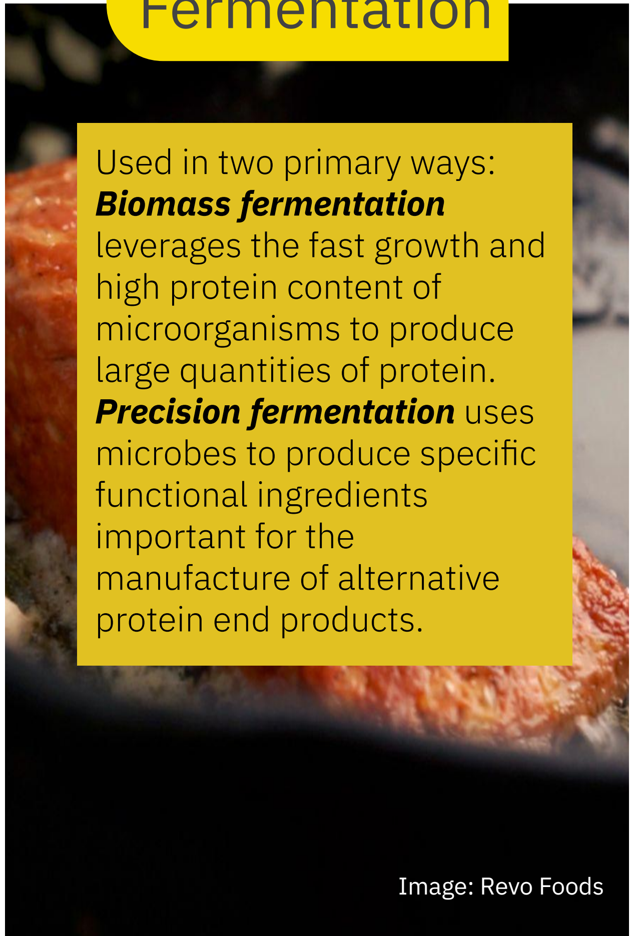


Image: Revo Foods

Cultivated

Foods like chicken, pork, beef, and fish that are produced by cultivating animal cells directly, thus replicating the sensory and nutritional profiles of conventional meat and seafood.

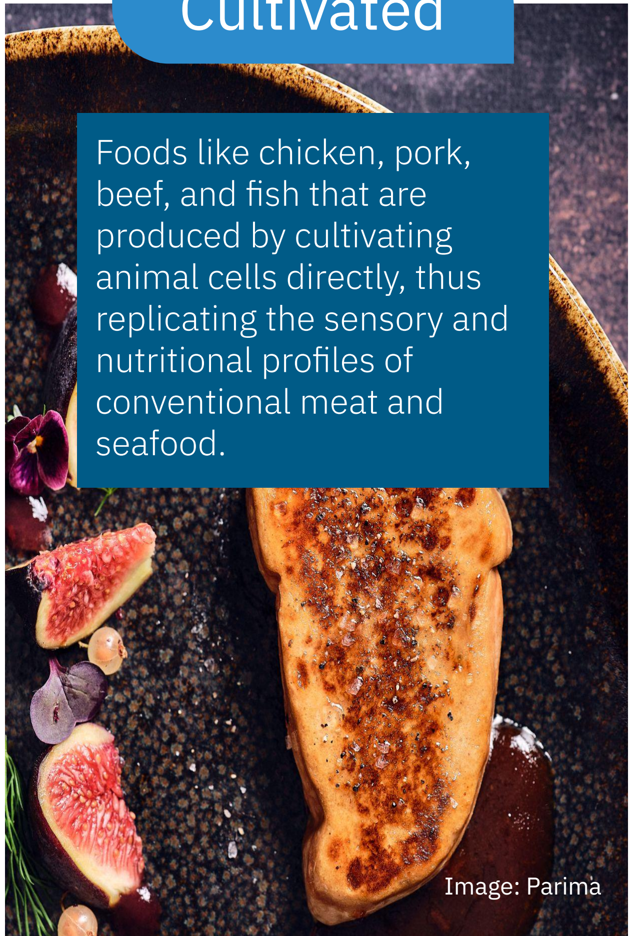
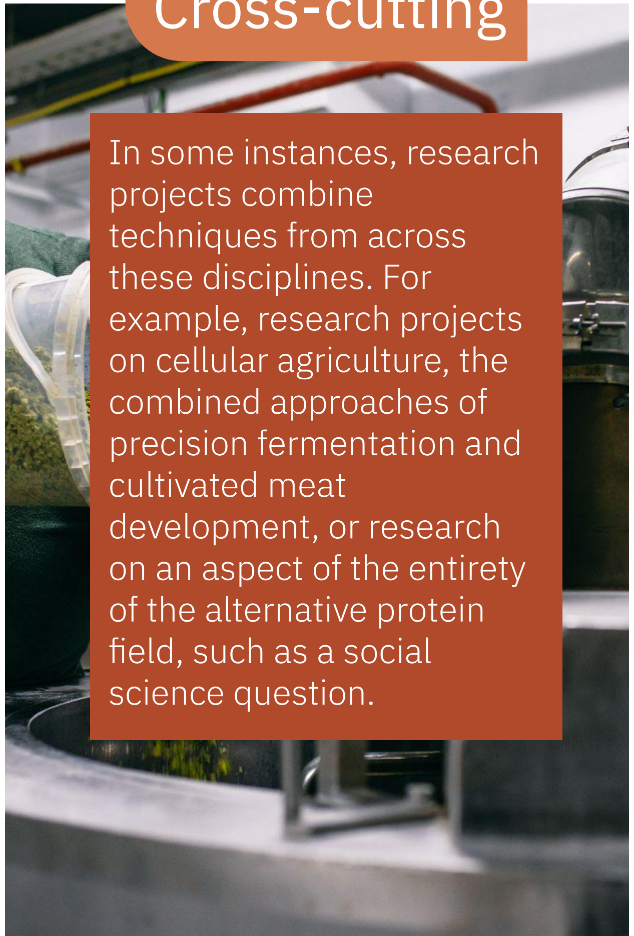


Image: Parima

Cross-cutting

In some instances, research projects combine techniques from across these disciplines. For example, research projects on cellular agriculture, the combined approaches of precision fermentation and cultivated meat development, or research on an aspect of the entirety of the alternative protein field, such as a social science question.



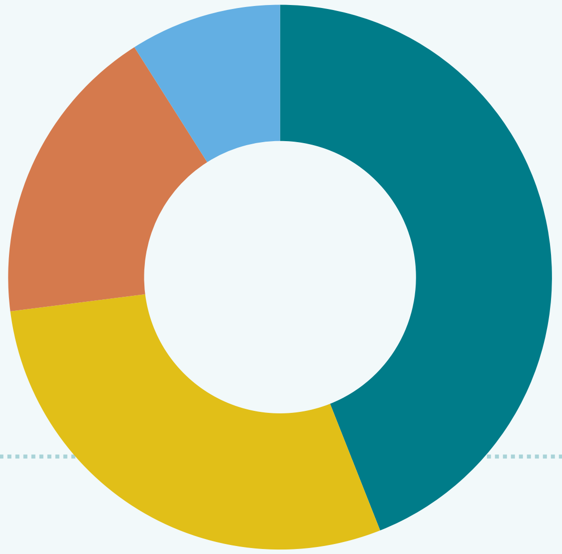
Findings at a glance

Funding

European institutions invested **€1.3 billion** in alternative protein research between 2020 and 2025, including **€236mn in 2025.**

Breakdown by pillar

- 44% Plant-based
- 29% Fermentation
- 18% Cross-cutting
- 9% Cultivated



Denmark €176mn (1)

UK €147mn (2)

Netherlands €88mn (3)

Total EU investment **€469 million**

The **top 3 countries** for overall investment in alternative protein research (2020-2025) were Denmark, the UK, and the Netherlands.

Fermentation was the top funded pillar in 2025 with total investment of €119.8 million in 2025.

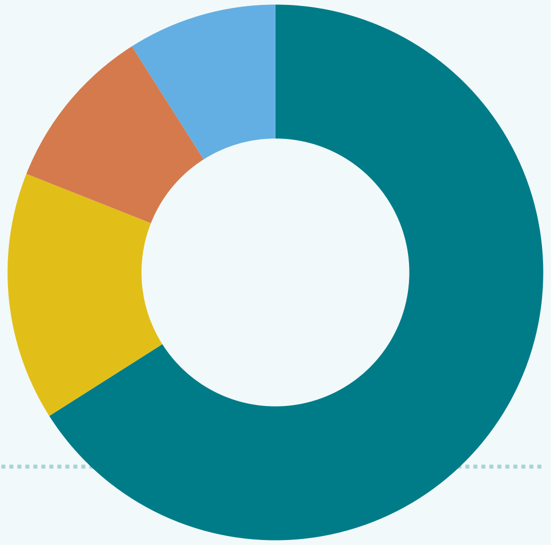
+11%

Publications

European researchers contributed to **3,783 unique publications** on topics related to alternative proteins between 2020 and 2025.

Breakdown by pillar

- 66% Plant-based
- 15% Fermentation
- 10% Cross-cutting
- 9% Cultivated



+31% average annual growth rate

+285% total publication volume

42, 321 citations in other academic papers.

8,164 researchers contributed to this output

1,008 organisations represented

70 external collaborating countries*

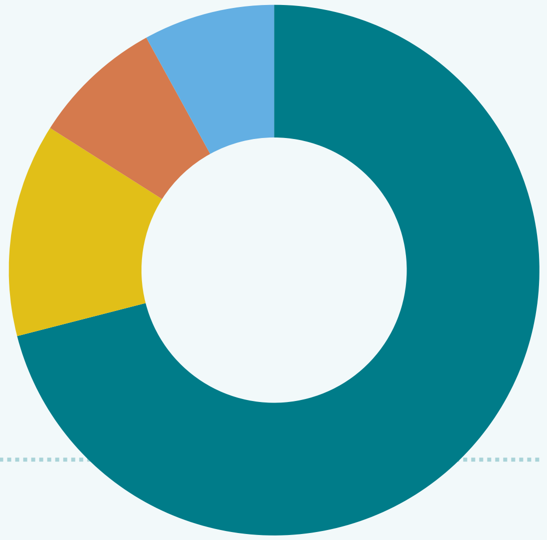
*Countries outside the EU27, Switzerland, Norway and the UK.

Patents

From 2015 to 2025, European alternative protein research generated **7,452 patents** spanning **1,584 unique patent families.**

Breakdown by pillar

- 71% Plant-based
- 13% Fermentation
- 8% Cross-cutting
- 8% Cultivated



512 assignees filing these patents

27 European countries represented

+1,124% increase in patent publication volume from 2015-2025

+31% average year on year growth rate

2020-2025 inclusive

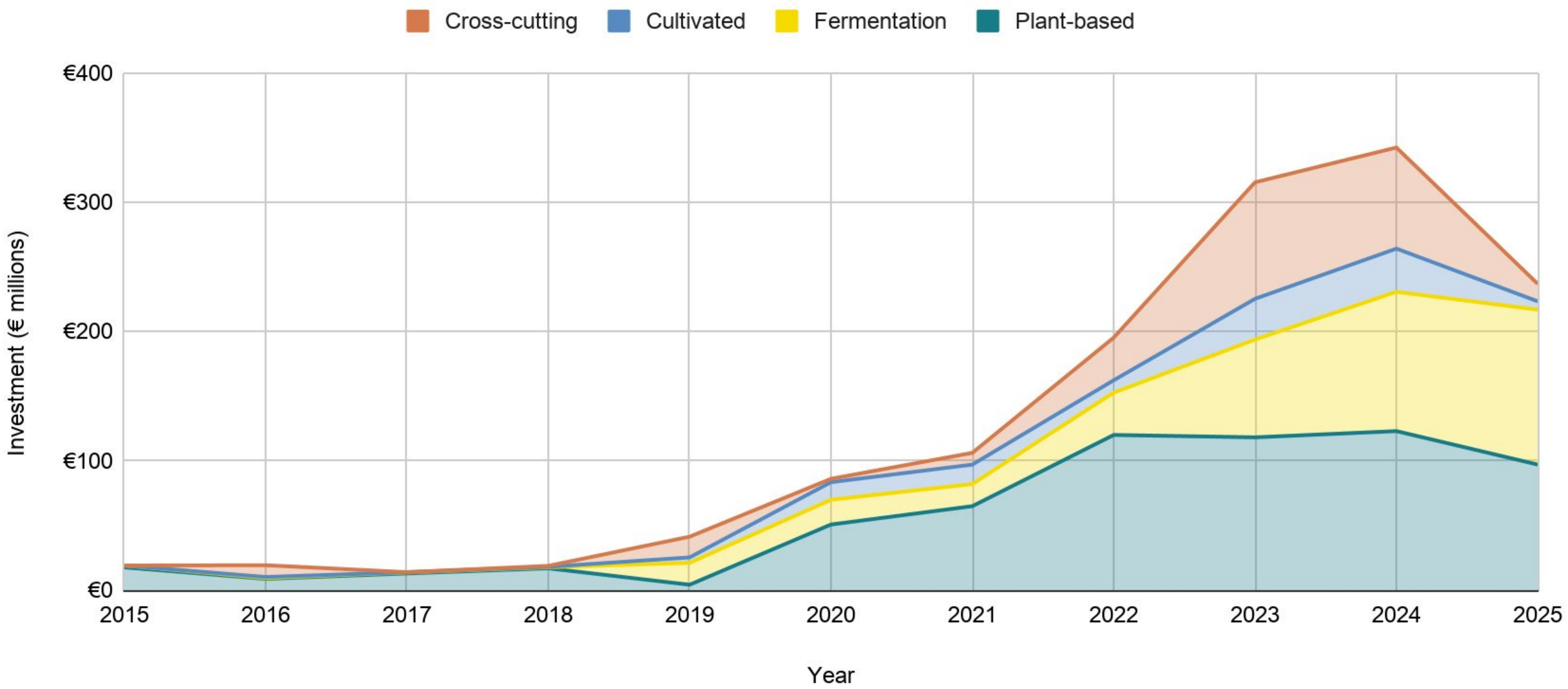
Public and nonprofit funding

As a global research and innovation (R&I) powerhouse accounting for over 20% of global R&I investment, Europe has the potential to be home to a world-leading alternative protein research ecosystem.

Here, we present a thorough overview of the funding landscape for European alternative protein research, including overall growth, leading countries and funders, and trends in funding allocation.

Funding for alternative proteins in Europe

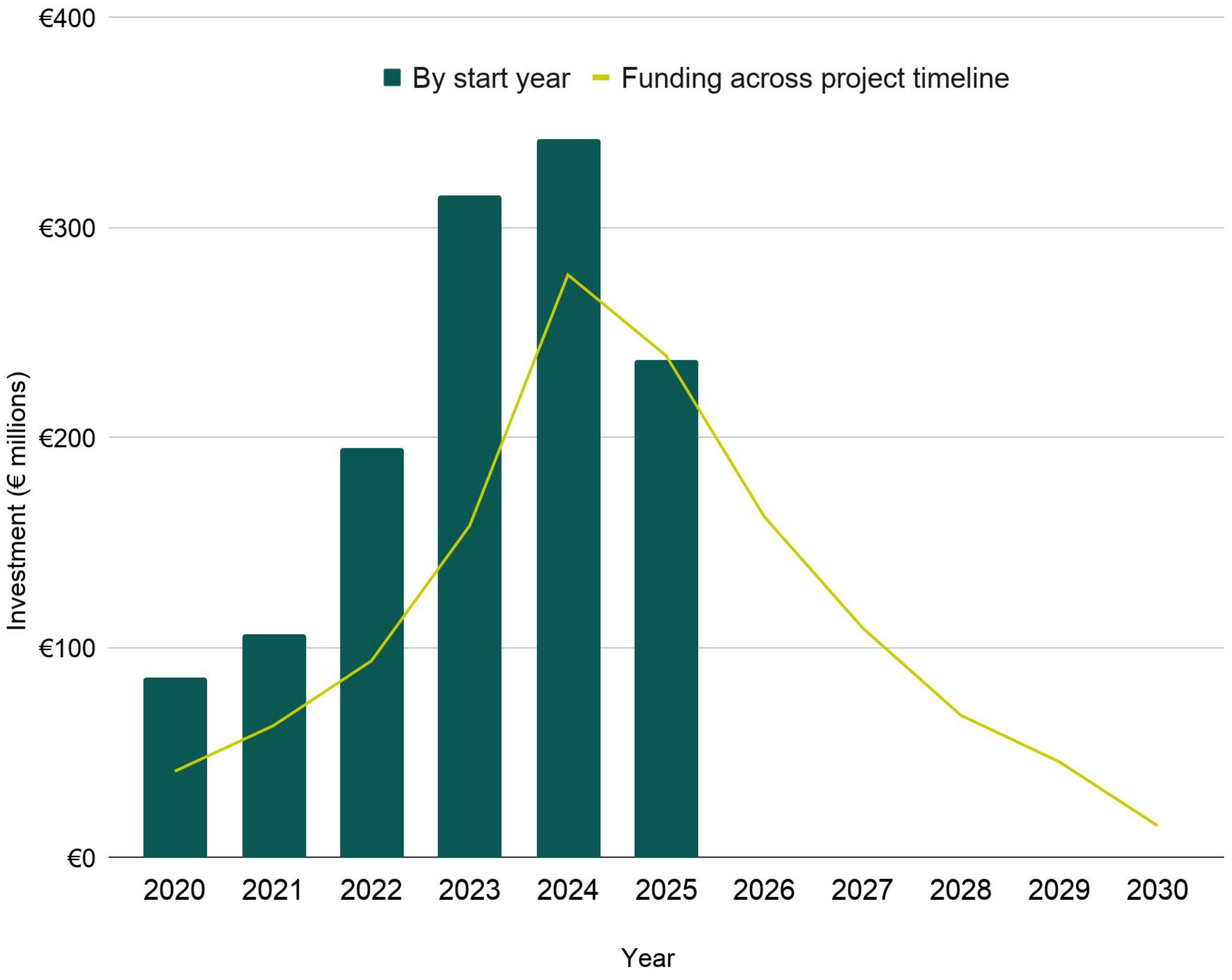
Investment in R&I for alternative proteins across Europe, including contributions from international funders.
Funding in Europe declined in 2025 for the first time since 2017, to a total of €236 million. The decrease in 2025 funding was largely driven by decreased funding for cultivated and cross-cutting research, while plant-based funding saw only a slight decrease, and fermentation funding increased to its highest-ever level.



Funding in Europe across full project timelines

This chart shows investment in R&I for alternative proteins across Europe over time* including contributions from international funders.

Currently funded projects stretch into the late 2020s. However, without new investment to maintain current levels, the research ecosystem will soon face a decline in available funding, leading to a contraction in the field.



* Funding is shown by start year and the allocation is split in accordance with the individual project timeline. Where length of project was unknown, funding was allocated to the year of the funding decision.

Top 10 geographies investing in R&I (2020-2025)

Investment from the top 10 European countries and the EU, including investment by nonprofit funders, 2020-2025.* Government total excludes investment by nonprofit funders. *Funding from some countries, such as the Netherlands, France, and Belgium, is likely incomplete.*

	Investment (€ millions)						Total relative to country size (€)		
	Total	Government investment	Cultivated	Fermentation	Plant-based	Cross-cutting	Per capita	Per € of GDP**	Per € of overall R&D spend*
EU	469	469	31	185	215	39	n/a	n/a	n/a
Denmark	176	24	3	86	83	4	29	470	15,756
UK	147	145	26	39	44	38	2	48	1,617
Netherlands	88	88	14	2	10	62	5	85	3,402
Germany	80	79	9	7	61	3	1	19	539
Finland	62	62	0	21	9	32	11	223	7,155
Norway	53	53	1	10	31	11	9	96	6,670
Sweden	47	47	0.2	3	43	1	4	86	2,222
France	29	29	0	0	29	0	0.5	10	382
Switzerland	28	28	4	5	18	2	3	34	1,368
Spain	26	26	8	3	8	7	1	18	870

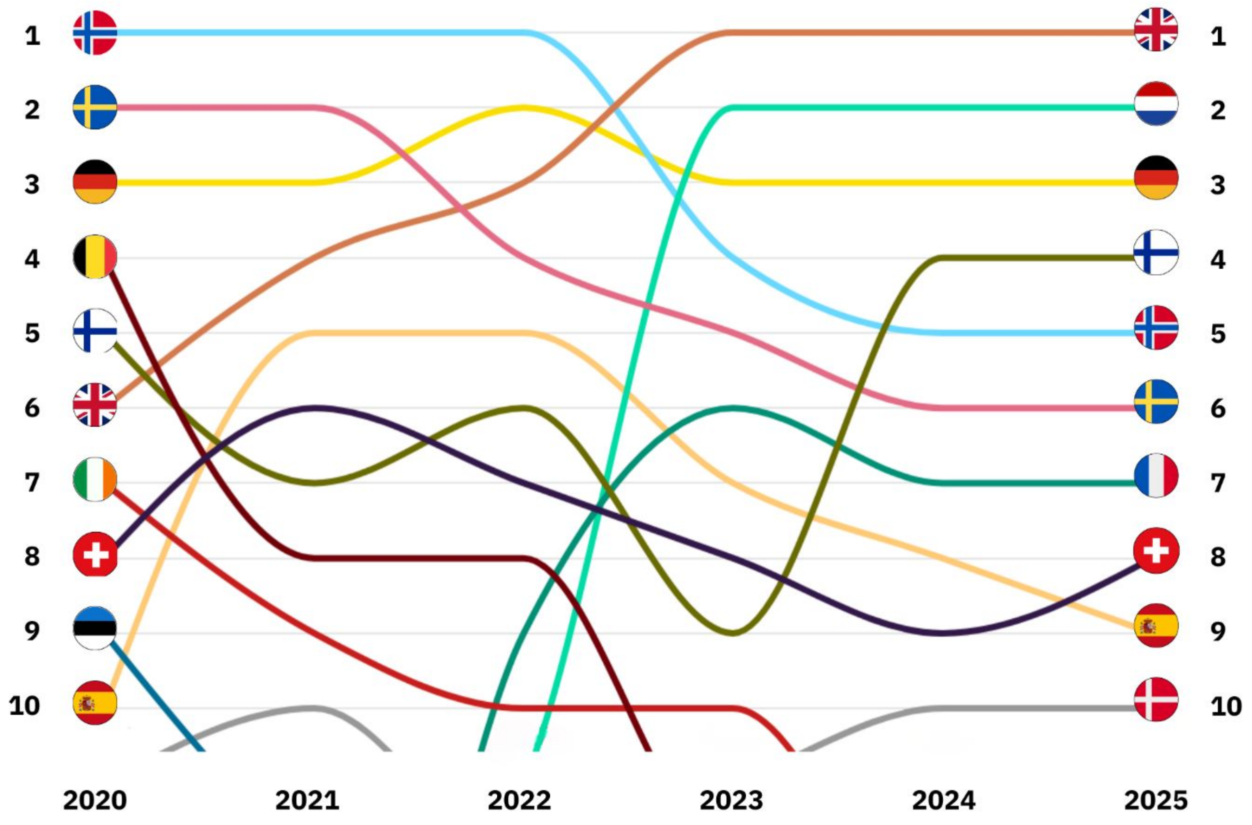
*Excludes investments in those geographies by international funders **GDP and R&D spend based on most recent year of available data from World Bank and OECD respectively, as of March 2026,

Top 10 national governments investing in alternative protein R&I

Over the past five years, the UK has emerged as a leading funder of alternative protein research, while others, such as Norway, Sweden and Belgium have not kept pace with the field to build on their early investments.

Germany has emerged as a steady player, especially compared with other countries such as Spain, where overall ranking has taken a recent fall after a promising start.

Ranking of national governments based on cumulative* R&I investment from 2020-2025. *Investment from some governments, such as those of the Netherlands, France, and Belgium, are likely an underestimate.*



*Note that cumulative rankings are calculated by adding the investment of each year to the total of the preceding years. For example, 2021 rankings are calculated by summing 2020 and 2021 funding investment; 2022 rankings are calculated by summing 2020, 2021, and 2022 investment, and so on. Chart created with Datawrapper.

Where has this funding been directed?

