

Country deep dive:  
**France**

# State of the European alternative protein research and innovation ecosystem

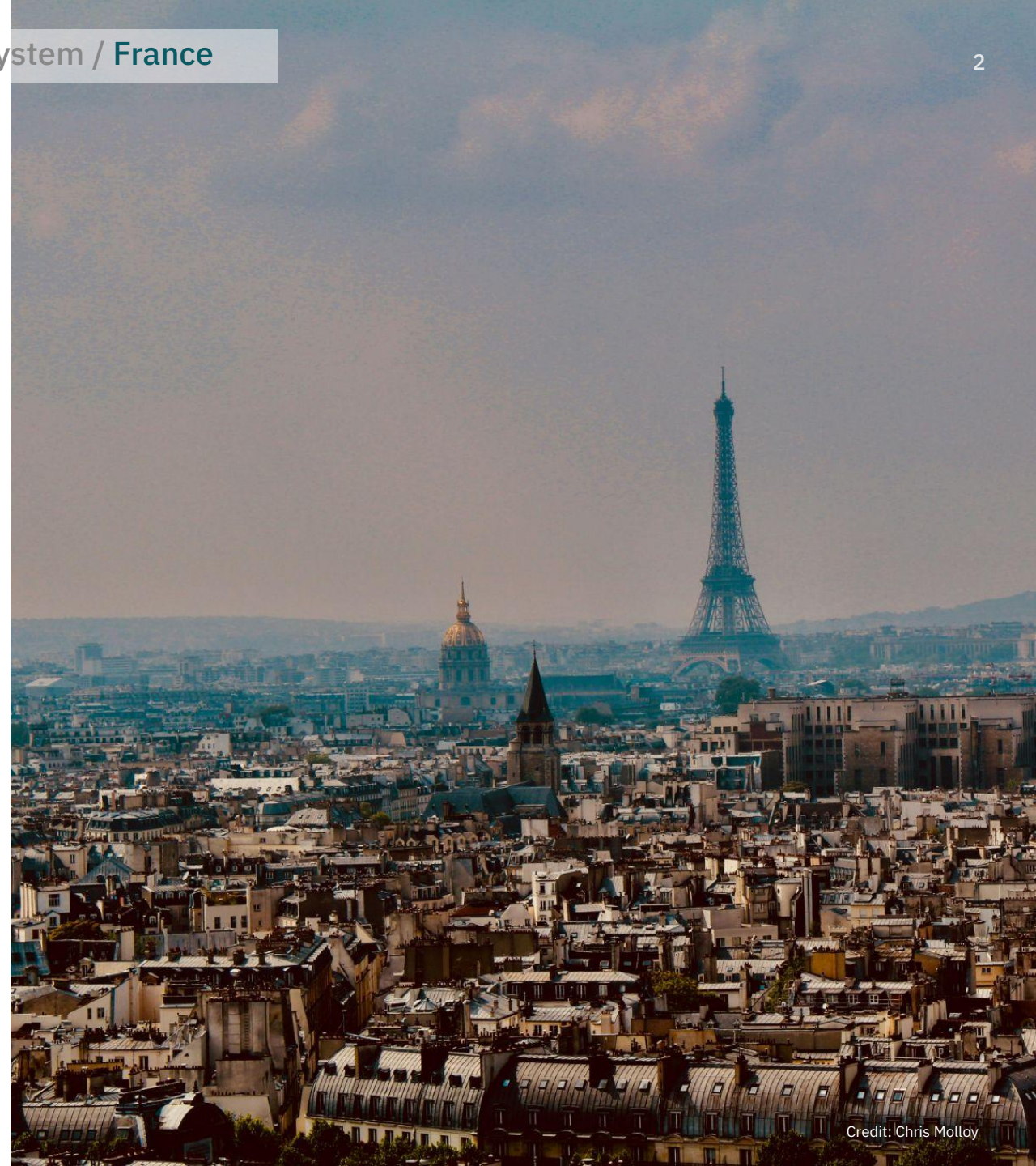
Dr David Hunt and Dr Stella Child



## Alternative protein research in France

France has made selected investments into plant-based protein research, but without consistent funding over time, the research ecosystem is unlikely to thrive.

While France is a significant player in private sector research, especially in plant-based proteins, its academic community needs support to ensure long-term success.