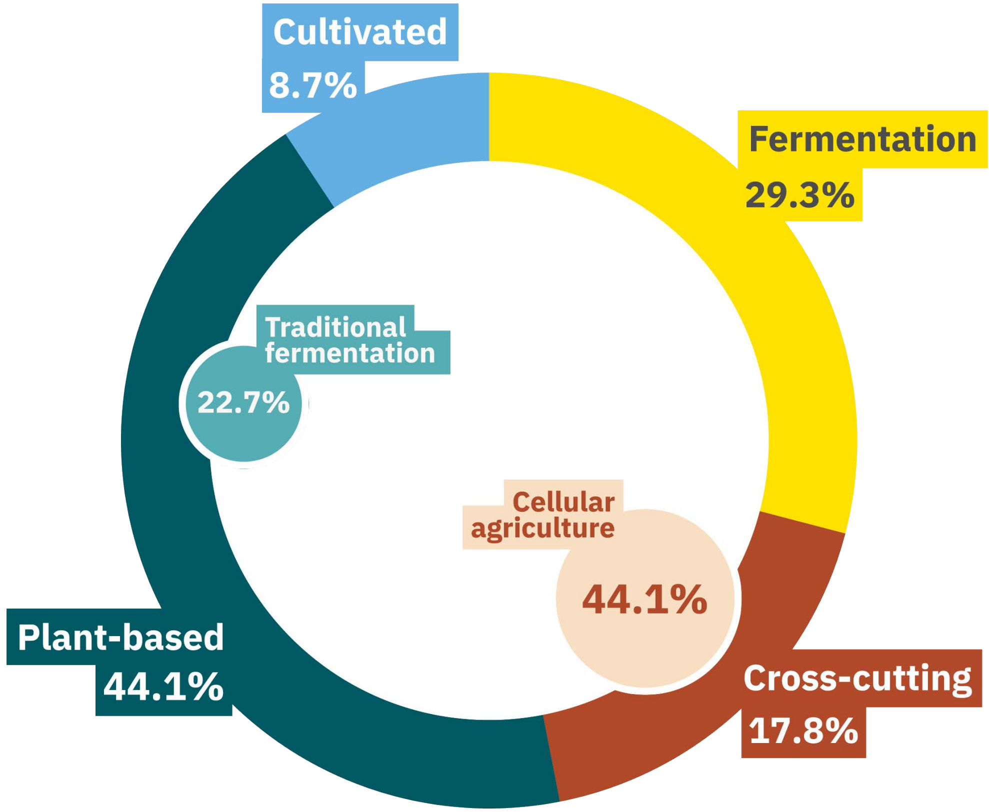
European funding over the past six years has not been uniformly spread between the alternative protein pillars.

Traditional fermentation is a major focus of plant-based projects, making up more than 20% of total plant-based funding.

Plant-based saw the highest combined investment between 2020 and 2025, while fermentation was clearly second.

In 2025, plant based investment was €97.1 million, fermentation was €119.8 million and cultivated meat and seafood €6.5 million. Cross-cutting research amounted to €13.4 million.

Investment in R&I for alternative proteins across Europe by pillar, showing major sub-pillar funding areas. *Cross-cutting funding includes cellular agriculture projects (those that cover both cultivated meat and fermentation).*



* GDP and R&D spend based on most recent year of available data from World Bank and OECD as of March 2026,

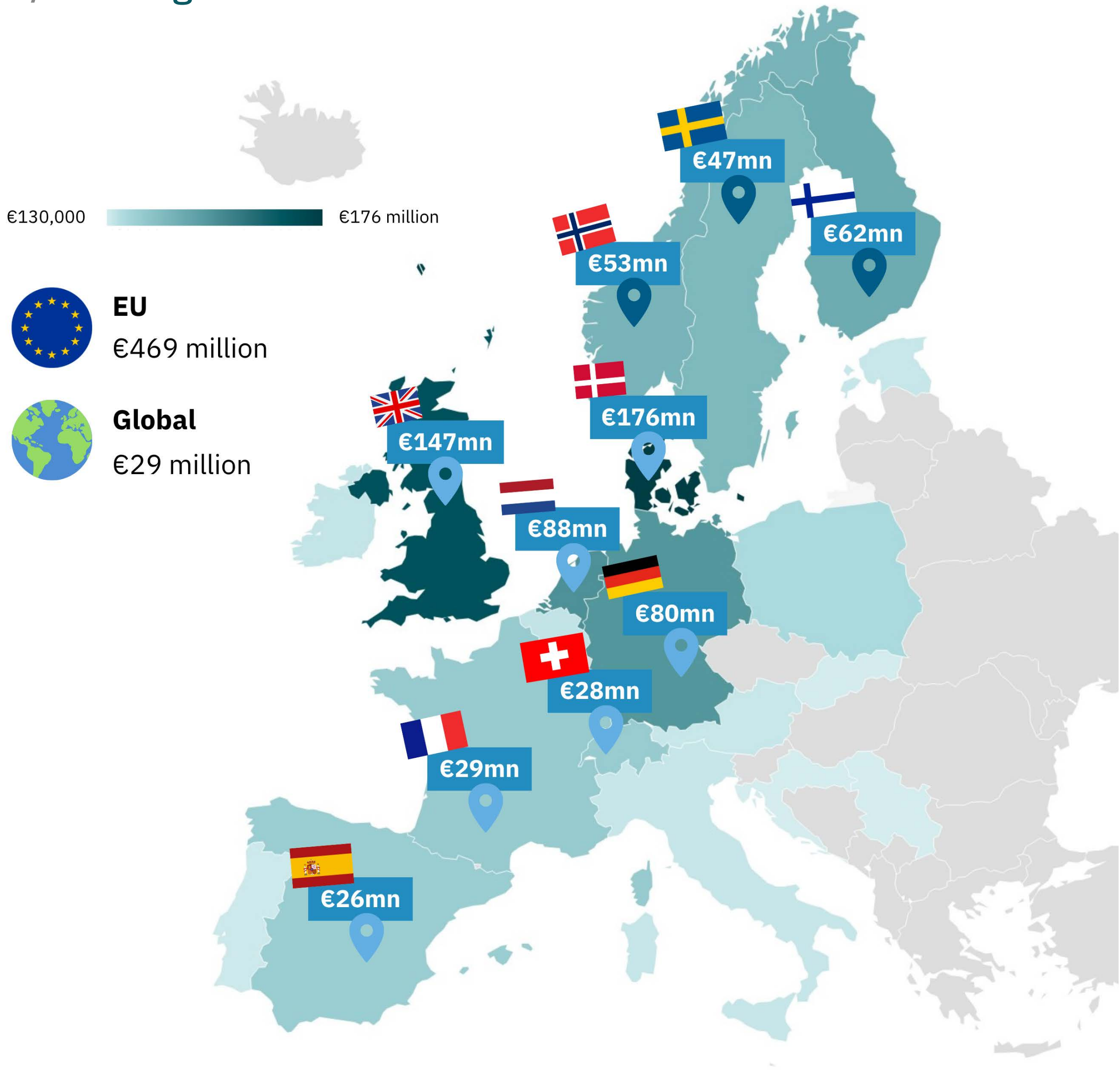
R&I funding from geographies across Europe

This map shows investment in R&I for alternative proteins across Europe* including contributions from international and nonprofit research funders.

The EU has driven a lot of the growth in funding across Europe, with cumulative funding between 2020 and 2025 above €460 million.

There are also some prominent national champions: Denmark, the UK, the Netherlands, Germany, and Finland.

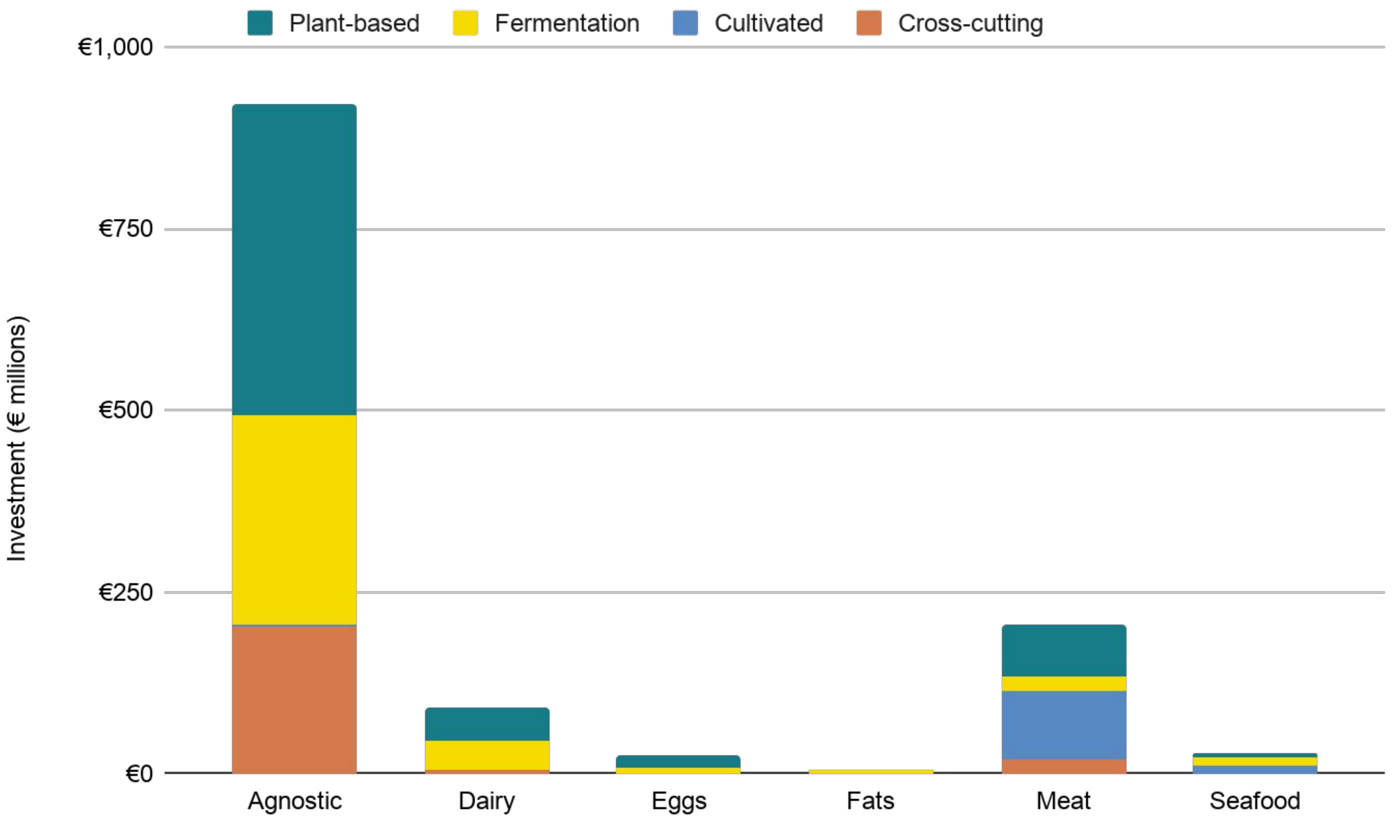
Global funders, from outside Europe, have also begun to fund European research in this space.

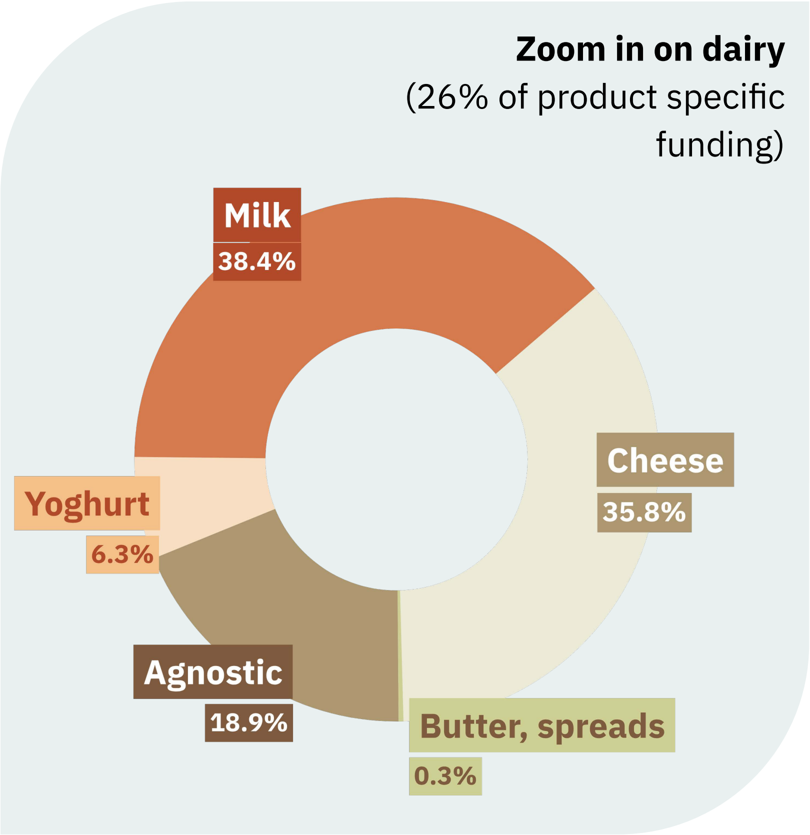


*Funding for some countries, such as the Netherlands, France, and Belgium, is likely an underestimate. Map created with Datawrapper.

End products targeted by R&I funding

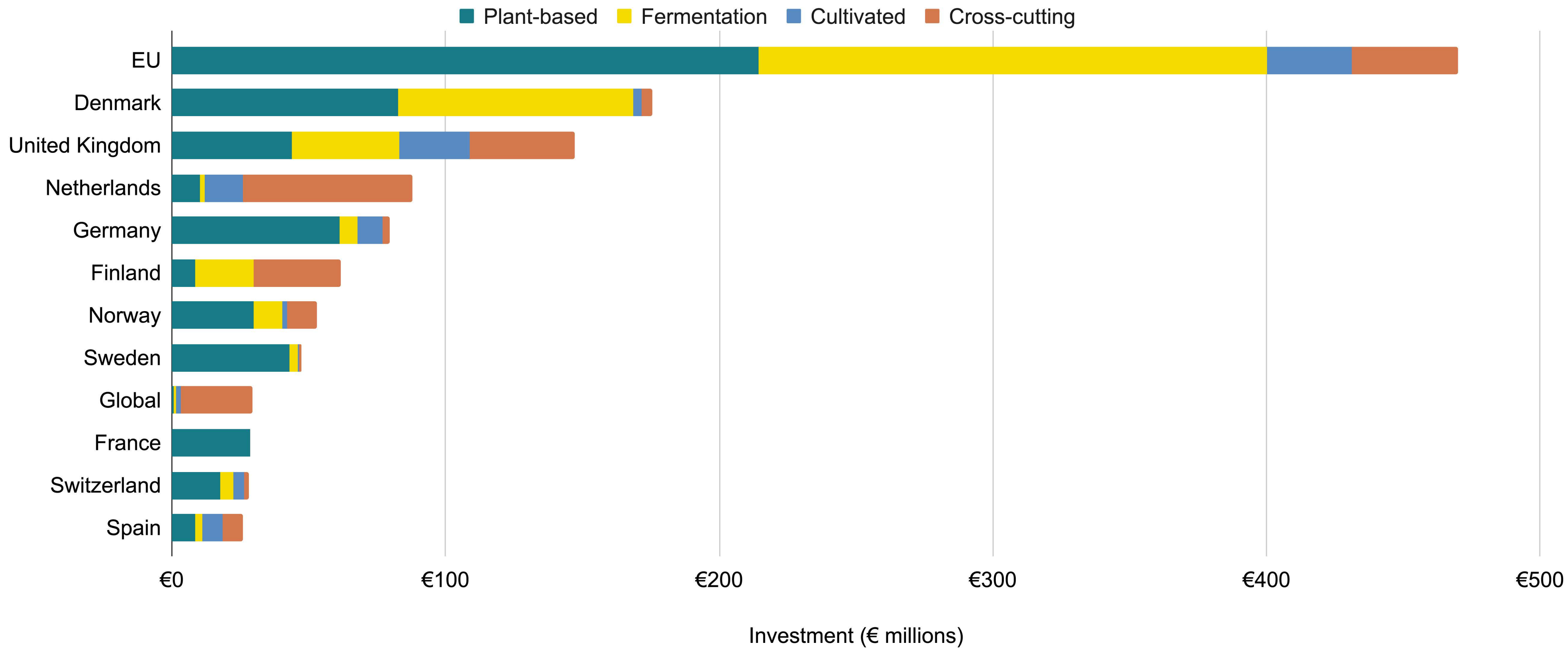
Investment by end product and pillar, 2020-2025, with breakdown of dairy-focused research. Most of these projects are agnostic about the end products. For those that aren't, almost 60% target meat, while seafood makes up less than 8%. Dairy research mostly focuses on milk and cheese.





Breakdown of funding by geography and alternative protein pillar

Investment from the top 10 European governments as well as the EU, 2020-2025.* The EU has taken quite a broad approach, in contrast with the specialisation of other countries. For example, the Netherlands has invested heavily in cellular agriculture.



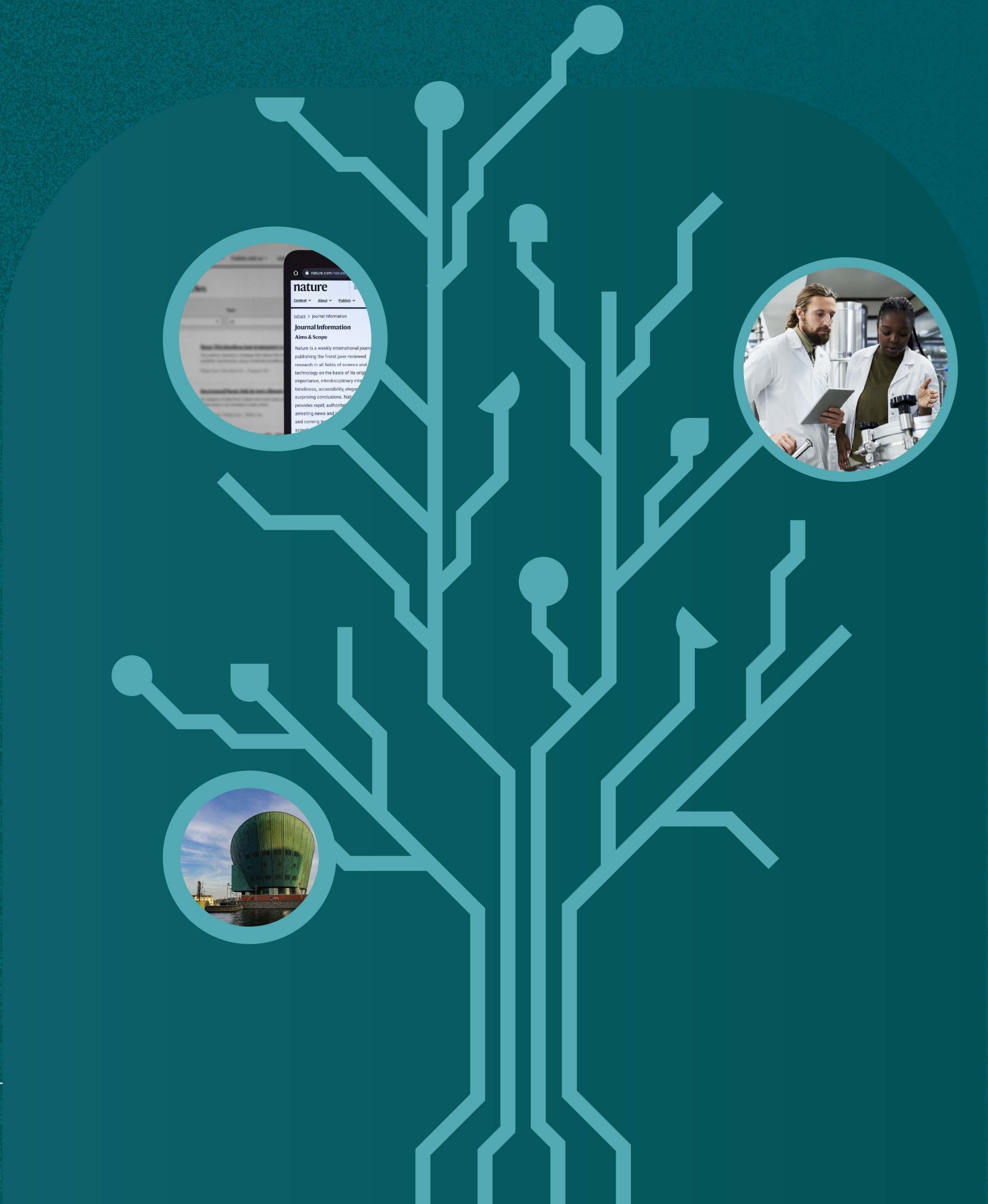
*Funding for some countries, such as the Netherlands, France, and Belgium, is likely an underestimate.

2020-2025 inclusive

Academic publications

As a global research and innovation powerhouse, Europe has the potential to be home to a world-leading alternative protein research ecosystem.

Here, we present a thorough overview of the European alternative protein publication landscape, including overall growth, leading countries and institutions, and trends in collaboration.



Overall trends

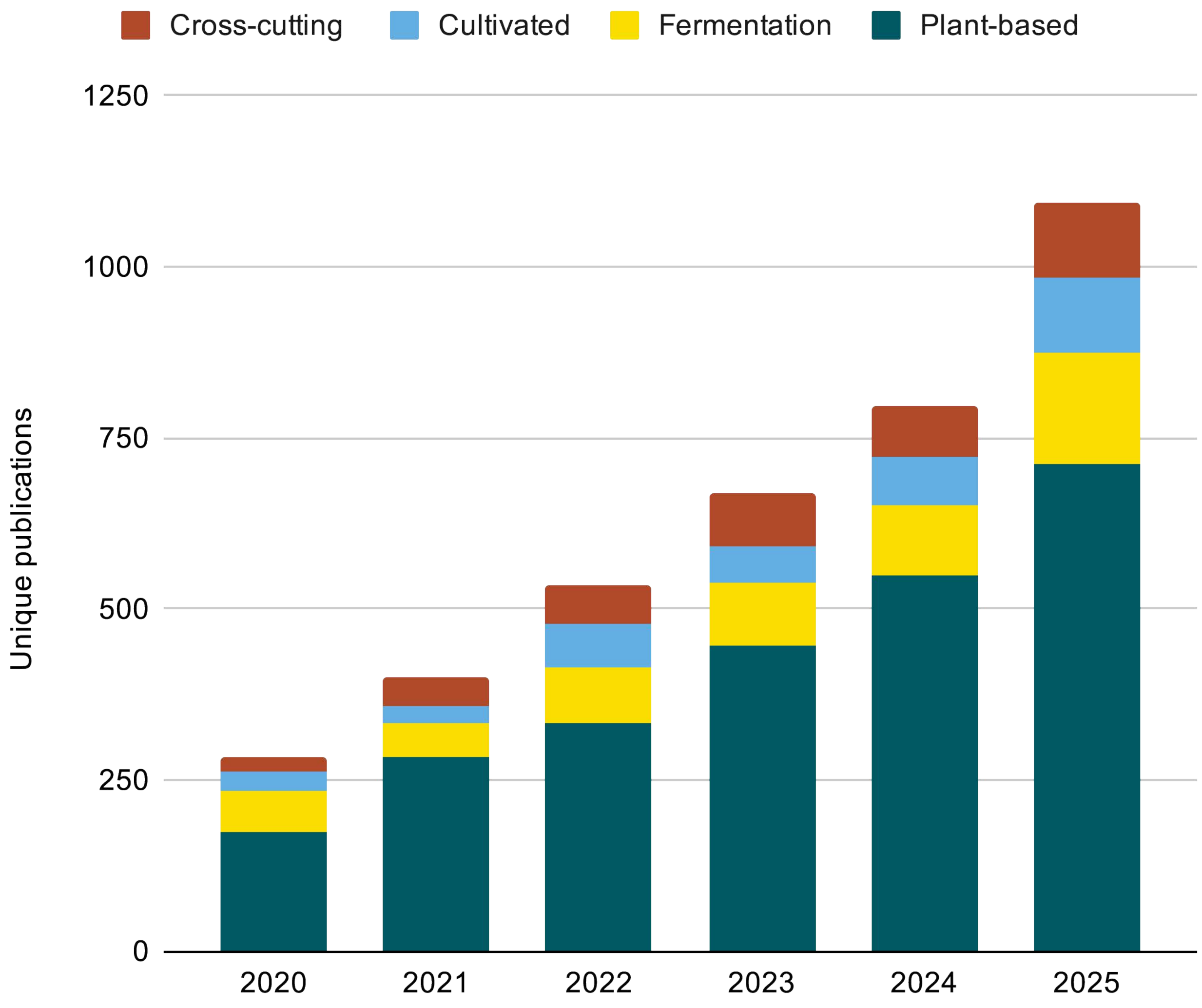
This graph shows the overall trends in academic publications in peer-reviewed journals on topics related to alternative proteins in the period 2020-2025.

In total, there were 3,783 publications, and outputs grew by 31% per year on average in this period.

There were 1,094 research publications in 2025 compared with 284 in 2020 – a 285% increase.

Breakdown of publications by alternative protein pillar:

- 66% plant-based proteins
- 15% fermentation-made proteins and ingredients
- 9% cultivated meat and seafood
- 10% cross-cutting topics



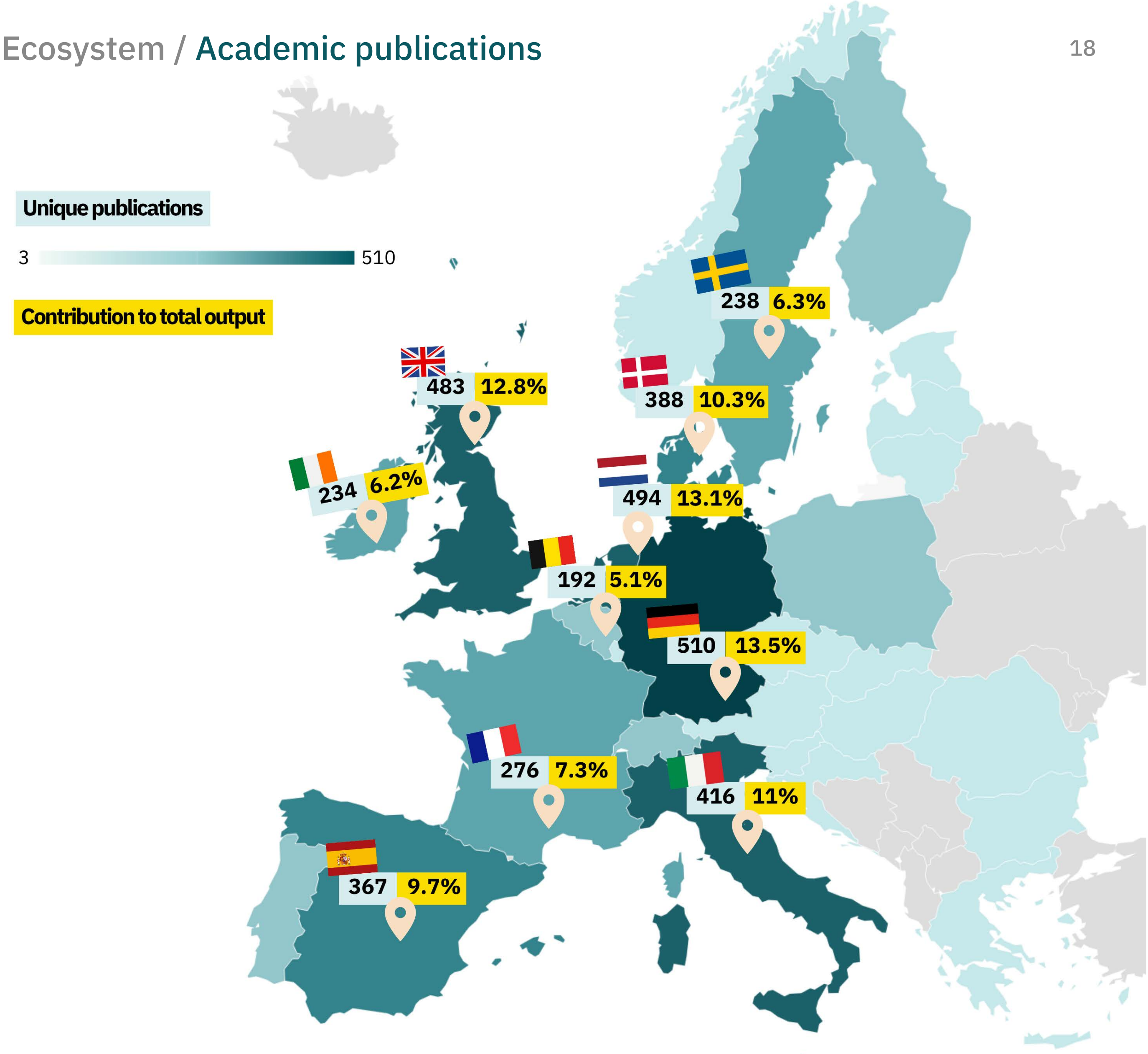
Publications by country

This heat map shows the most productive European countries in alternative protein research in the years 2020-2025 inclusive, as measured by total unique publications.

8,164 researchers representing 1,008 organisations from all 30 European countries analysed contributed to this output along with collaborators from 70 external countries.

Germany leads Europe, with a contribution to 13.5% of publications, followed by the Netherlands (13.1%), and the UK (12.8%).

Italy has the largest number of researchers (1,028), followed by Germany (828), and the UK (770).



Map created with Datawrapper

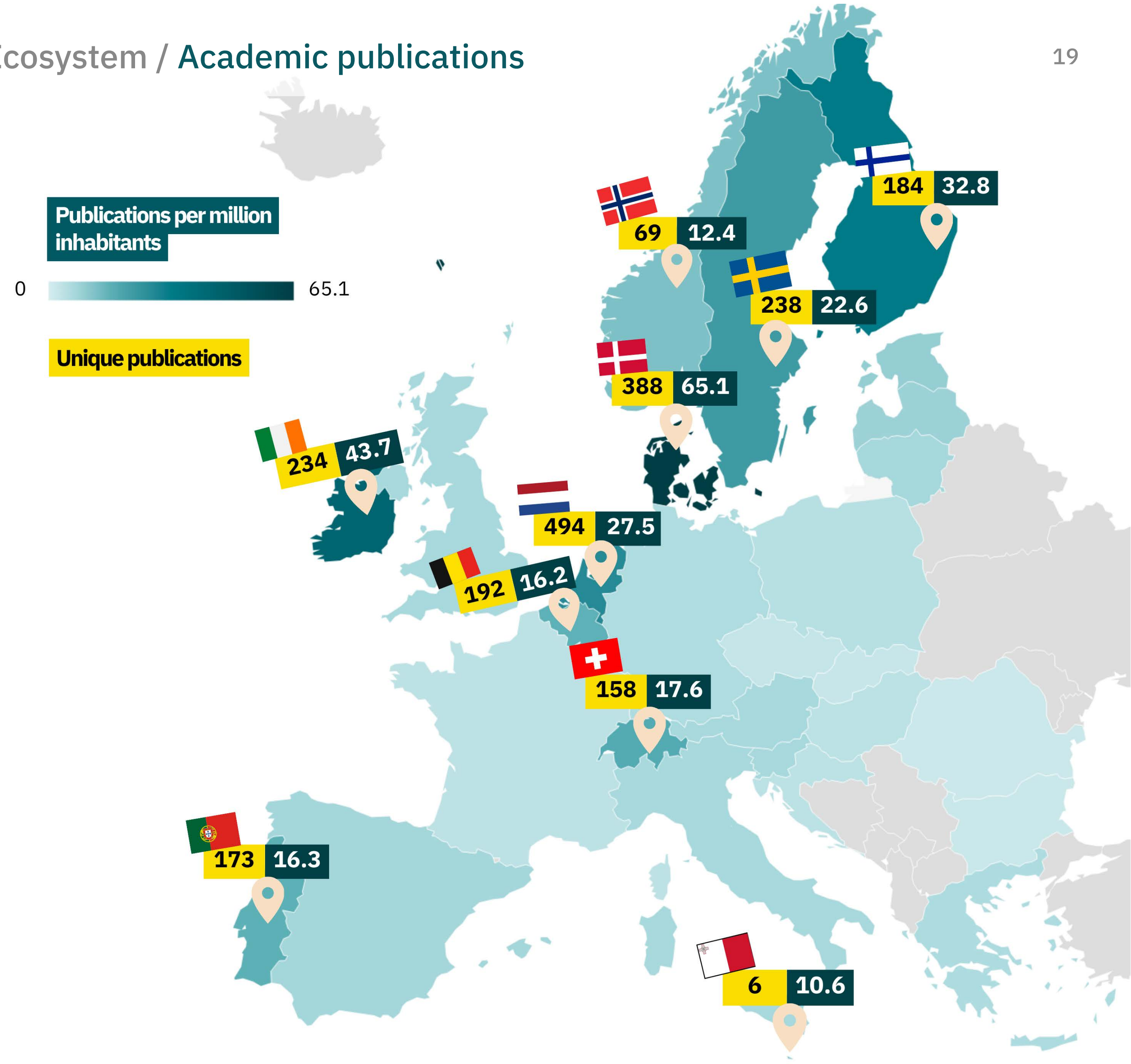
Publications per capita

This maps shows European countries on the basis of unique publications per million inhabitants in the years 2020-2025.

Highlighted in this way, the most productive countries are Denmark, Ireland, and Finland.

Larger countries such as the UK and Germany ranked 16th and 20th, respectively.

Some smaller countries are punching above their weight, while their larger neighbours have the capacity to contribute more.



Map created with Datawrapper

Annual ranking of countries by number of publications, 2020-2025

For most of the 2020-2025 period, the top three most productive countries have consistently been Germany, the Netherlands, and the UK.

Italy shot to the top of the rankings in 2025 following an almost doubling of their research output from the previous year.

Smaller countries such as Denmark, Sweden, and Ireland have been consistently strong performers.

Most productive European countries in alternative protein research as measured by total unique publications per year, 2020-2025.

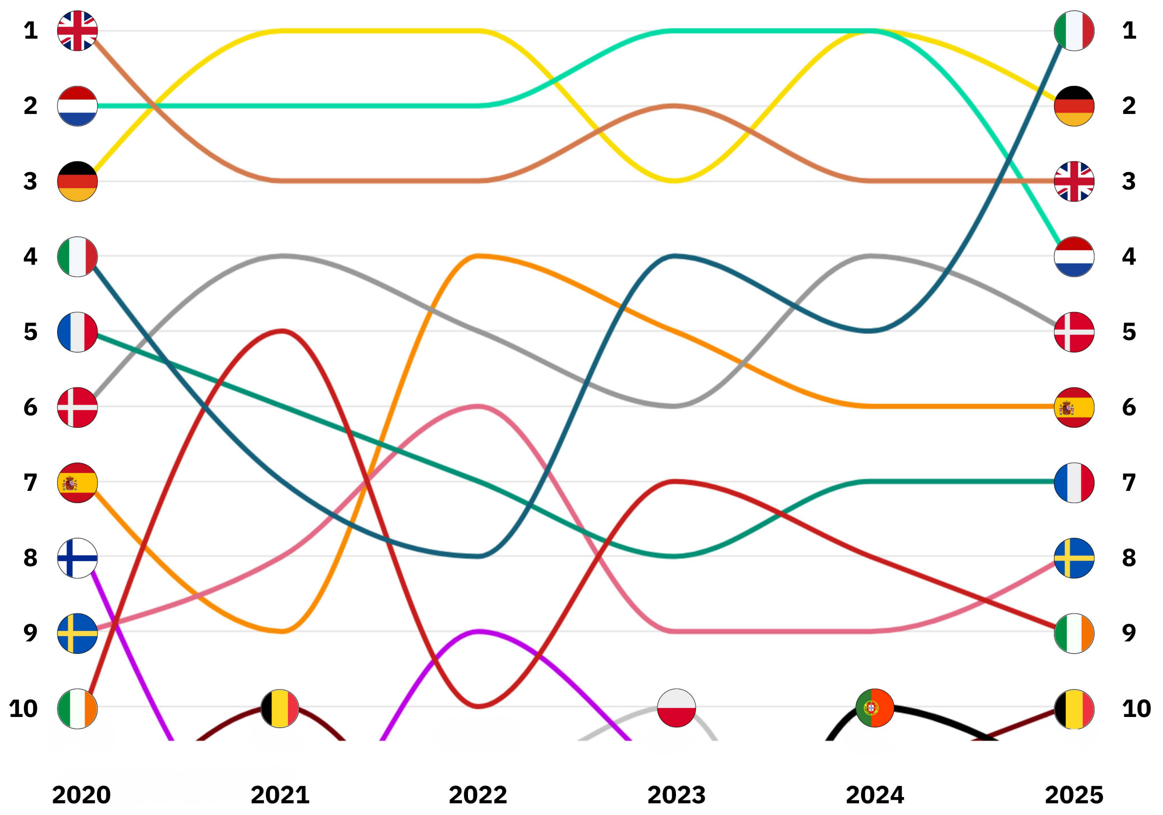
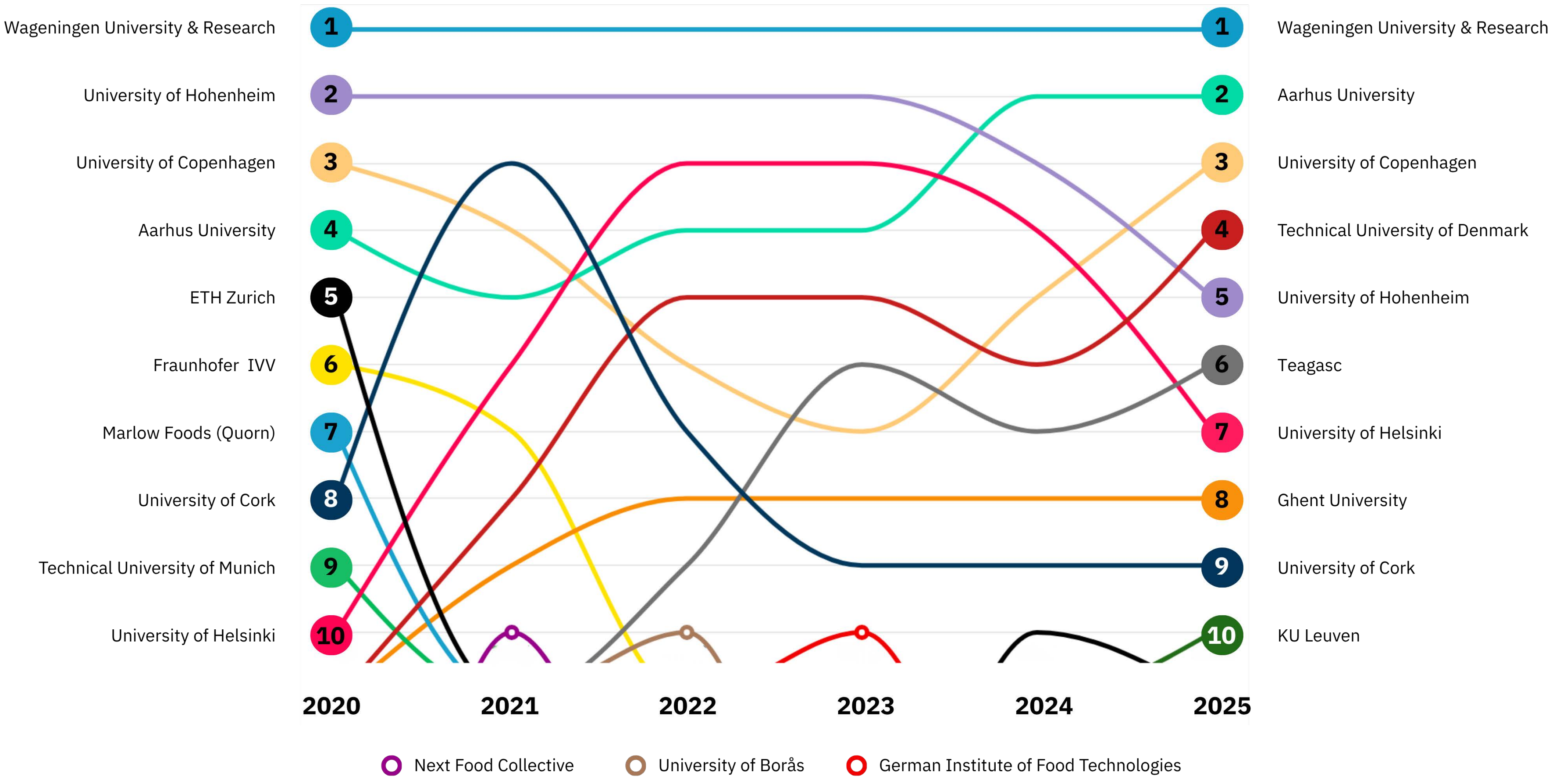


Chart created with Datawrapper.

Key statistics for Europe's top performers

	Germany	Netherlands	United Kingdom	Italy	Denmark	Spain
Publications	510	494	483	416	388	367
Contribution to total European output	13.5%	13.1%	12.8%	11.0%	10.3%	9.7%
Average growth rate	30%	29%	29%	44%	45%	50%
2020-2025 change	256%	245%	246%	403%	461%	542%
Authors	828	626	770	1,028	509	671
Research performing organisations	141	45	146	105	26	96
International collaborations	49%	44%	58%	50%	58%	61%
Academic-corporate collaborations	11%	9%	11%	6%	14%	4%

Ranking of research-performing organisations by cumulative academic publication volume (2020-2025)



Note that cumulative rankings are calculated by adding the publication output each year to the total of the preceding years. For example, 2021 rankings are calculated by summing 2020 and 2021 publication numbers; 2022 rankings are calculated by summing 2020, 2021, and 2022 publications numbers, and so on. Chart created with Datawrapper.

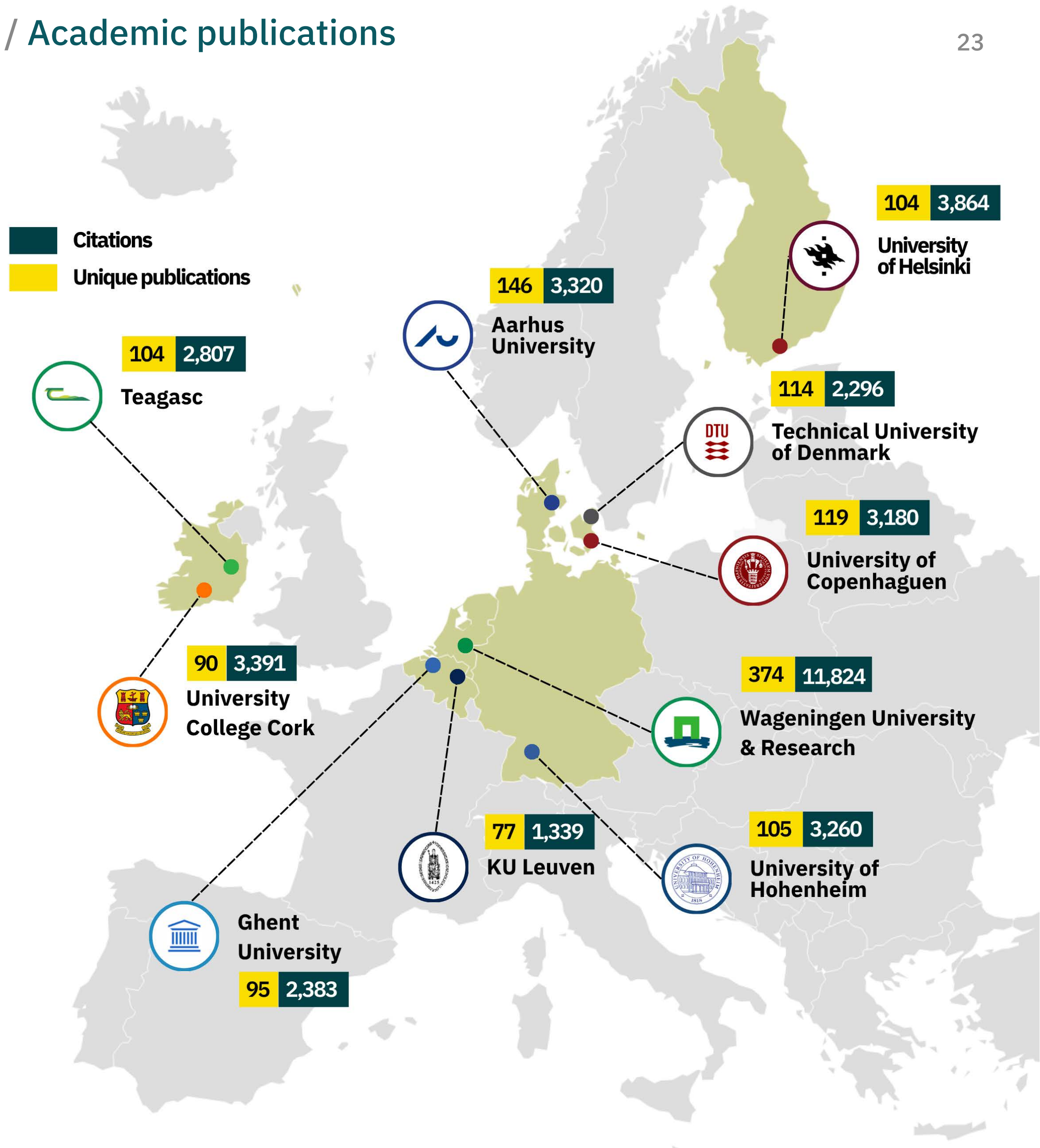
Leading research-performing organisations

This map shows the leading institutions for alternative protein research in Europe on the basis of unique publications in the years 2020-2025.

Wageningen University & Research is the dominant institution in Europe – both in terms of publications (374) and citations (11,824).

Some small countries have 1-2 clear leading institution(s) that contribute a disproportionate amount of the overall output.

Large countries such as the UK, Italy, France, and Spain rank highly in Europe on the basis of total output but do not have any individual research organisations in the top 10.



Map created with Datawrapper

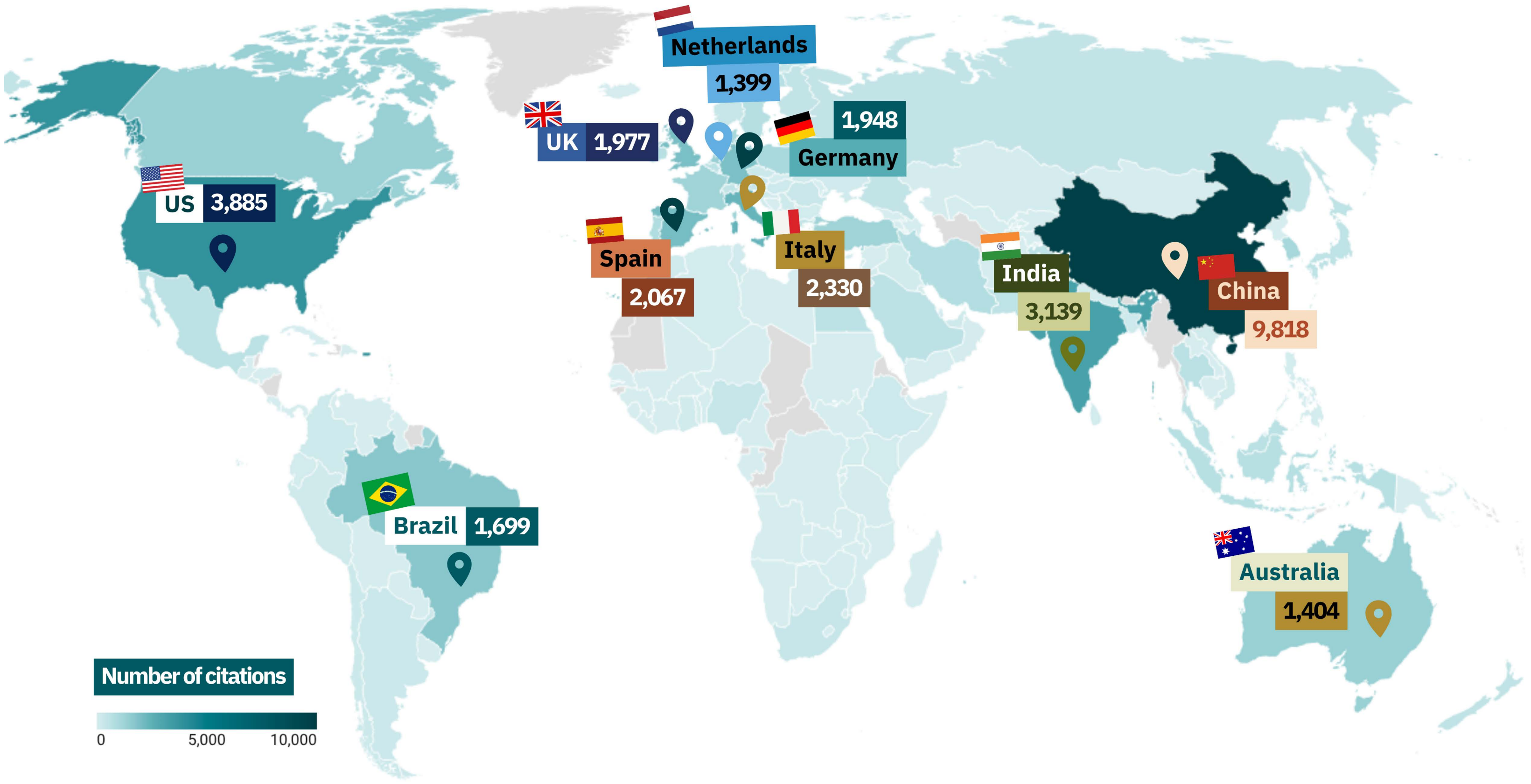
Citations & global impact

This heat map shows the top countries where European alternative protein researchers have been cited in the academic literature in the years 2020-2025 inclusive, as measured by unique citing publications.

Publications involving European researchers accumulated a total of 42,321 citations in 166 countries in this period.

The country that cited European research more than any other is China, followed by the United States and India.

88.34% of publications in the dataset have been cited at least once.