## 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.

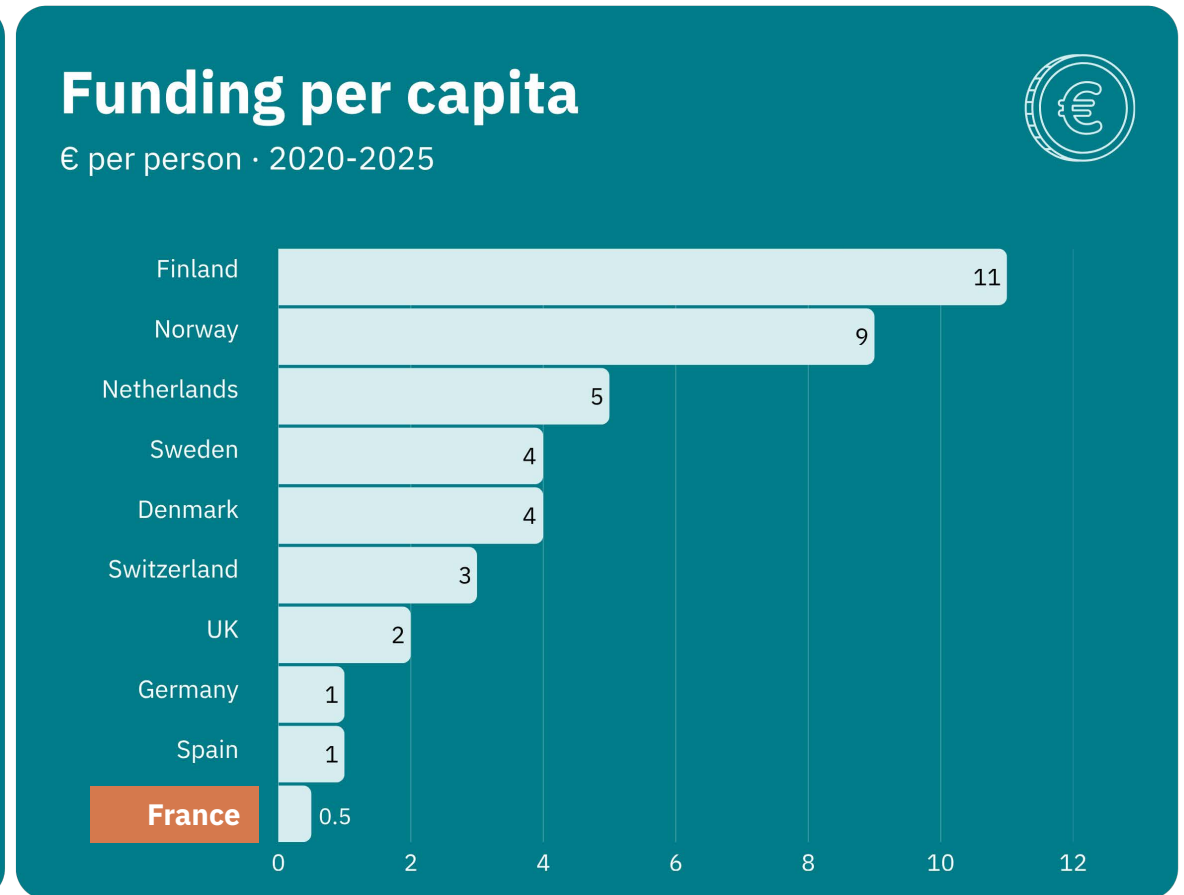
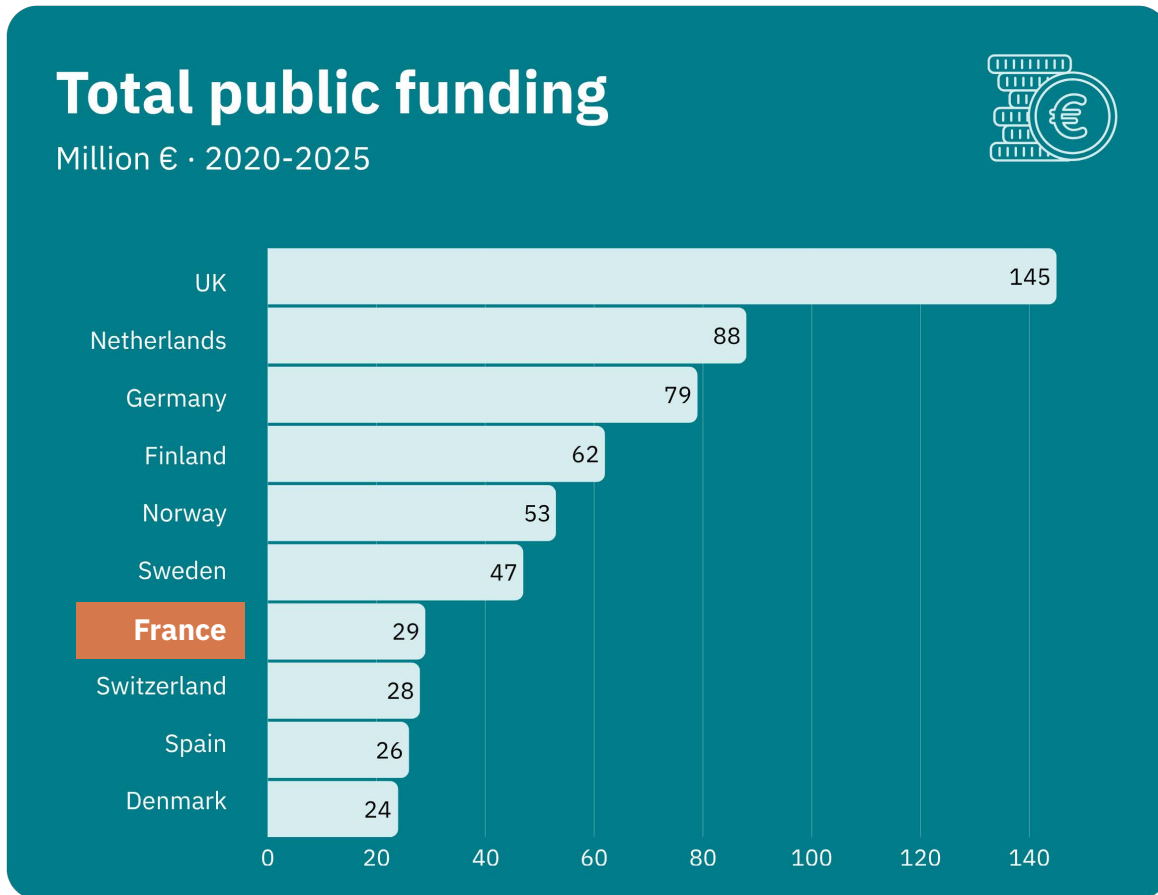
Image: Parima