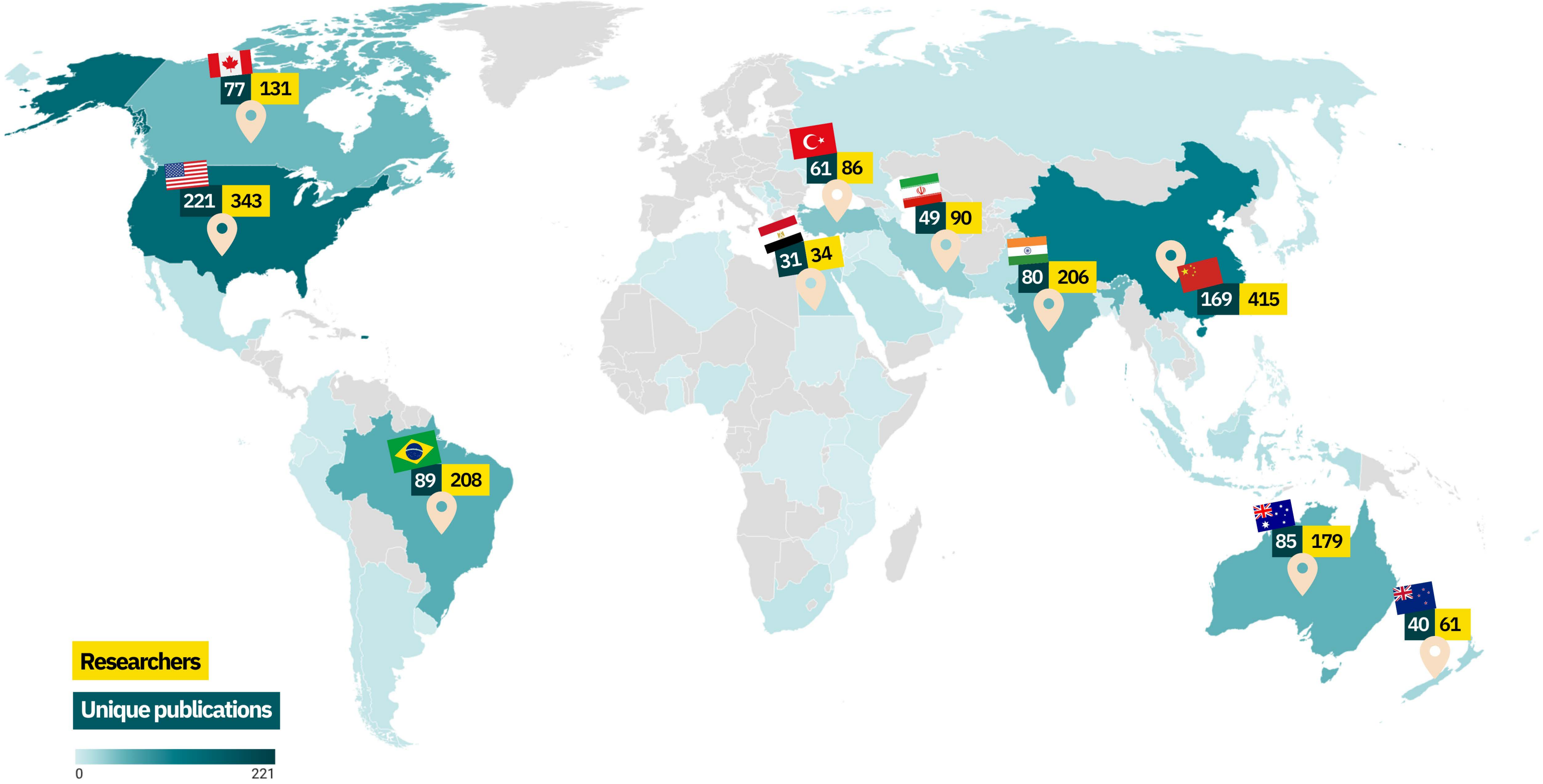
This map shows the number of publications from each country that have cited publications on topics related to alternative proteins co-authored by European researchers.
Citation data is assigned based on the organisation affiliation of at least one author or researcher. Map created with Datawrapper.

Collaboration

This heat map shows the top countries with which European alternative protein researchers co-authored publications in the years 2020-2025 inclusive.

European alternative protein researchers collaborated with over 2,500 researchers from 70 countries outside of Europe (those outside of the EU, Norway, Switzerland, and the UK).

International co-authorships make up 43% of the total, on par with the 40% international average for all scientific disciplines, but lower than the corresponding figure of 55% in the EU and 64% in the UK.



International co-authorships includes publications that have two or more authors and at least two of those authors come from different countries. Here we show co-authorships between at least one European country within the scope of this report and and one external country (defined here as those outside the 27 EU member states, along with Norway, Switzerland, and the United Kingdom).Map created with Datawrapper.

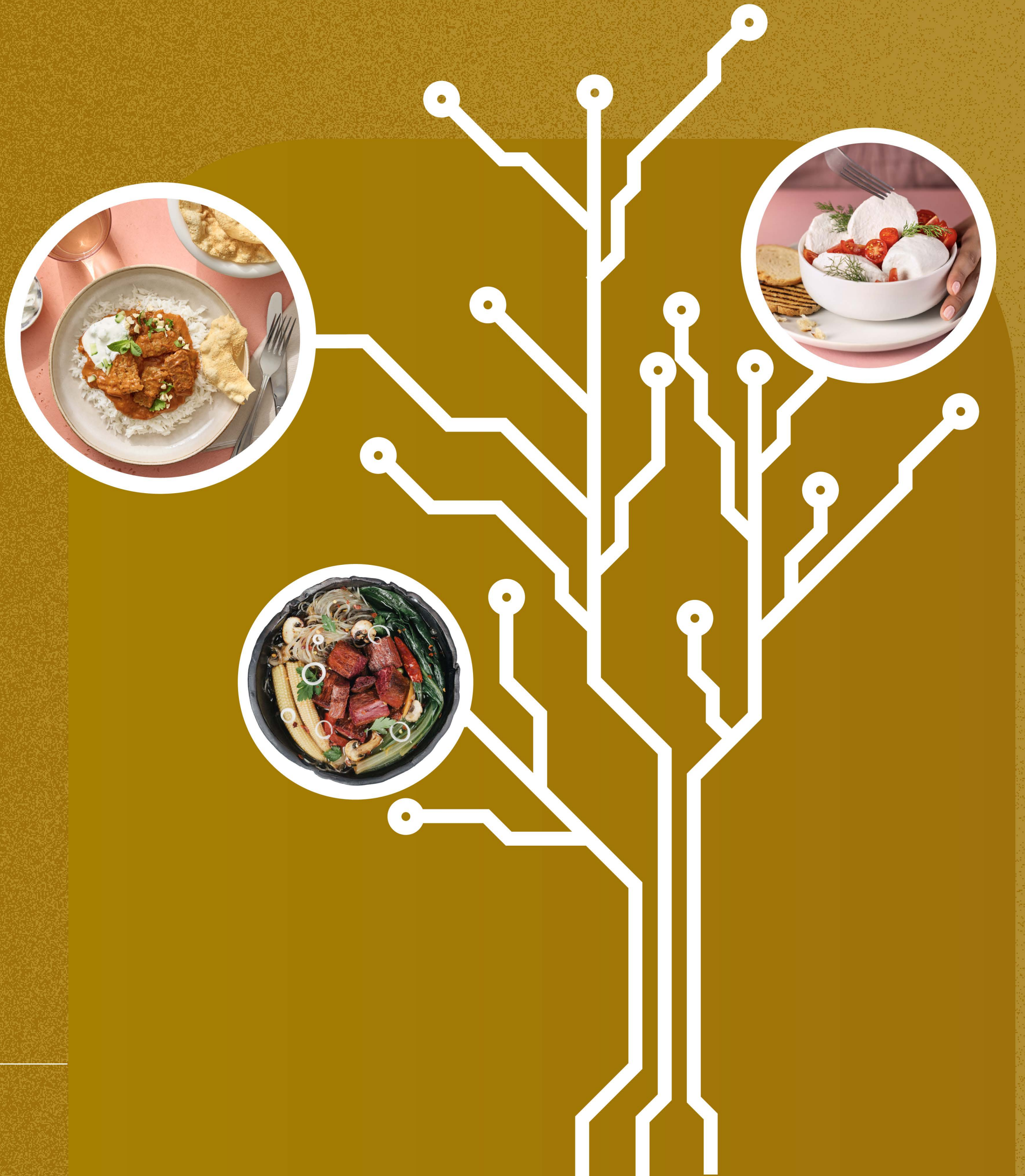
2015-2025 inclusive

Patents

Patent filings are an indication of scientific research translating into real world impact, and show the promising potential of European alternative protein science to drive the development of innovative new foods and ingredients.

Here we present a thorough overview of the European alternative protein patent landscape, including overall growth, key organisations and countries, and specific fields of innovation.

Given there can often be a significant delay between patenting filing, publication, and granting, this section focuses on patenting trends in the European alternative protein sector since 2015. For a glossary of patent terms, see appendix.



Overall trends

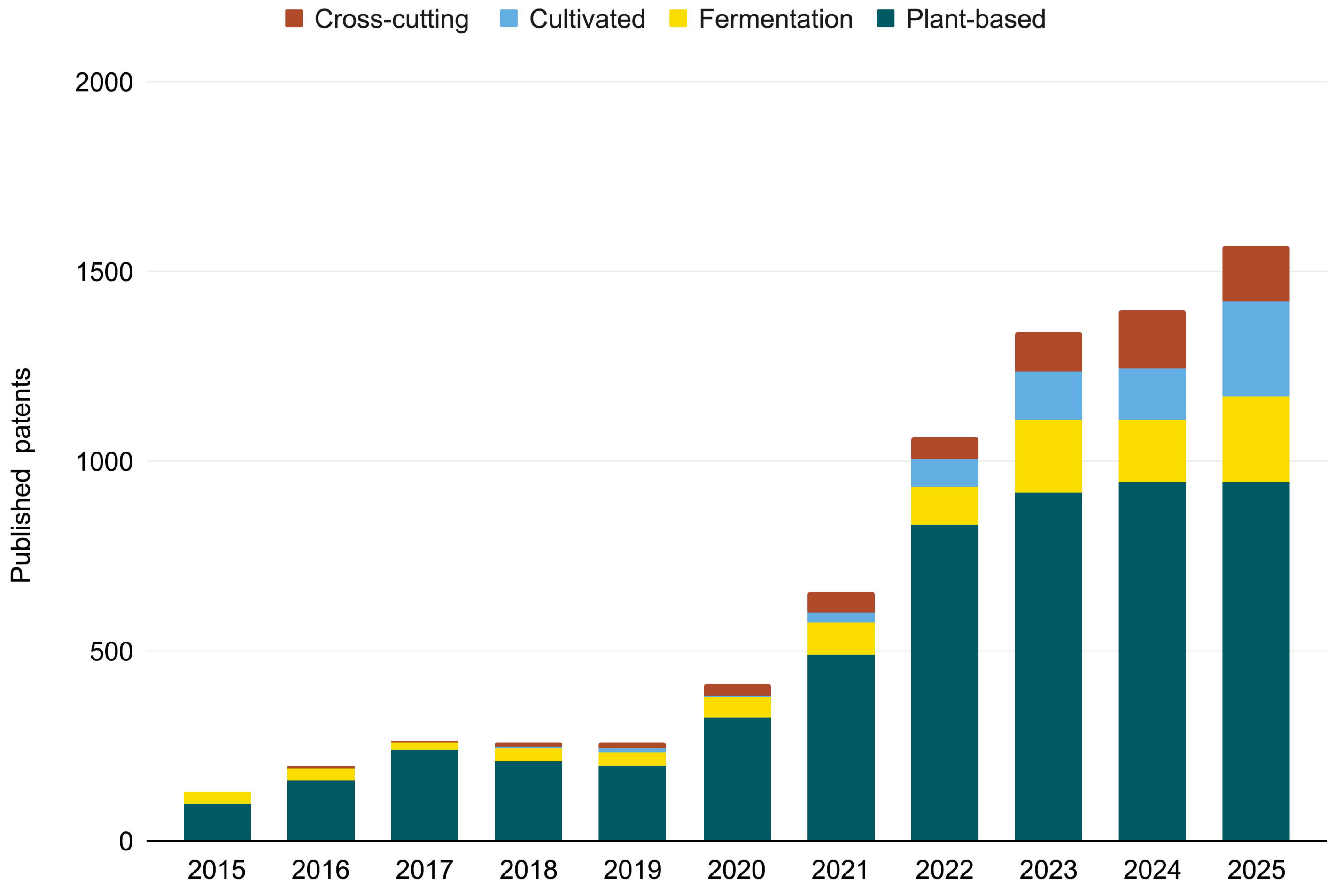
This chart shows the overall number of alternative protein patents published by European innovators in the years 2015-2025 inclusive, stratified by pillar.

There were 7,542 total patents published in the period 2015-2025.

The number of patents has risen each year since 2018, reaching 1,567 in 2025.

Breakdown of patents by alternative protein pillar:

- 71% plant-based proteins
- 13% fermentation-made proteins and ingredients
- 8% cultivated meat and seafood
- 8% cross-cutting topics



Given there can often be a significant delay between patenting filing, publication, and granting, this section focuses on patenting trends in the European alternative protein sector since 2015. For glossary of patent terms, see appendix.

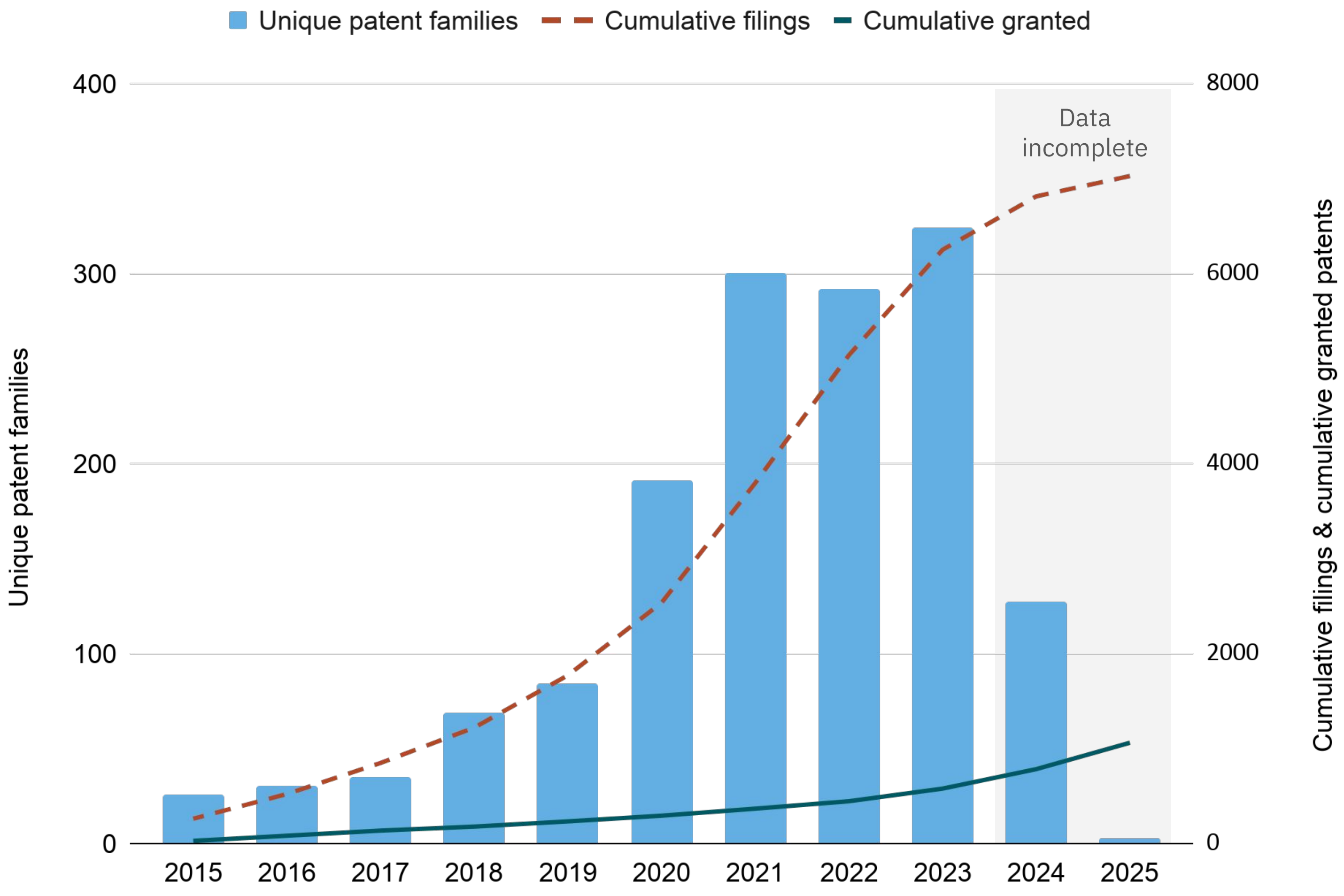
Overall trends

This chart shows trends in unique patent families and cumulative patent filings by European innovators in the years 2015-2025 inclusive, along with the cumulative number of patents that have been granted.

Priority filings – the very first filing on a new invention – began to rise significantly in 2020 and peaked at 324 in 2023.

Overall, a total of 7,027 patents from 1,584 families have been filed since 2015, with 2022 seeing the highest number of filings at 1,346.

The number of patents granted has also risen, reaching 278 in 2025, with 1,061 patents granted in total.



Due to the ~18-month lag between patent filing and publishing, 2024 and 2025 data are incomplete and should be treated with caution. For glossary of patent terms, see appendix.

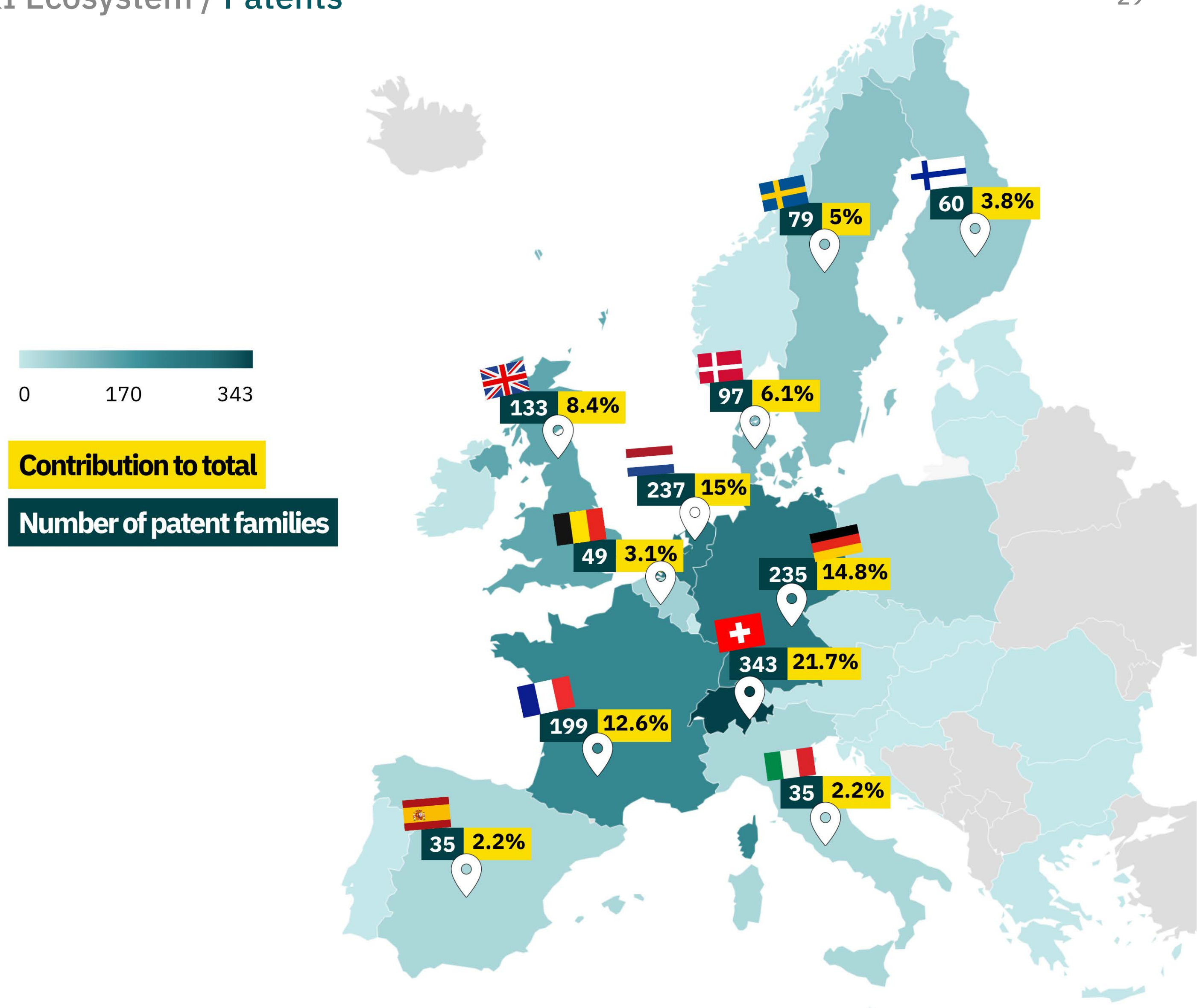
Patent families by country

This heat map shows the number of unique patent families on alternative protein technologies per European country in the years 2015-2025 inclusive, and their percentage contribution to the overall European total.

Switzerland leads with 21.7% of all patent families, followed by the Netherlands (15%), and Germany (14.8%).

Germany has the largest number of assignees (106), followed by the UK (59), with the Netherlands and France in joint third place (54).

Ranked on a patent families per million inhabitants basis, the most productive countries are Switzerland, Denmark, and the Netherlands. Larger countries such as the Germany and the UK are ranked 10th and 11th, respectively.



Map created with Datawrapper. For glossary of patent terms, see appendix.

Private sector assignees

This table shows the most productive companies in Europe on the basis of unique patent families filed on topics related to alternative proteins along with a breakdown of the pillars covered in those patents.

	Country	Total patent families	Total patents	Plant-based families	Fermentation families	Cultivated families	Cross-cutting families
Nestlé	Switzerland	163	896	157	4	0	2
dsm-firmenich	Switzerland, Netherlands	75	349	53	10	1	11
Roquette Frères	France	64	383	59	5	0	0
Unilever	Netherlands, United Kingdom	51	280	36	1	0	14
Novonesis	Denmark	47	244	45	1	0	1
Givaudan	Switzerland	38	161	29	0	1	8
AAK	Sweden	25	87	25	0	0	0
Oatly	Sweden	22	108	22	0	0	0
Marlow Foods	United Kingdom	21	135	17	0	0	4
Bühler Group	Switzerland	20	101	7	0	1	12

For glossary of patent terms, see appendix.

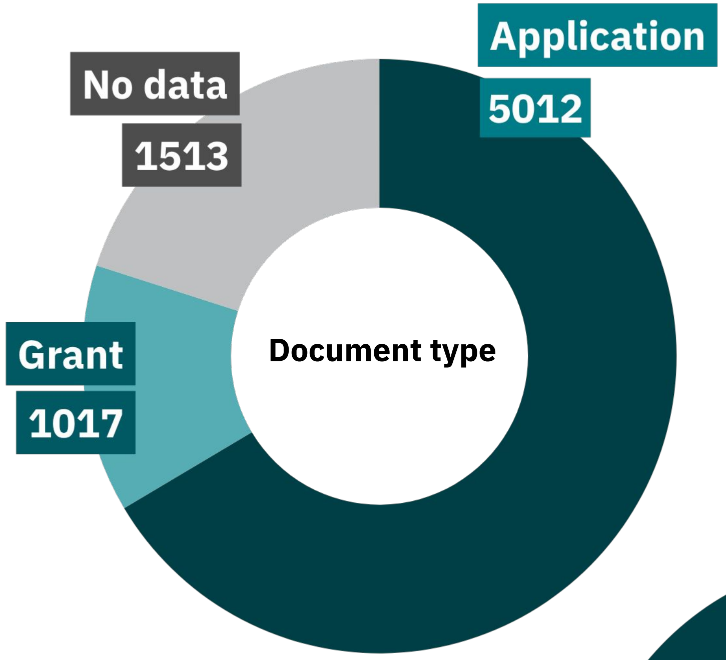
Patent legal status

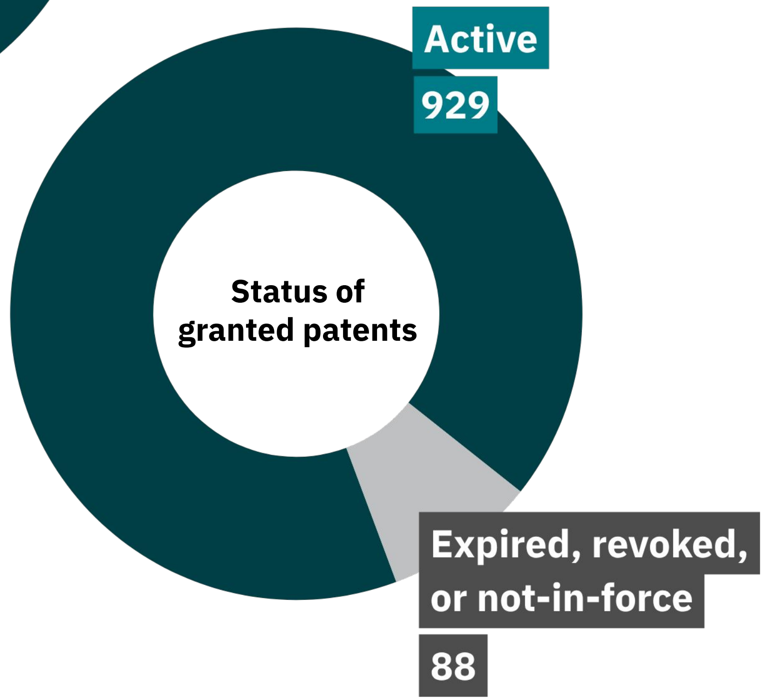
The patents in this dataset comprise two document types: *patent applications*[1] and *granted patents*[2]. These charts break down the types of document in the dataset, and show the status of the granted patents.

Of the documents in this dataset, 5,012 are patent applications, 1,017 are granted patents, and data is unavailable for the remaining 1,513.

Of the 5,012 application documents, 746 (15%) have subsequently been granted since publication, while a further 2,734 (55%) are pending.

Of granted patents, 929 (91%) are active, with the remainder either expired, revoked, or not-in-force.





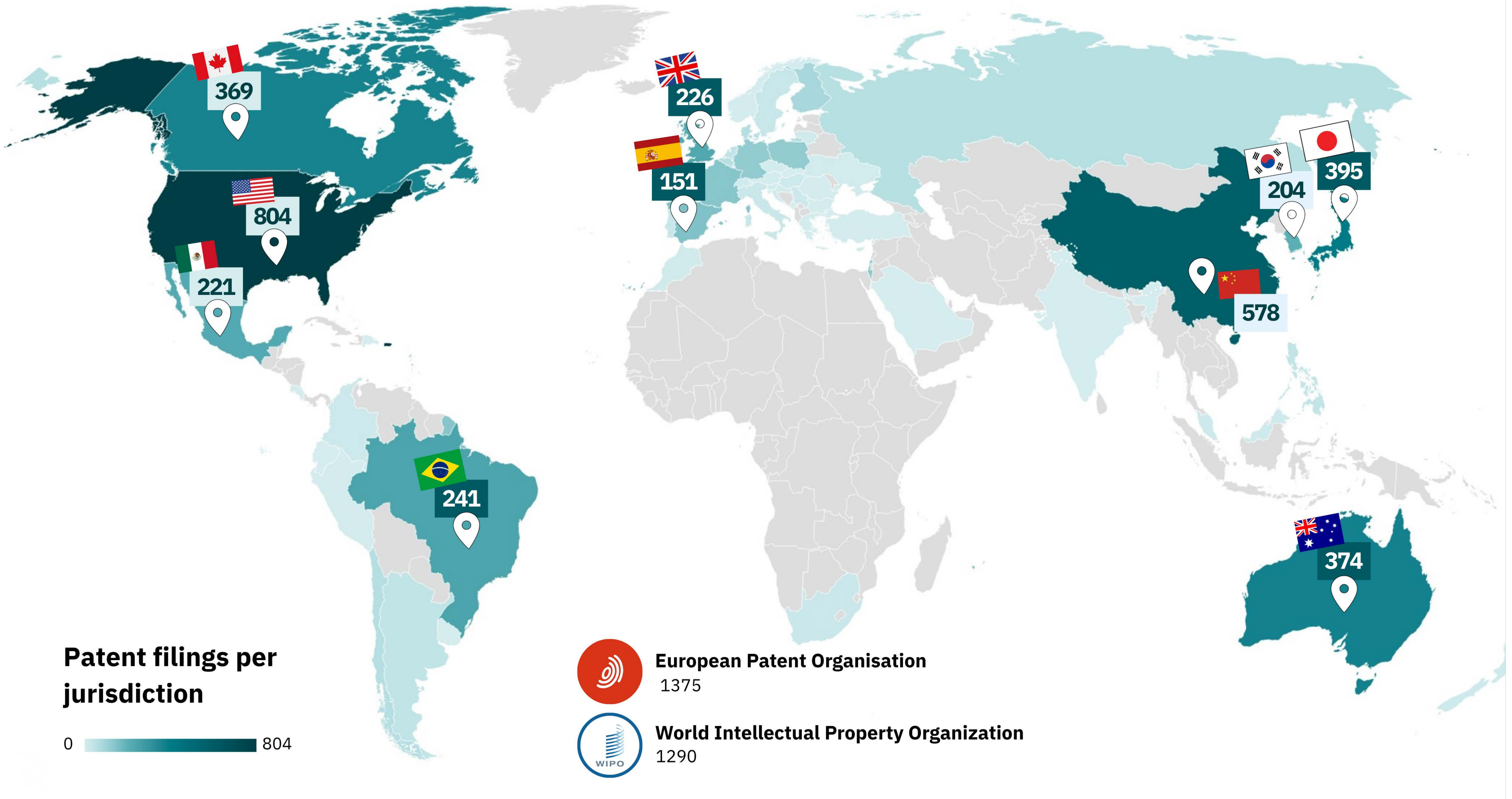
1. A patent application is a filed request for protection (pending status) that is published for public view, offering no, or limited, legal enforcement rights. 2. A granted patent is the final, approved right to exclude others from using the invention for up to 20 years, allowing for full legal enforcement. For a glossary of patent terms, see appendix.

Filing jurisdictions

Heat map of the most common jurisdictions where alternative protein patents have been filed by European innovators in the years 2015-2025 inclusive.

The majority of patents in this dataset have been filed with either the World Intellectual Property Organization (WIPO) (1,290 patents) or the European Patent Organisation (EPO) (1,375).

The most popular national jurisdictions for filing patents are the United States (804), China (578), Japan (395), Canada (369), and Australia (374).



Jurisdiction refers to the legal territory in which a patent is sought, for example, France, Spain, etc. Each patent must be filed with a national patent office in the country where protection is sought and there are no global patents. The high number of patent filings with WIPO reflects the abundance of Patent Cooperation Treaty (PCT) filings in this dataset, which is a common route for innovators to take at the early stage of exploring the patentability of a new invention and is administered by WIPO. While PCT filings do not result in a patent being granted, this mechanism provides a single point of entry to receive a quick opinion on the patentability of an invention when assessed against a common set of standards agreed by 158 countries worldwide. The EPO operates a similar one-step process for the filing of patents under common standards across the 39 EPO member countries. The granting of a European patent can then be followed by validation of the patent in selected member countries. Map created with Datawrapper. For glossary of patent terms, see appendix.

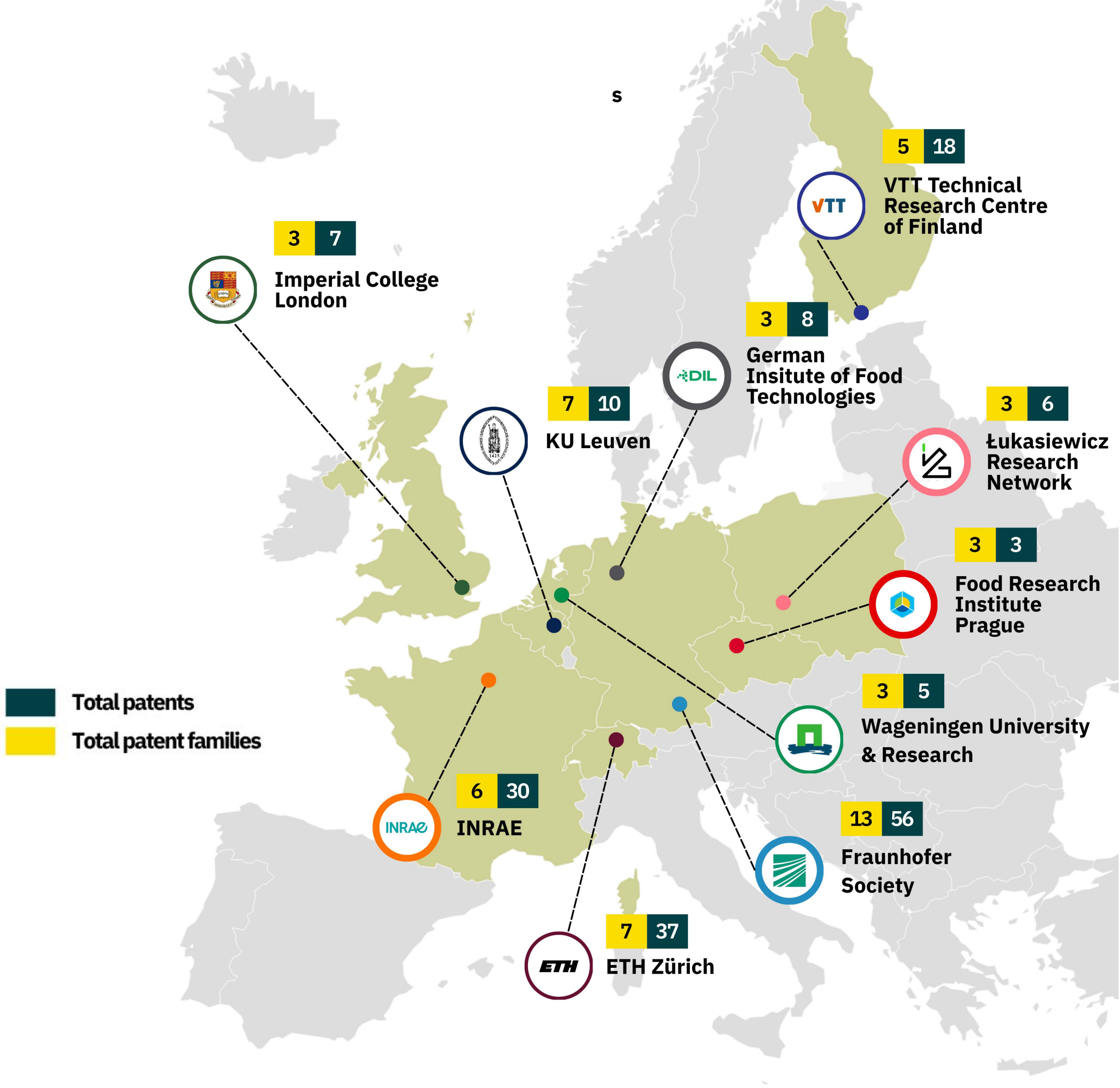
Public and nonprofit research-performing organisations

This map shows the leading European public and nonprofit research organisations on the basis of alternative protein patent filings in the period 2015-2025.

64 public or nonprofit research organisations have published patents on alternative proteins, representing 18 countries.

7% of patent families have a public or nonprofit research organisation listed as a sole or co-assignee.

Just 1% of patent families list both a public and private entity as co-assignees.



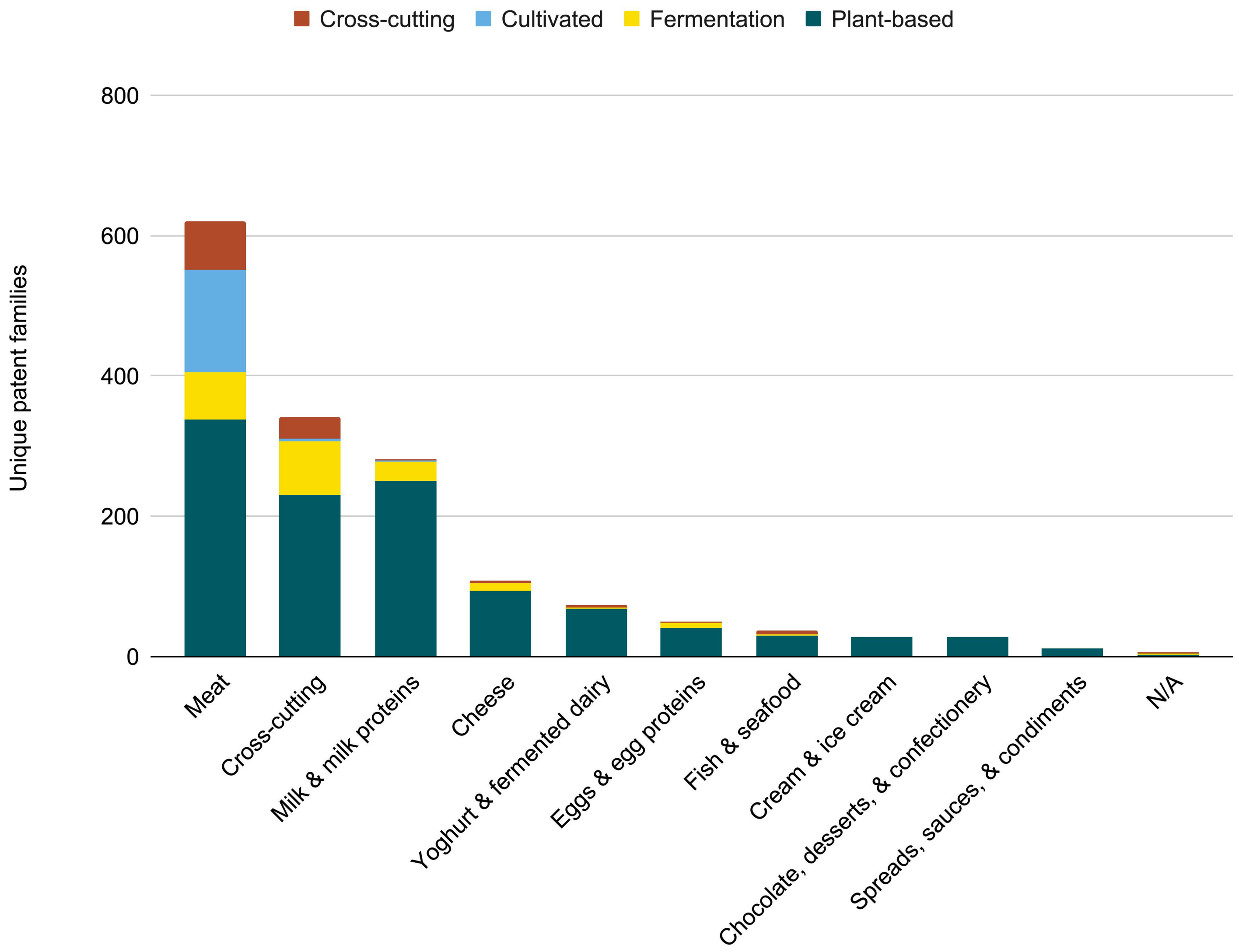
Map created with Datawrapper. For glossary of patent terms, see appendix.

End product type

This chart shows a breakdown of European alternative protein patent families by intended end product in the time period 2015-2025.

Meat is by far the most common end product, with 39% of patent families. Dairy products (combining the 'milk & milk proteins', 'cheese', 'yoghurt & fermented dairy', and 'cream & ice cream' categories) account for 31%.

Most end product categories are dominated by plant-based patents. Just 2% of dedicated families are on innovations specific to fish and seafood analogues. Innovations on cheese and egg analogues also remain relatively neglected.



For glossary of patent terms, see appendix.

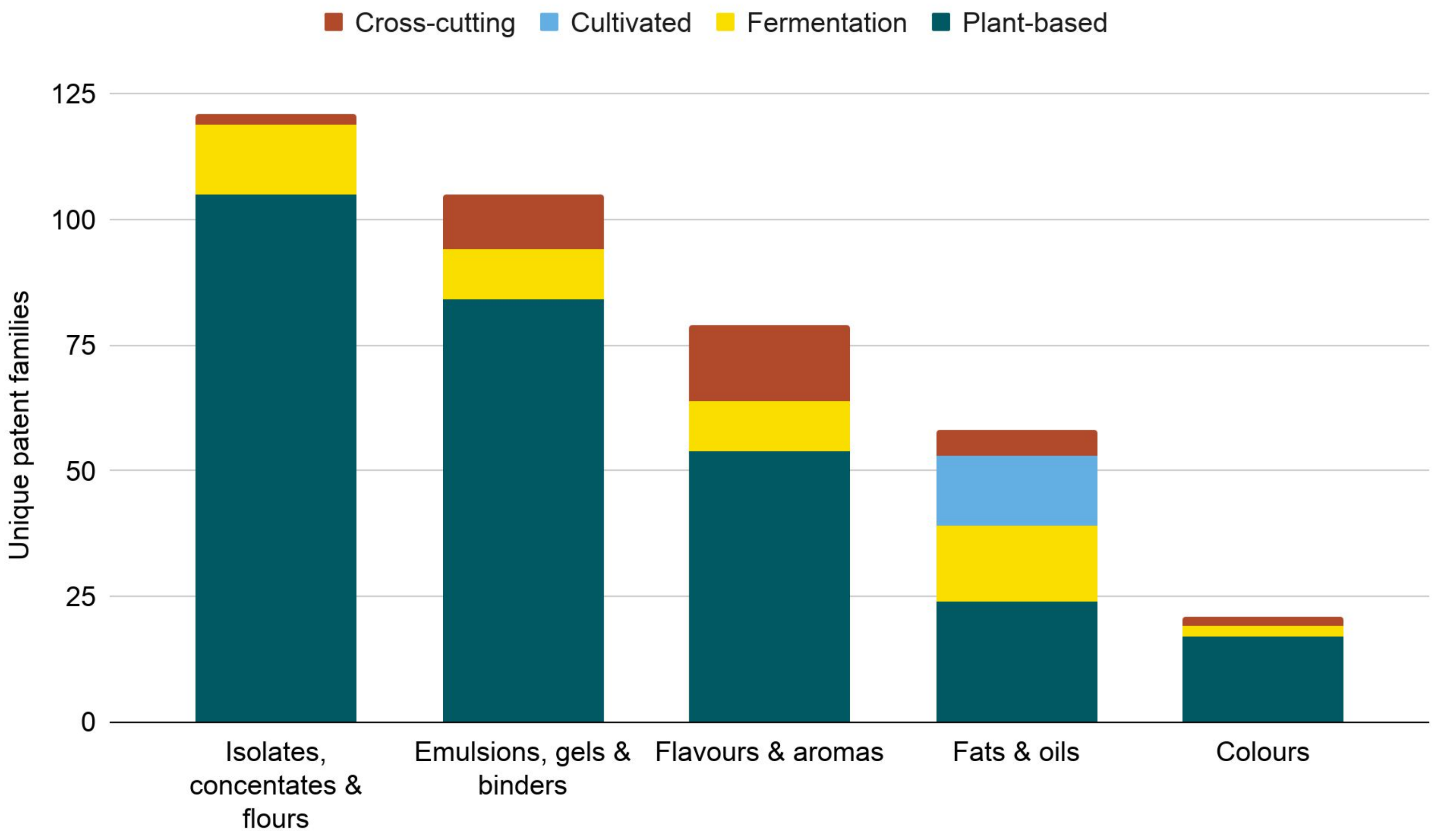
Patents by ingredient type

This chart shows a breakdown of alternative protein patent families on the basis of intended ingredient type in the time period 2015-2025.

Protein isolates, concentrates and flours are the most common ingredients, followed by emulsions, gels and binders.

Plant-based ingredients are most common, although many patents apply to more than one alternative protein pillar.

Cultivated fats are being developed by several European companies as an ingredient for meat analogues.



Deep-dive: Plant-based

This section breaks down funding, publications, and patent trends, using research categories to explore strengths and weaknesses in the field of plant-based meat, seafood, eggs and dairy in Europe.

Research categories:

Plant-based

Crop development

Breeding of crops and increased use of underutilised protein crops for higher protein yields and functionality.

Strain development

Screening and optimisation of novel strains to identify the most efficient pathways for producing targets or modifying substrates.

Ingredient optimisation

Improved protein fractionation and functionalisation for higher-quality ingredients with less processing, and development of novel ingredients to augment nutritional profiles and enhance sensory experience.

Texturisation methods

Process innovations, including (but not limited to) novel texturisation methods such as extrusion, electrospinning, 3D printing, and enzymatic processing to match the texture of animal protein.

End product formulation

Formulation and product design, including fat integration, shelf life, stability, sensory quality, and nutritional assessment and fortification.

Food safety and quality

Toxicological and safety assessments, regulatory improvements, such as assay development or validation.

Health and nutrition

Dietary impacts of alternative proteins including population-wide studies, systematic reviews, and in vitro studies on health impacts such as bioavailability.

Consumer and market research

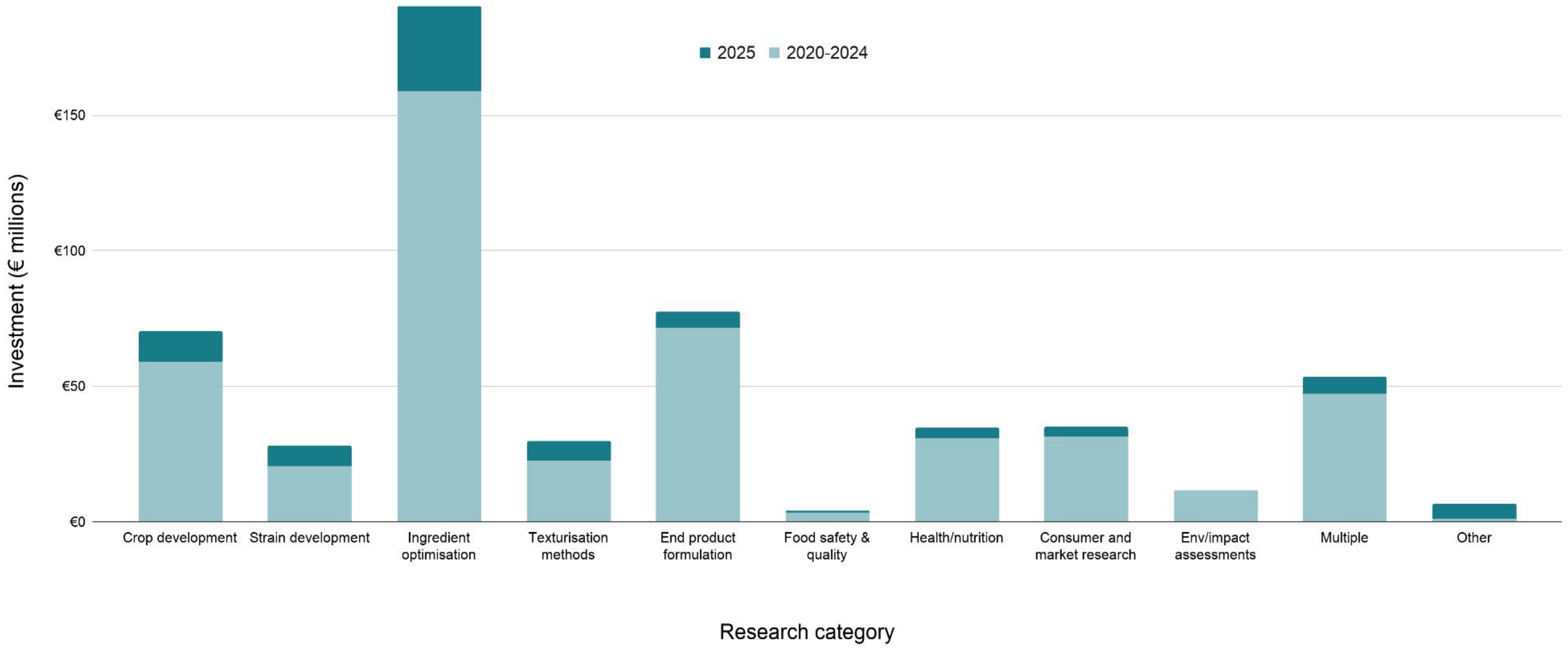
Consumer behaviour research including nomenclature studies, purchasing intent across retail and food environments, and market scoping and brand development.

Impact assessments

Includes life cycle, techno-economic, environmental, social, and geopolitical impact analyses.

Investment by plant-based research category

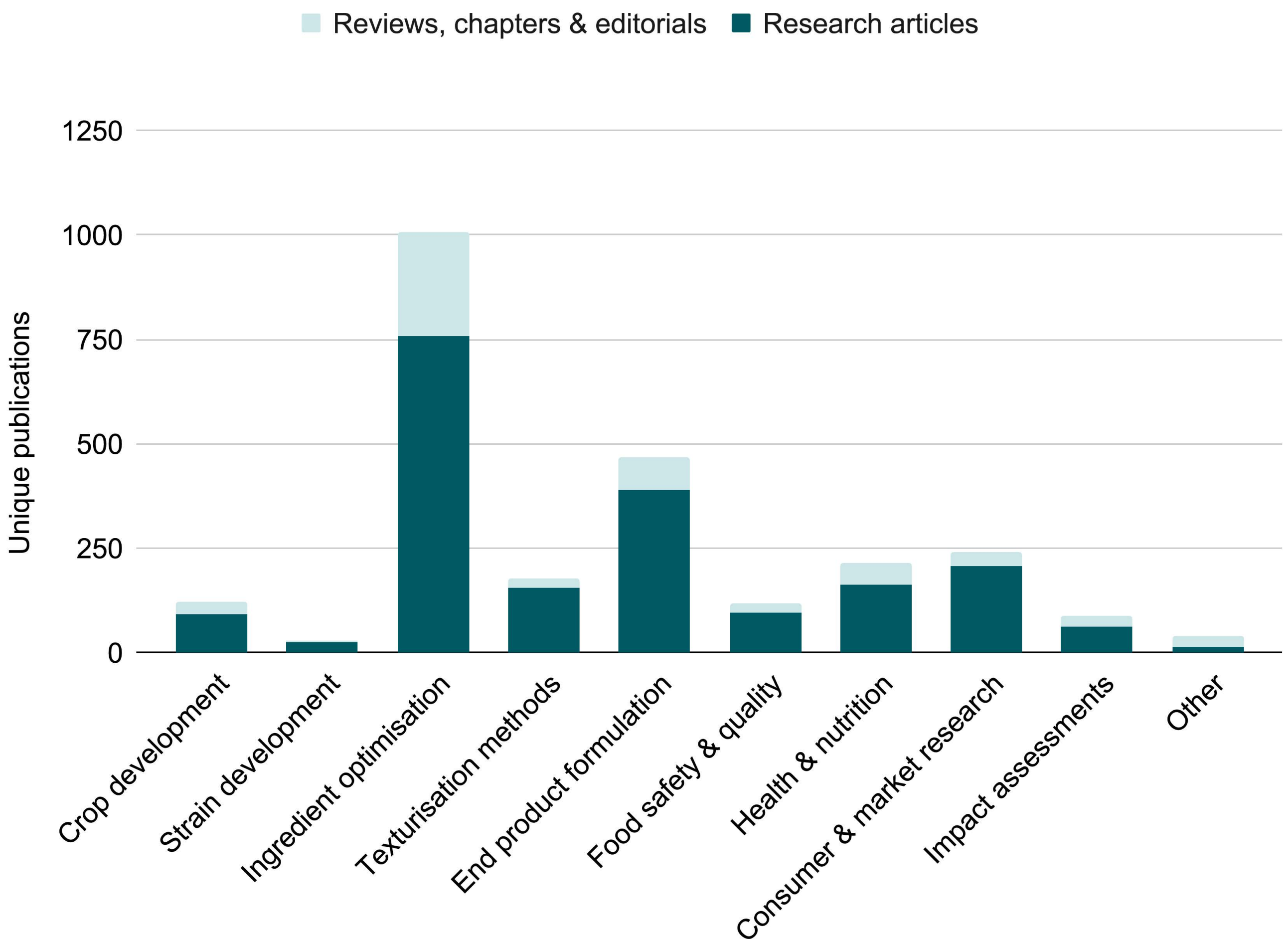
Investment from funders in Europe into plant-based research, assigned by research category (2020-2025 inclusive). Investment in plant-based R&I across Europe continued to focus heavily on ingredient optimisation.



Publications by plant-based research category

This chart shows a breakdown by research category of European academic publications on plant-based proteins in the years 2020-2025 inclusive.

Ingredient optimisation and end product formulation are the most common categories, accounting for 40% and 19% of publications, respectively.

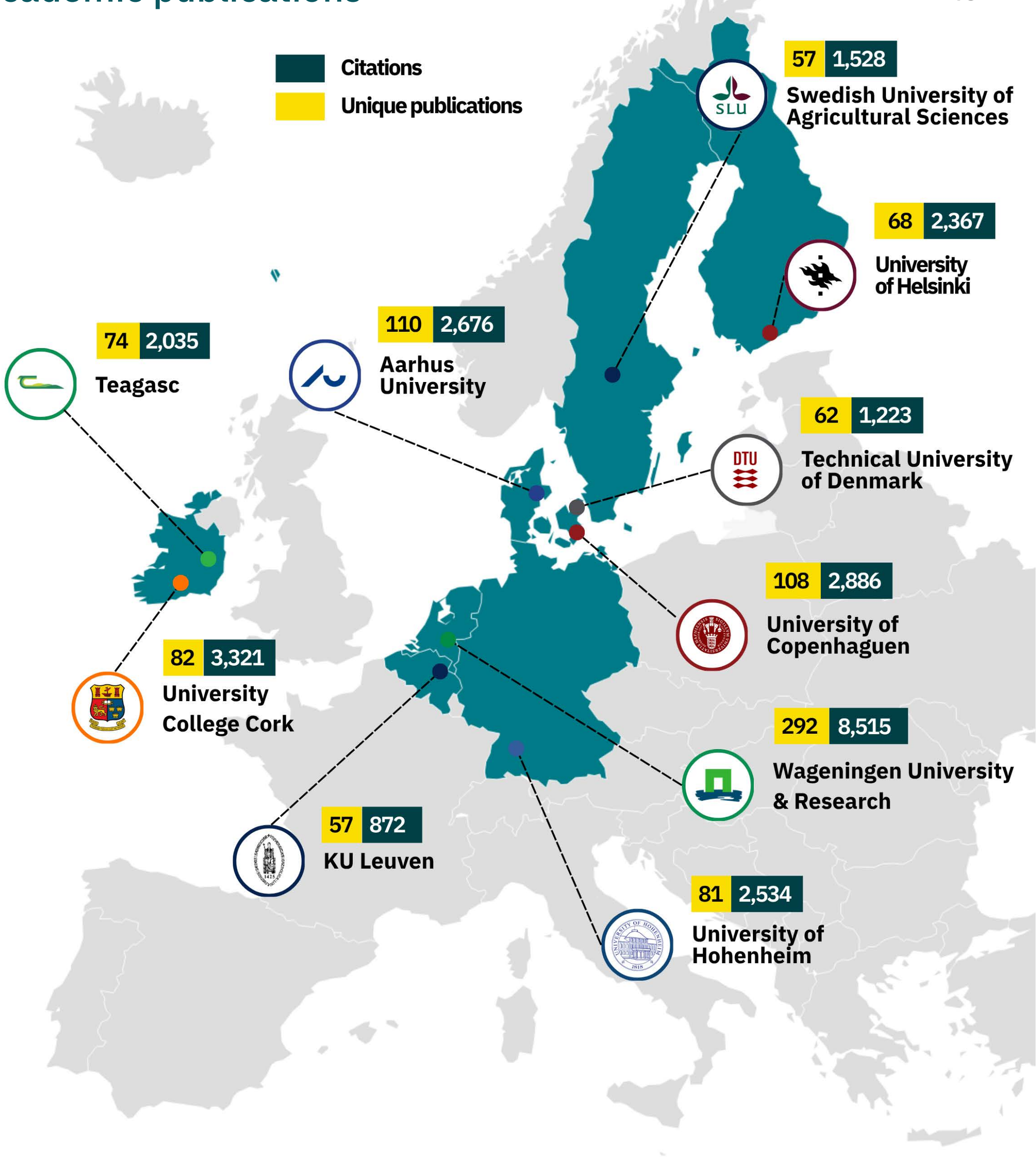


Leading plant-based research-performing organisations

This map shows the leading institutions for plant-based protein research in Europe on the basis of unique publications in the period 2020-2025.

The leading countries for plant-based research are the Netherlands (contributing to 13.8% of 2020-2025 output), Germany (13.6%), and Denmark (11.3%).

Wageningen University & Research leads in publications (292) and citations (8,515).

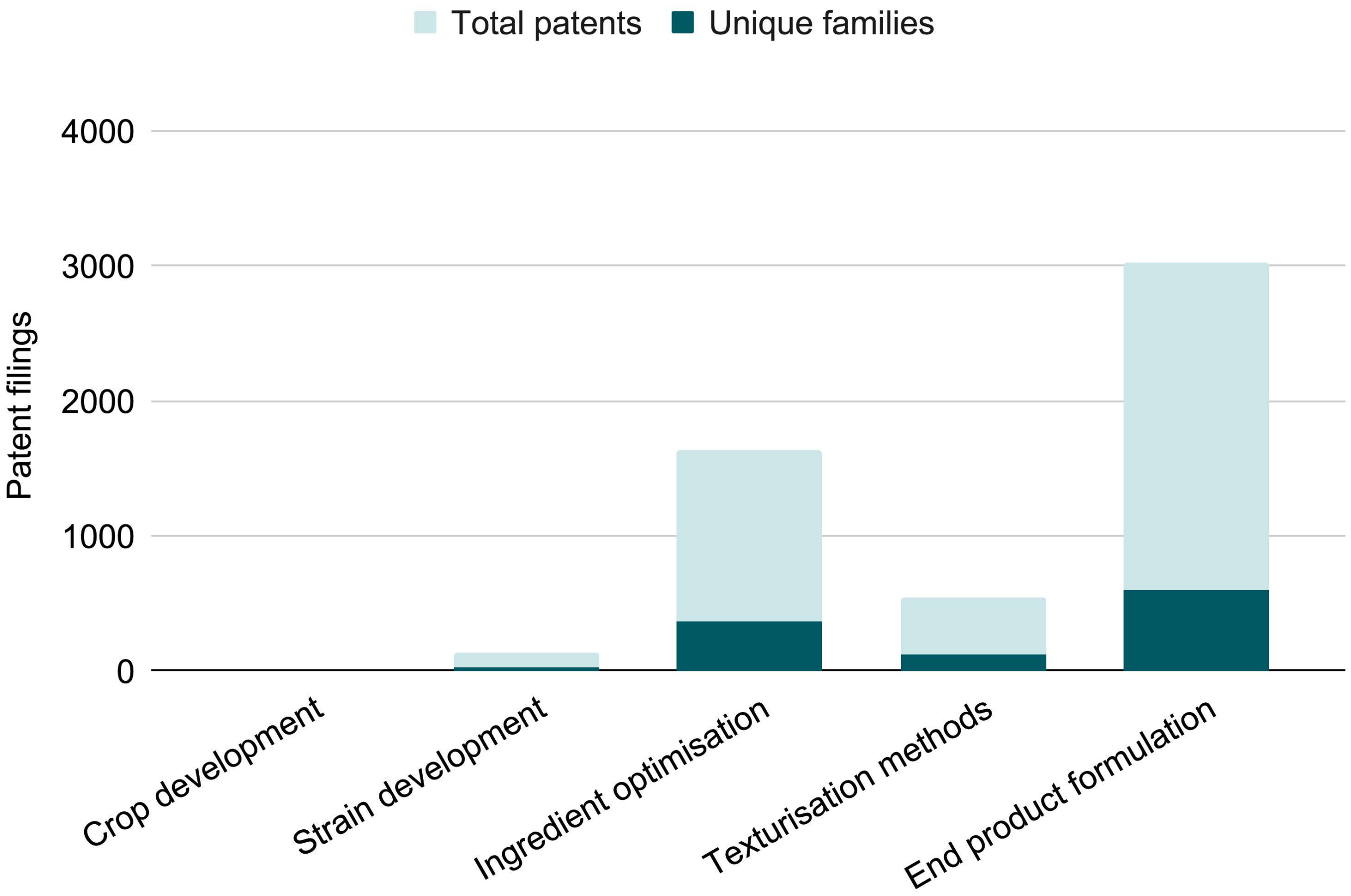


Map created with Datawrapper

Patents by plant-based research category

This chart provides a breakdown of patent filings by European innovators on technology areas related to plant-based proteins in the years 2015-2025 inclusive.

End product formulation and ingredient optimisation are the most common categories, accounting for 57% and 30% of patent filings, respectively.



For glossary of patent terms, see appendix.

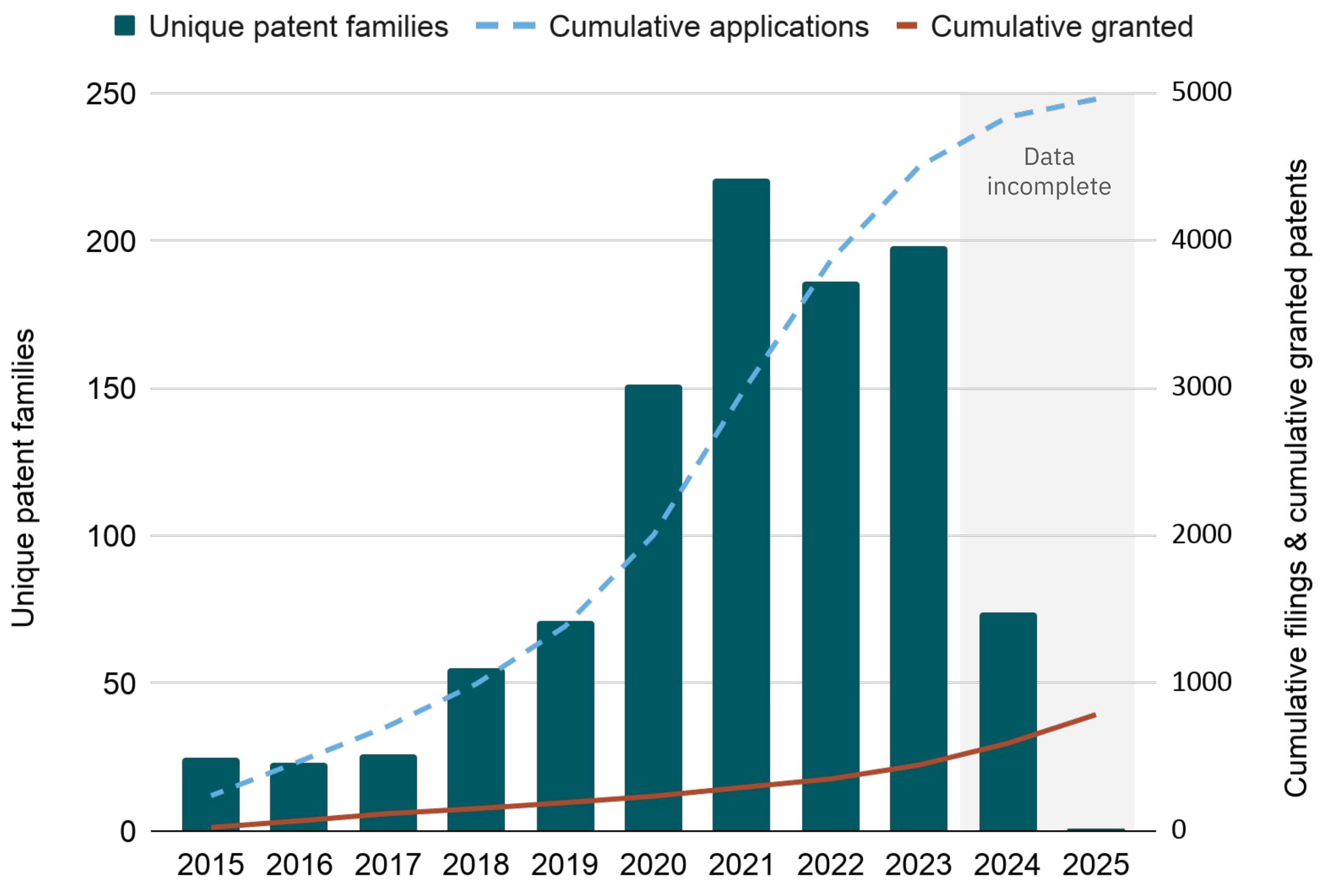
Plant-based patents over time

This chart shows trends in unique plant-based patent families and cumulative patent filings by European innovators in the years 2015-2025 inclusive, along with the cumulative number of patents that have been granted.

Priority filings – the very first filing on a new invention – began to rise significantly in 2020 and peaked at 198 in 2023.

Overall, a total of 4,960 patents from 1,120 families have been filed since 2015, with 2021 seeing the highest number of filings at 963.

The number of patents granted has also risen, reaching 195 in 2025, with 787 patents granted in total.



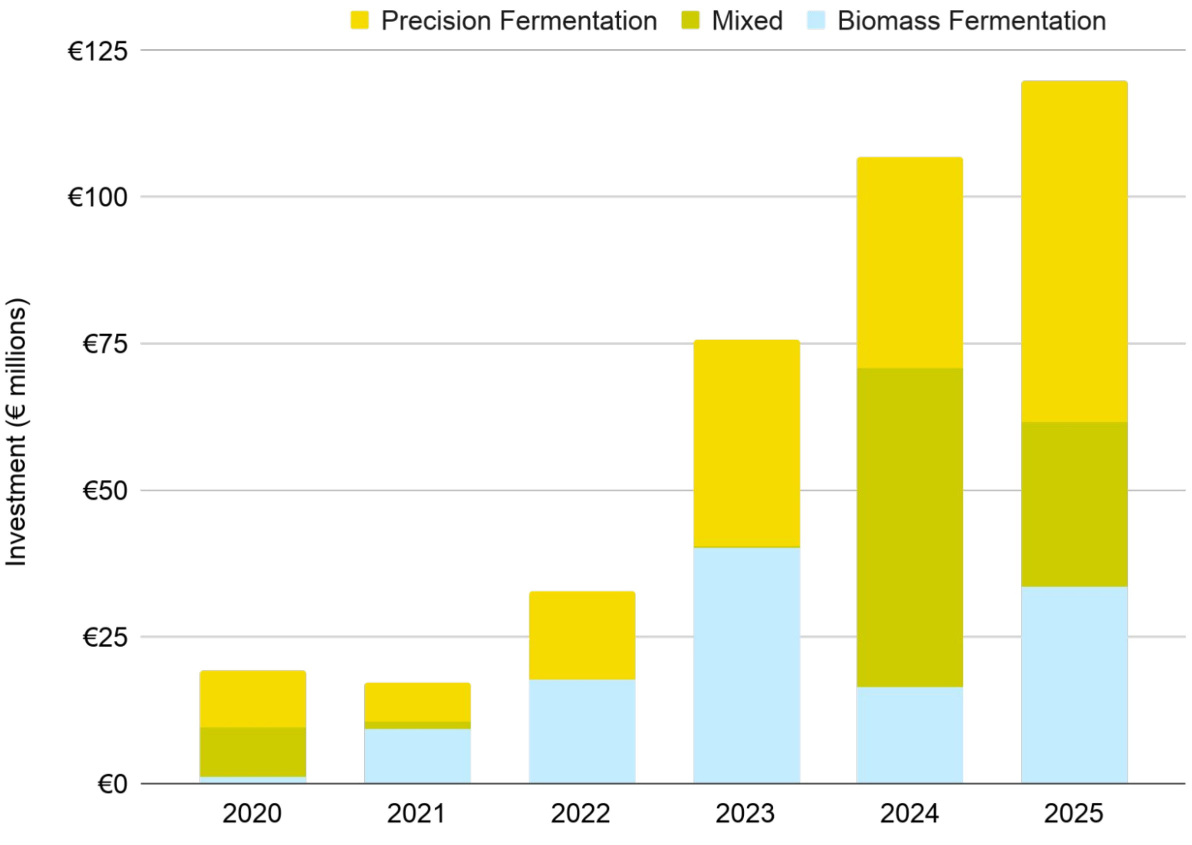
Due to the ~18-month lag between patent filing and publishing, 2024 and 2025 data are incomplete and should be treated with caution. For glossary of patent terms, see appendix.

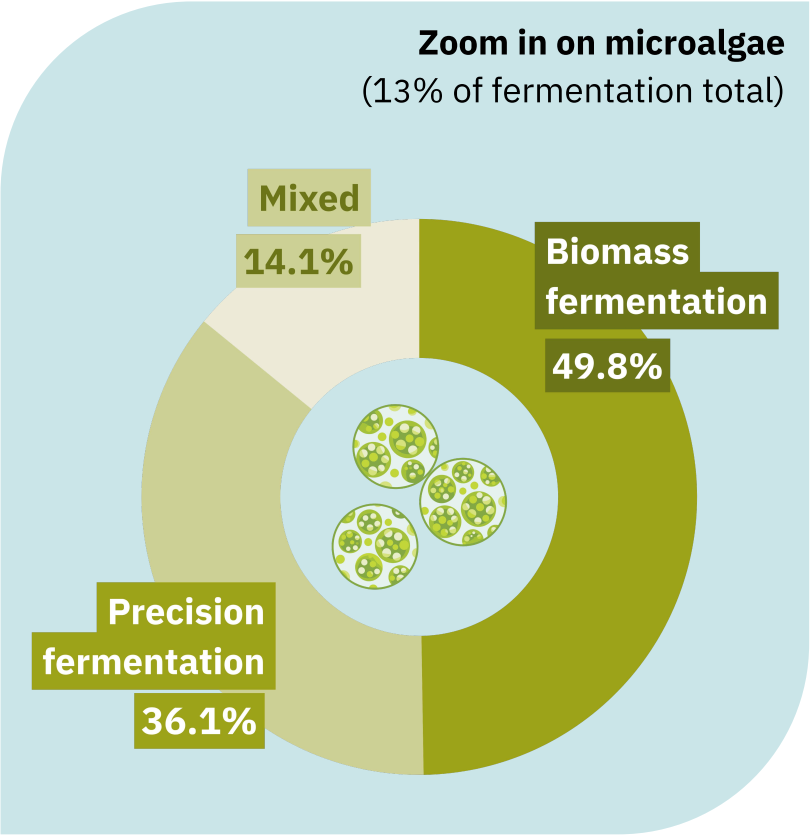
Deep-dive: Fermentation

This section breaks down funding, publications, and patent trends, using research categories to explore strengths and weaknesses in the field of fermentation-enabled alternative proteins in Europe.

Investment by type of fermentation

Investment into fermentation research from funders in Europe, assigned by fermentation type (2020-2025 inclusive), with a deep-dive on algae.
Precision fermentation received more funding than biomass again in 2025 (€58.3 million compared with €33.5 million), reflecting a growing prioritisation of the technology across Europe. Microalgae was the focus in 13% (€49.2 million) of funded research, and was used both to produce microbial biomass and as a host for specific ingredients through precision fermentation.





Research categories: Fermentation

Target molecule selection

Target identification and validation to broaden the scope of food ingredients produced by precision fermentation.

Feedstocks

Media composition and feedstock utilisation strategies (including alternative feedstocks) to improve efficiency, scale and cost.

Strain development

Screening and optimisation of novel strains to identify the most efficient pathways for producing targets or modifying substrates.

Bioprocess design

Innovations in bioreactor design and upstream/downstream processes to improve efficiency, monitoring, and control.

Ingredient optimisation

Improved protein fractionation and functionalisation for higher-quality ingredients with less processing, and development of novel ingredients to augment nutritional profiles and enhance sensory experience.

Texturisation methods

Developing techniques such as extrusion technology to replicate the fibrous, chewy textures of conventional meat and dairy.

End product formulation

Formulation and product design, including fat integration, shelf life, stability, sensory quality, and nutritional assessment and fortification.

Food and safety quality

Toxicological and safety assessments, regulatory improvements, such as assay development or validation.

Health and nutrition

Dietary impacts of alternative proteins including population-wide studies, systematic reviews, and in vitro studies on health impacts such as bioavailability.

Consumer market and research

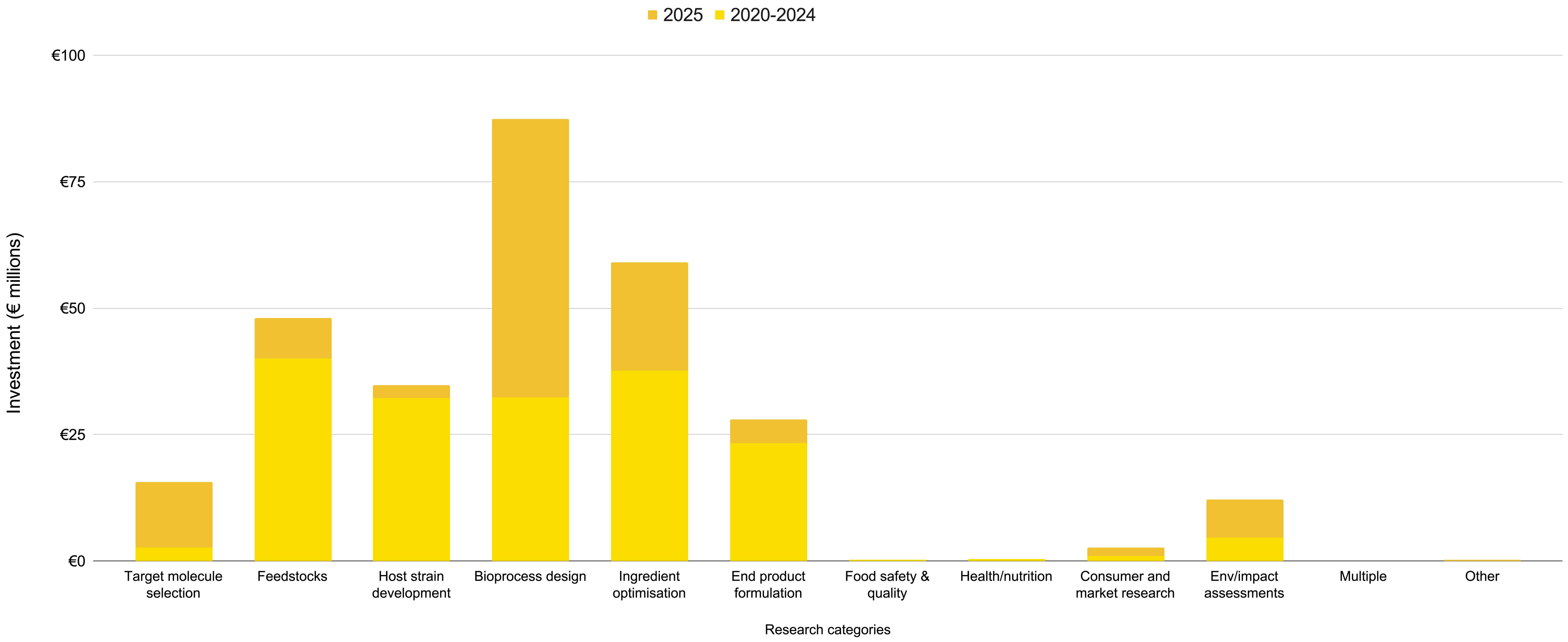
Consumer behaviour research including nomenclature studies, purchasing intent across retail and food environments, and market scoping and brand development.

Impact assessments

Includes life cycle, techno-economic, environmental, social, and geopolitical impact analyses.

Investment by fermentation research category

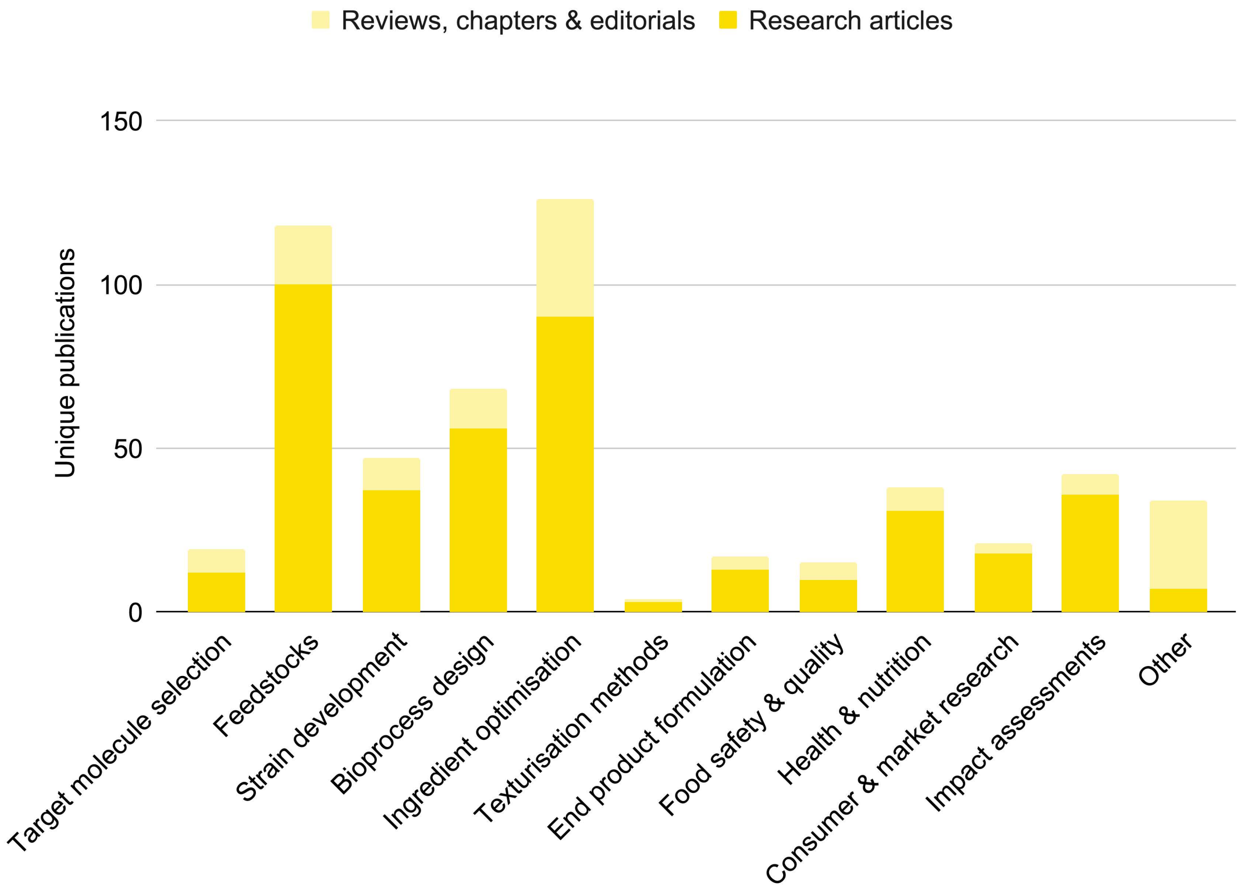
Investment in fermentation research from funders in Europe, assigned by research category (2020-2025 inclusive). Investment in fermentation R&I across Europe increasingly prioritises critical areas like bioprocess design, and increasing the target molecule pool. However, there is still very little direct research on areas like health and nutrition and food safety.



Publications by fermentation research category

This chart shows a breakdown by research category of European academic publications on fermentation-made proteins and ingredients in the years 2020-2025 inclusive.

Ingredient optimisation, feedstocks, and bioprocess design are the most common categories, making up 23%, 21%, and 12% of publications, respectively.

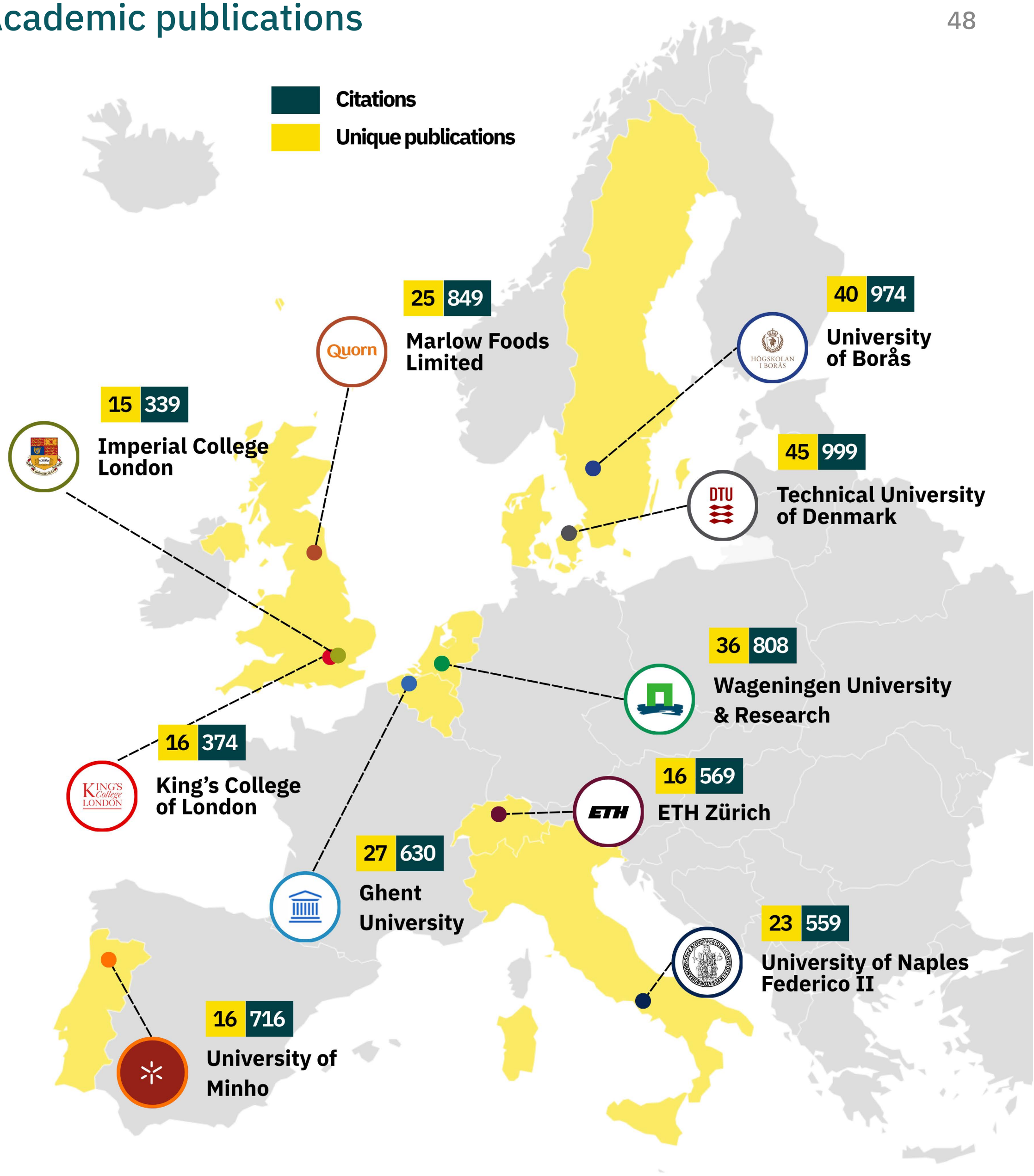


Leading fermentation research-performing organisations

This map shows the leading institutions and companies for fermentation-made protein and ingredients research in Europe on the basis of unique publications in the period 2020-2025.

The leading countries in Europe for fermentation-made protein and ingredients research are the UK (contributing to 14% of total 2020-2025 output), Germany (13%), and Italy (11%).

Technical University of Denmark leads in unique publications (45) and citations (999).



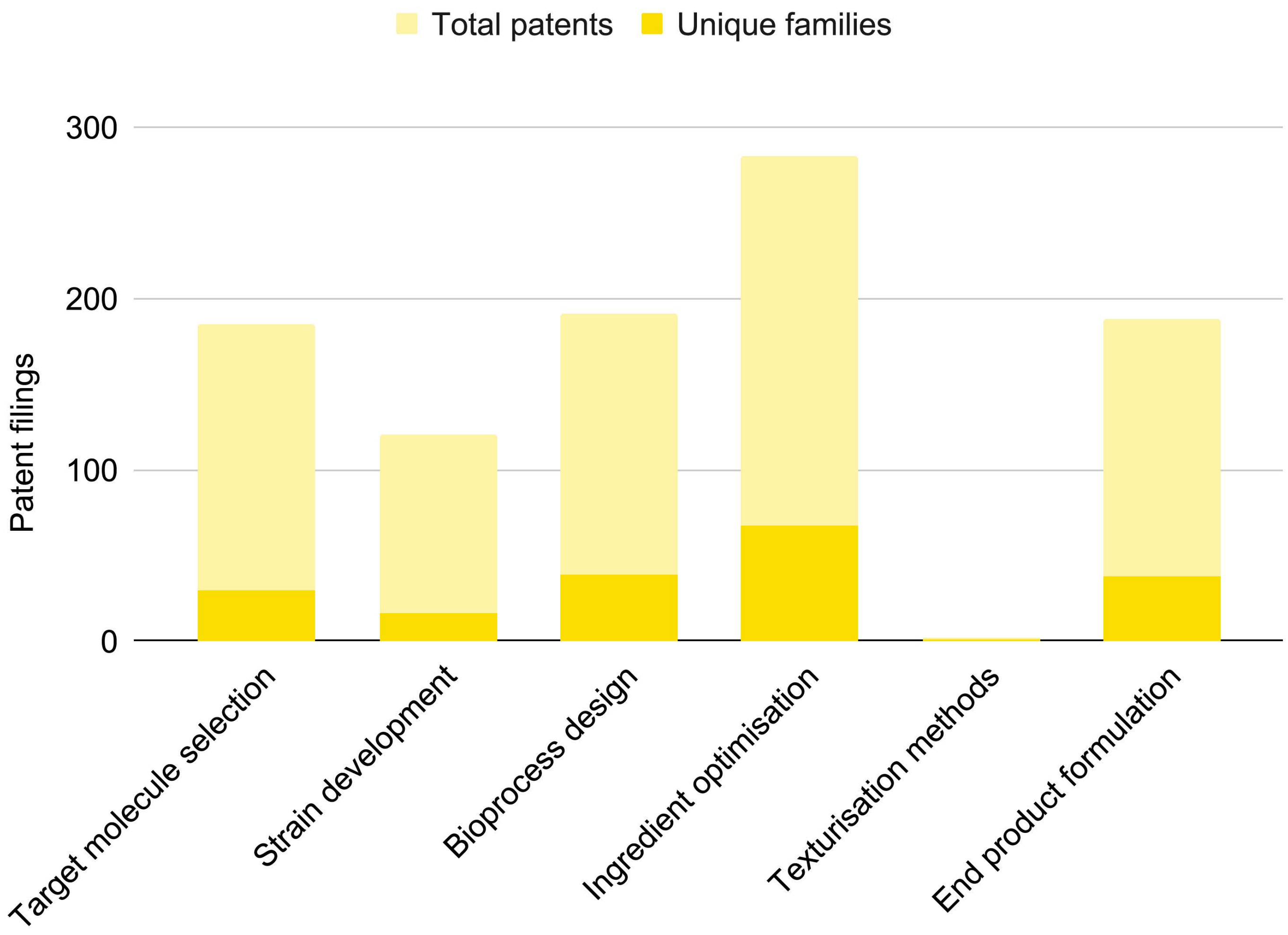
Map created with Datawrapper

Patents by fermentation research category

This chart provides a breakdown of patent filings by European innovators on technology areas related to fermentation-made proteins and ingredients in the years 2015-2025 inclusive.

Patent filings are evenly spread across research categories. Ingredient optimisation, bioprocess design, and end product development are the most common categories, making up 29%, 21%, and 19% of patent filings, respectively.

However, there are very few patents on texturisation methods for fungal proteins.



For glossary of patent terms, see appendix.

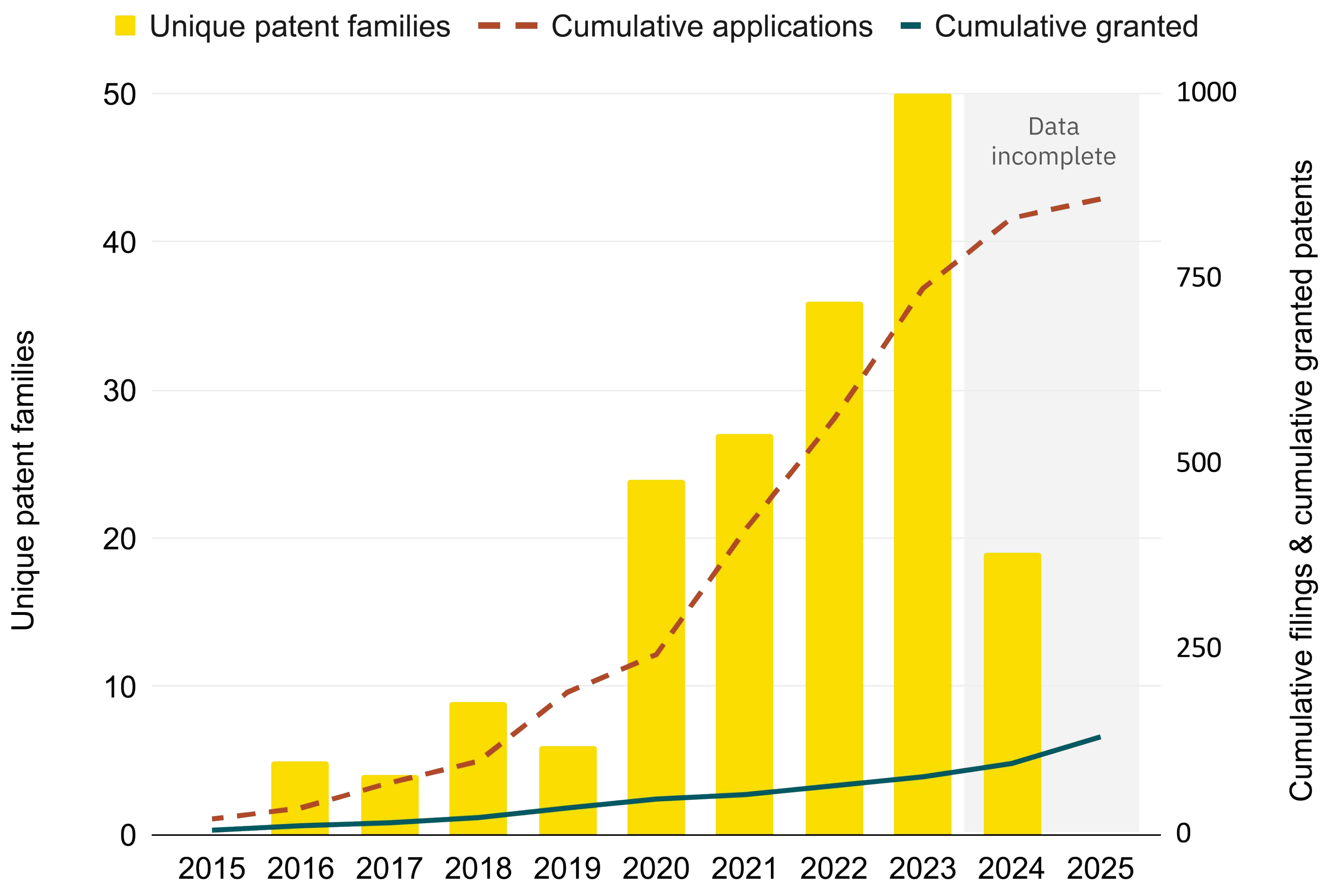
Fermentation patents over time

This chart shows trends in unique fermentation patent families and cumulative patent filings by European innovators in the years 2015-2025 inclusive, along with the cumulative number of patents that have been granted.

Priority filings – the very first filing on a new invention – began to rise significantly in 2020 and peaked at 50 in 2023.

Overall, a total of 858 patents from 192 families have been filed since 2015, with 2023 seeing the highest number of filings at 176.

The number of patents granted has also risen, reaching 36 in 2025, with 132 patents granted in total.

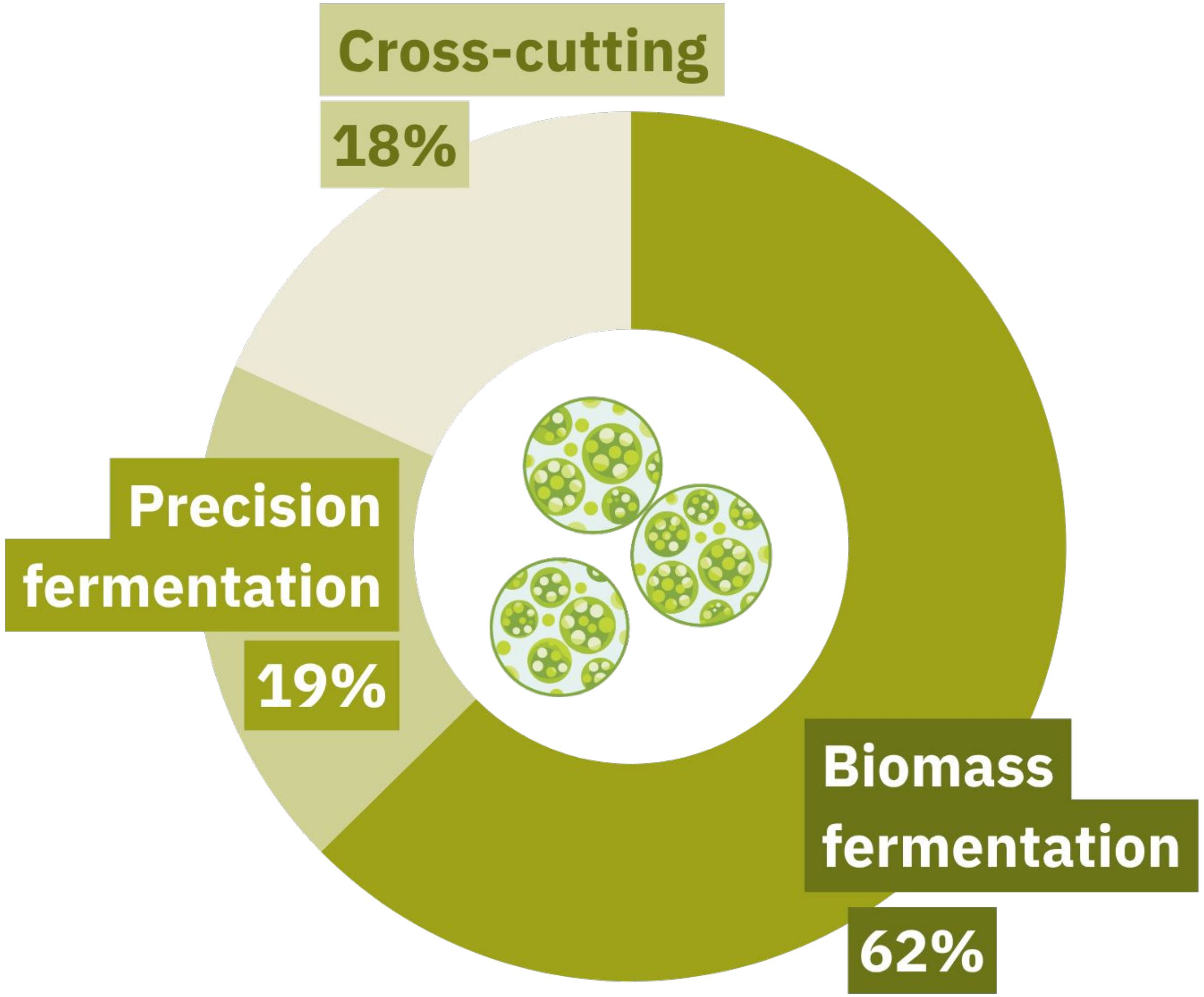


Due to the ~18-month lag between patent filing and publishing, 2024 and 2025 data are incomplete and should be treated with caution. For glossary of patent terms, see appendix.

Fermentation patents: biomass vs precision fermentation

This chart shows a breakdown of unique fermentation patent families from European innovators in the years 2015-2025 inclusive on the basis of whether the technology is intended for use in biomass or precision fermentation applications.

A majority of patent filings (62%) focus on biomass fermentation rather than precision fermentation (19%), with the remainder cutting across both fermentation types.



For glossary of patent terms, see appendix.

Deep-dive: cultivated

This section breaks down funding, publications, and patent trends, using research categories to explore strengths and weaknesses in the field of cultivated meat and seafood in Europe.

Research categories: Cultivated

Cell line development

Sourcing, optimising, and banking new and existing cell lines to achieve faster growth, greater stability and stress tolerance, improved performance (including adherence and differentiation), and higher density across terrestrial and aquatic cell lines.

Cell culture media

Reducing cell culture media costs and increasing their availability by characterising and validating novel sources of growth factors, amino acids, and other media components.

Bioprocess design

Innovations in bioreactor design and upstream/downstream processes to improve efficiency, monitoring, and control.

Scaffolding

Improved scaffolding biomaterials that support cell adherence and differentiation to allow the replication of complex animal meat structures.

Texturisation methods

Developing techniques such as extrusion technology to replicate the fibrous, chewy textures of conventional meat and dairy.

End product formulation

Formulation and product design, including fat integration, shelf life, stability, sensory quality, and nutritional assessment and fortification.

Food safety and quality

Toxicological and safety assessments, regulatory improvements, such as assay development or validation.

Health and nutrition

Dietary impacts of alternative proteins including population-wide studies, systematic reviews, and in vitro studies on health impacts such as bioavailability.

Consumer market and research

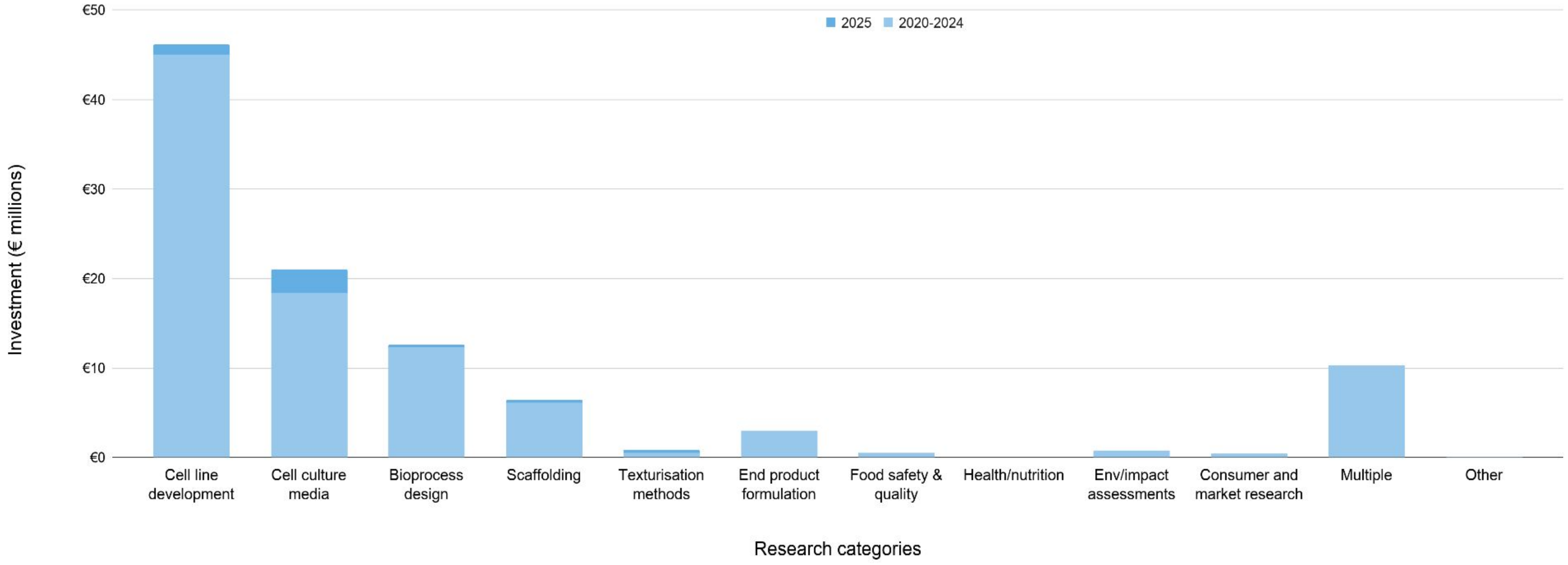
Consumer behaviour research including nomenclature studies, purchasing intent across retail and food environments, and market scoping and brand development.

Impact assessments

Includes life cycle, techno-economic, environmental, social, and geopolitical impact analyses.

Investment by cultivated research category

Investment in cultivated meat and seafood research from funders in Europe, assigned by research category (2020-2025 inclusive). Investment in cultivated R&I across Europe is still focussed on early-stage aspects such as cell line development and cell culture media. With little new investment in 2025, this technology spread is largely unchanged from past years.

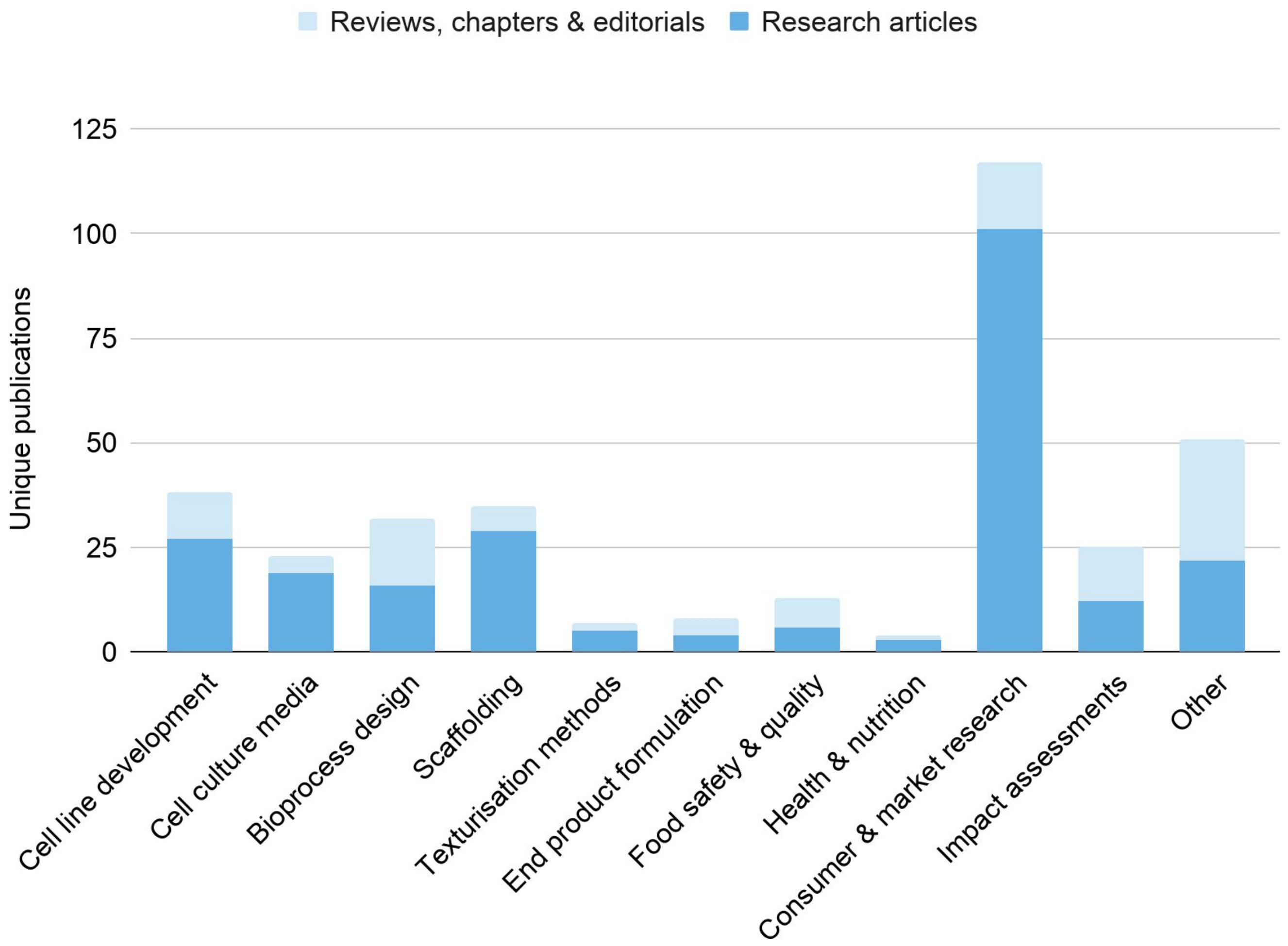


Cultivated publications by research category

This chart shows a breakdown by research category of academic publications in Europe on cultivated meat and seafood in the years 2020-2025 inclusive.

One-in-three cultivated meat and seafood publications were assigned to the consumer & market research category, while a further 14% were not assigned to any category.

Cell line development and scaffolding were the most common technical categories, but only accounted for 11% and 10% of all publications, respectively.

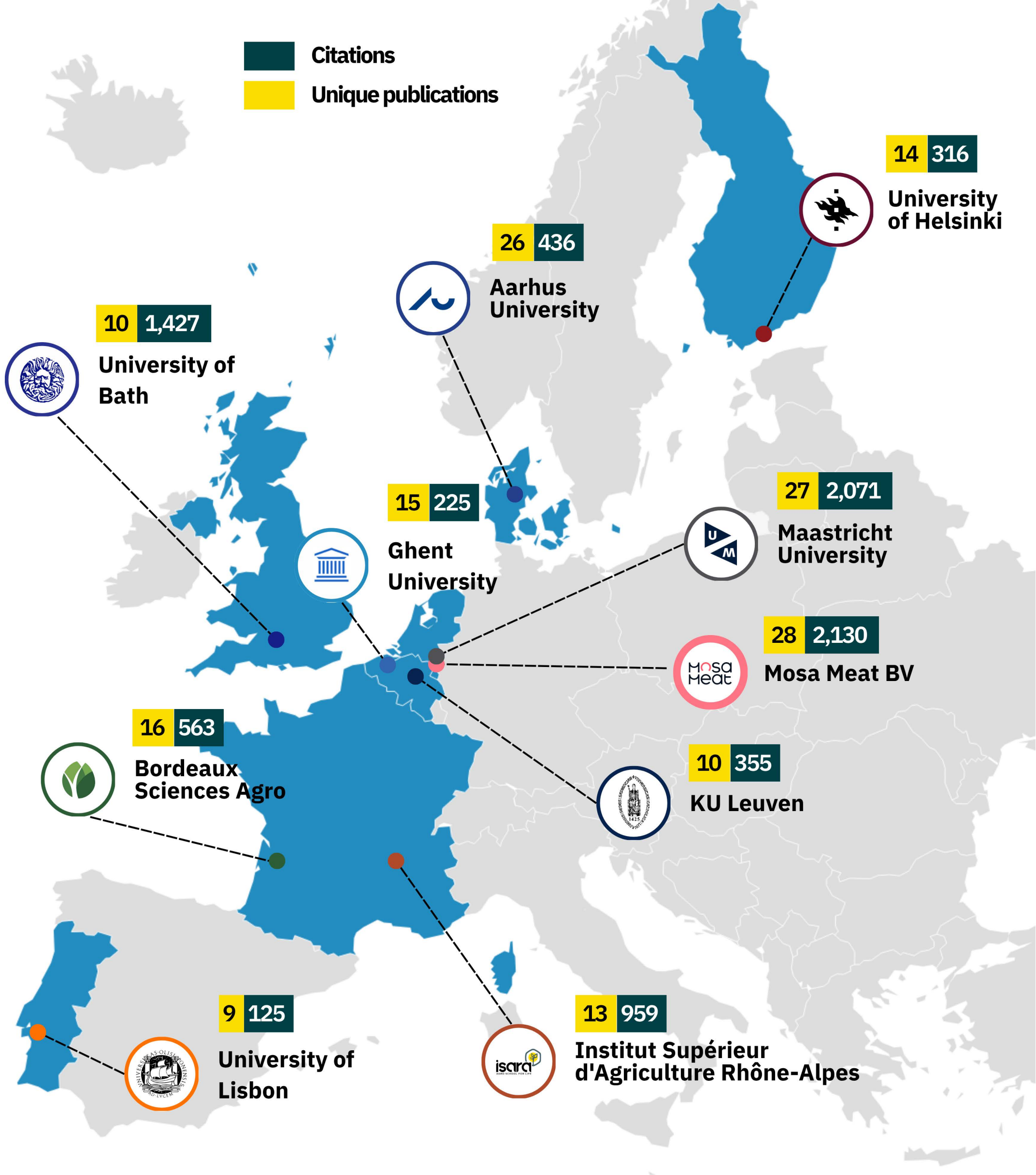


Leading cultivated research-performing organisations

This map shows the leading institutions and companies for cultivated meat and seafood research in Europe on the basis of unique publications in the period 2020-2025.

The leading countries for cultivated meat and seafood research are the UK (contributing to 20% of 2020-2025 total output), Germany (15%), and Italy (14%).

Mosa Meat leads on unique publications (28), and citations (2,130).

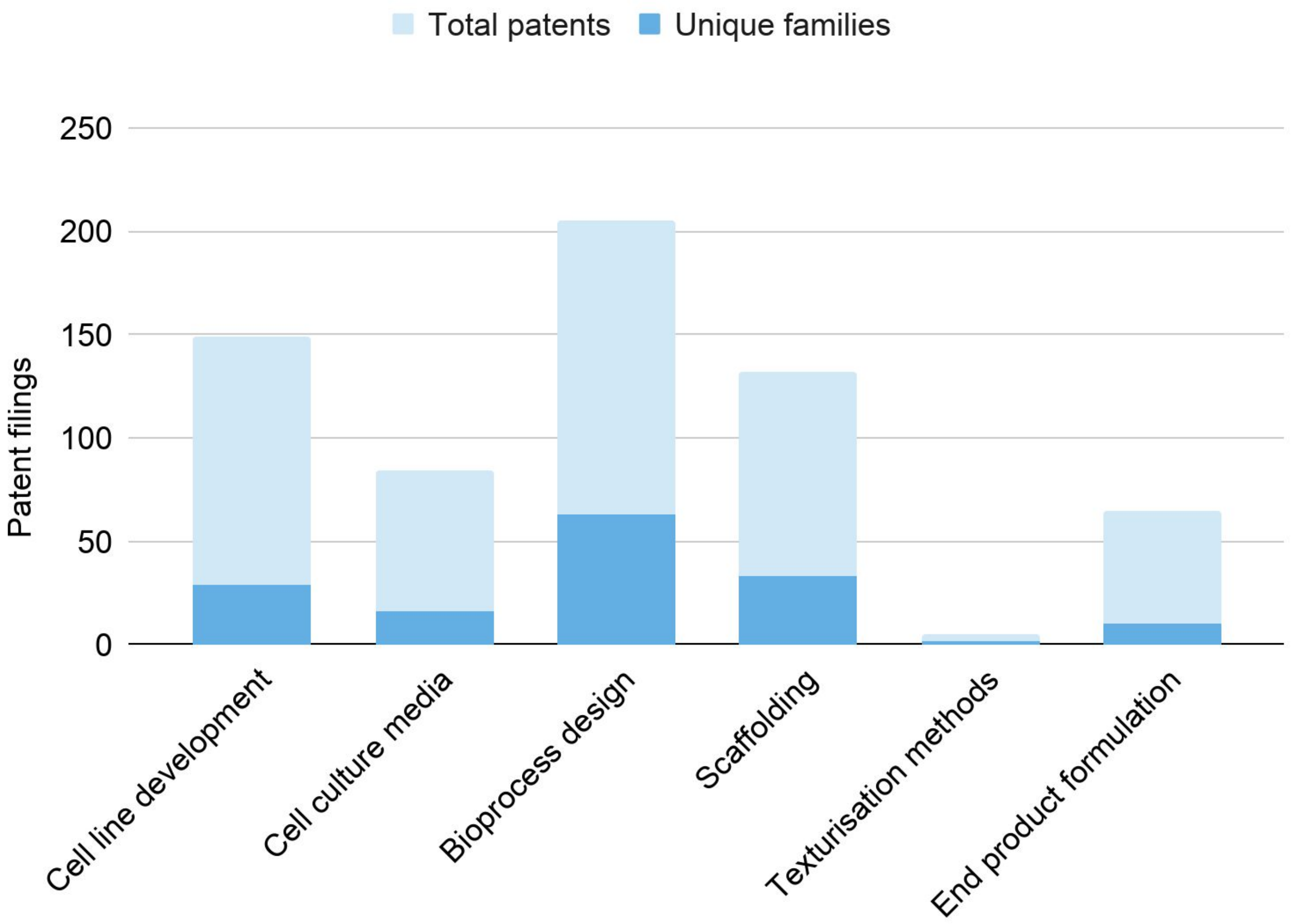


Map created with Datawrapper

Cultivated patents by research category

This chart provides a breakdown patent filings by European innovators on technology areas related to cultivated meat and seafood in the years 2015-2025 inclusive.

Of cultivated meat and seafood patents, 32% are related to bioprocess design, 23% relate to cell line development, while 21% relate to scaffolding.



For glossary of patent terms, see appendix.

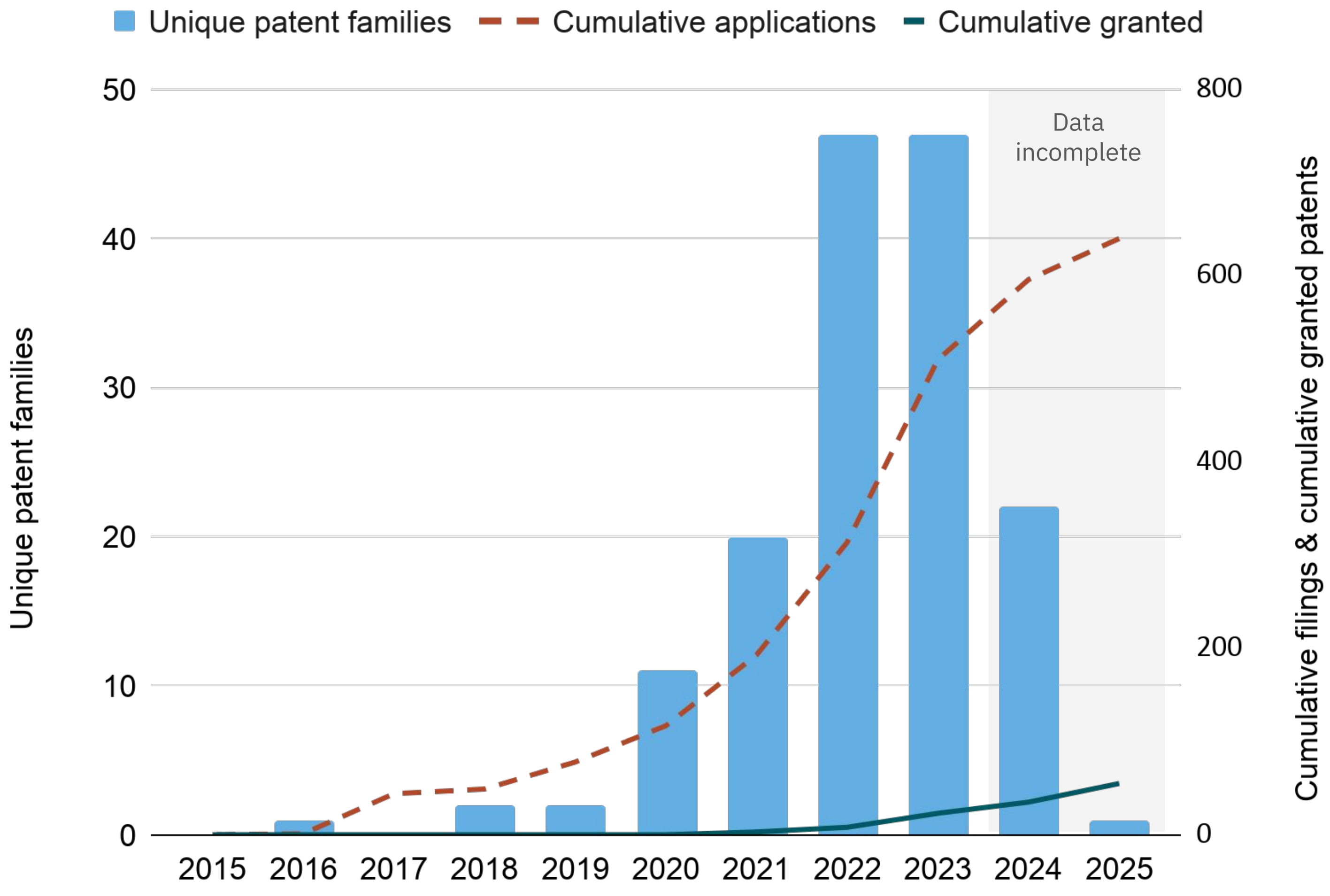
Cultivated patents over time

This chart shows trends in unique cultivated patent families and cumulative patent filings by European innovators in the years 2015-2025 inclusive, along with the cumulative number of patents that have been granted.

Priority filings – the very first filing on a new invention – began to rise in 2020 and peaked at 47 in both 2022 and 2023.

Overall, a total of 640 patents from 153 families have been filed since 2015, with 2023 seeing the highest number of filings at 196.

The number of patents granted has also risen, reaching 20 in 2025, with 55 patents granted in total.



Due to the ~18-month lag between patent filing and publishing, 2024 and 2025 data are incomplete and should be treated with caution. For glossary of patent terms, see appendix.

Conclusions and future recommendations

Conclusions and recommendations

The alternative protein research ecosystem has undergone tremendous growth in Europe but remains in its infancy and has only recently begun to attract significant numbers of researchers. To achieve its full potential, it needs strategic support and collaboration.

Funding

To help this fledgling ecosystem truly flourish, stable public funding is key. Amid a turbulent political environment with tightening public research spending in many places, Europe-wide funding for alternative proteins fell in 2025 for the first time in several years – though fermentation research managed to buck this trend. Given the promise of plant-based and cultivated meat, they should not be neglected.

Publications

Large differences are observed in research activity across certain technology areas, particularly within cultivated meat and precision fermentation, which remain underdeveloped. Across the three pillars, the European alternative protein research community displays a lower-than-average degree of collaboration and a considerable amount of regional disparity.

Patents

Europe is home to innovators from across all sectors of society who are exploring a diverse range of technological areas and achieving exciting breakthroughs in the process. However, the recent increase in both academic output and public funding for alternative protein R&I is not yet materialising in significant increases in patent filings from public research organisations.

Researchers should:

- Engage with local and regional funders, supporting them with evidence of the field's needs and technical roadblocks.
- Focus on applying their scientific expertise to addressing the technical bottlenecks that are holding alternative proteins back from achieving taste and price parity with animal proteins.
- Explore opportunities for international networking such as COST Actions.

Funders should:

- Earmark stable and consistent funding for the field to allow the fledgling R&I community to stabilise and research to come to fruition.
- Continue to fund fundamental research, creating a pipeline of new technological developments.
- Address collaboration and knowledge-sharing gaps across borders.
- Offer mechanisms through which public institutions can collaborate with private industry via pre-competitive and open innovation mechanisms.

Appendix and methods

Methodology

For full methods including search terms, inclusion and exclusion criteria and other technical details, please see the full technical appendix **here.**

Funding

Data
Data sourced from GFI's publicly available global research funding database, the GFI Research Grants Tracker, which houses information published by funders and research conductors globally. Kernel Science contributed to data retrieval. Funding information was also retrieved from Dimensions.ai.

Time period
2010-2025. Data retrieved in February 2026.

Country focus
EU27 + Norway + Switzerland + UK.

Search strategy
A list of search terms was developed and Dimensions.ai results screened against predefined inclusion/exclusion criteria to identify those in scope for the study.

Grants focusing plant-based, fermentation-made, or cultivated proteins and ingredients meeting these criteria were analysed by title, recipient, funder country, pillar categorisation, end product and research sub-category.

Publications

Data
Data sourced from Dimensions, an interlinked research information system provided by Digital Science (https://www.dimensions.ai).

Time period
2020-2025. Data retrieved January 2026.

Country focus
EU27 + Norway + Switzerland + UK.

Search strategy
Complex search terms were devised that allowed us to trigger numerous publications that may be relevant to our analysis.

Search returns were screened against predefined inclusion/exclusion criteria to identify those in scope for the study.

Publications relevant to plant-based, fermentation-made, or cultivated proteins and ingredients meeting these criteria were analysed in the Dimensions Landscape & Discovery application and in spreadsheet format.

Patents

Data
Data sourced from Dimensions, an interlinked research information system provided by Digital Science (https://www.dimensions.ai).

Time period
2015-2025. Data retrieved February 2026.

Country focus
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Search returns were screened against predefined inclusion/exclusion criteria to identify those in scope for the study.

Patents relevant to plant-based, fermentation-made, or cultivated proteins and ingredients meeting these criteria were analysed in the Dimensions Landscape & Discovery application and in spreadsheet format.

Overview of research categories

Research category	Description	Pillar(s)
Strain development	Screening and optimisation of novel strains to identify the most efficient pathways for producing targets or modifying substrates.	PB F
Cell line development	Sourcing, optimising, and banking new and existing cell lines to achieve faster cell growth, greater stability and stress tolerance, improved cell line performance (such as adherence and differentiation), and higher cell density in terrestrial and aquatic cell lines.	CM
Target molecule selection	Target identification and validation to broaden the scope of food ingredients produced by precision fermentation.	F
Cell culture media	Reducing cell culture media costs and increasing their availability by characterising and validating novel sources of growth factors, amino acids, and other media components.	CM
Feedstocks	Innovations in media, including new components and feedstock utilisation strategies (including the use of alternative feedstocks) to achieve higher efficiency, greater scale, and reduced costs.	F
Bioprocess design	Innovations in bioreactor design including improved efficiency, monitoring and control, and both upstream and downstream process innovations.	PB F CM
Crop development	Breeding of crops and increased use of underutilised protein crops for higher protein yields and functionality.	PB
Ingredient optimisation	Improved protein fractionation and functionalisation to achieve higher-quality ingredients with less processing. Also covers the development of novel ingredients to augment nutritional profiles and enhance the sensory experience of alternative protein products.	PB F

Overview of research categories (continued)

Research category	Description	Pillar(s)
Scaffolding	Improved scaffolding biomaterials that support cell adherence and differentiation to allow the replication of complex animal meat structures.	CM
Health & nutrition	Dietary impacts of alternative proteins including population-wide studies, systematic reviews, and in vitro studies on health impacts, for example, bioavailability.	PB F CM
Food safety & quality	Toxicological and safety assessments, regulatory improvements, such as assay development or validation.	PB F CM
Consumer & market research	Consumer behaviour research including nomenclature studies, purchasing intent (including retail and food environments), and market scoping and brand development.	PB F CM
Impact assessments	Impact assessments including life cycle or techno-economic analyses, economic and other broader environmental impact assessments, and social/geopolitical impacts including policy interventions.	PB F CM
No category assigned/other	Topics not covered by the other categories. This can include discussions on the political, ethical, or philosophical implications of alternative protein or the protein transition. Also includes broad-scope review articles covering numerous aspects of alternative proteins.	PB F CM

Key terminology: patents

Patent	An exclusive right granted for an invention that excludes others from making, using, offering for sale, or selling the invention. Patents benefit inventors by providing them with legal protection for their inventions. To receive this protection, they must publicly disclose details of the invention.
Patent family	A collection of patents covering the same or similar technical content disclosed by a common inventor(s) and patented in more than one country.
Priority date	Sometimes called the “effective filing date”, this is the first filing date in a family of patent applications and is used to establish the novelty and/or obviousness of a particular invention relative to other art. Each patent family will only have one priority date.
Filing date	The date when a patent application is first filed in the respective patent office. As there are no global patents, there may be numerous patent filings in different jurisdictions from the same patent family, each with its own filing date.
Publication date	The date on which the patent application is published (ie, the information is available to the public). This normally occurs approximately 18 months after the filing date.
Assignee	Organisation(s) and individual(s) that have an ownership interest in the legal rights a patent offers. An assignee is often the organisation employing the inventor of the technology. An assignee can also change at a later date.
Jurisdiction	The legal territory in which a patent is sought, for example, France, Spain, etc. Each patent must be filed with a national patent office in the country where protection is sought and there are no global patents.
Patent legal status	The current legal status of the patents, eg. ‘Granted’, ‘Active’, ‘Abandoned’, etc.

The patenting process

There are differences between patent offices in how a patent application is processed once it has been filed, but a general overview of the process is described in the table below.

For a more detailed explanation, please refer to this resource from the World Intellectual Property Organization. A detailed description of the European patent application process can be found here.

1.	**Formal examination**	The application is examined to ensure it complies with the administrative requirements set by the patent office.
2.	**Prior art search**	A search is conducted to identify prior art that will be relevant in determining the patentability of the claimed invention.
3.	**Substantive examination**	A more detailed examination is carried out to ensure the claimed invention satisfies the main criteria for patentability (patentable subject matter, novelty, inventive step, industrial applicability and sufficiency of disclosure).
4.	**Notification**	Results of the examination are sent to the applicant or their legal representative and they are given an opportunity to respond to any objections raised.
5.	**Publication of patent application**	The patent application is usually published approximately 18 months after the filing date.
6.	**Granting of patent**	If the outcome of the examination is positive, the patent office grants the patent.
7.	**Publication of granted patent**	The granted patent is published and the invention is disclosed to the public.
8.	**Pre-grant and/or post-grant opposition**	Patent offices offer others the opportunity to oppose the grant of a patent, for example, if they believe the claimed invention is not new. Opposition proceedings can be held before or after the patent is granted.

About this report

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About GFI Europe
The Good Food Institute Europe is a nonprofit think tank helping to build a more sustainable, secure and just food system by diversifying protein production.