### 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.

# French funding compared to governments across Europe

Investment from the top 10 governments funding alternative proteins in Europe, 2020-2025, showing total public funding\* (excluding nonprofit contributions) and public funding per capita for those 10 countries.\*\* France ranks seventh in total funding, and 14th on a per capita basis.

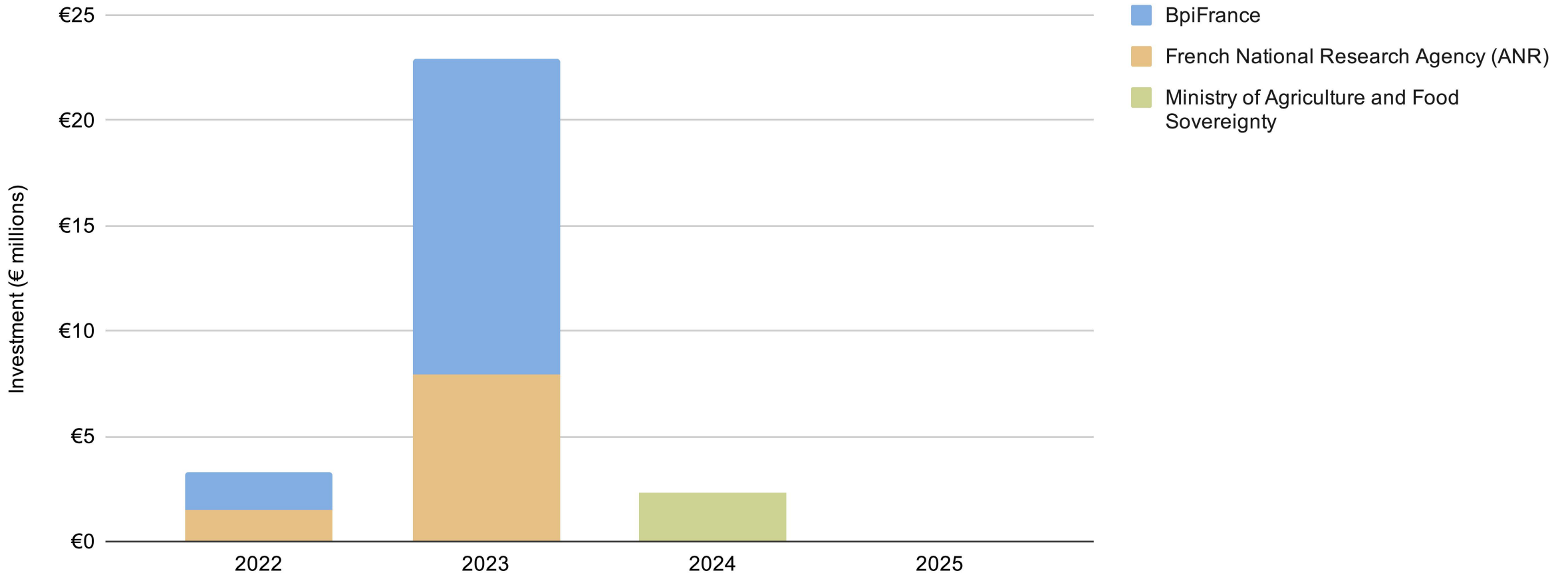


\*Funding for some countries, such as the Netherlands, France, and Belgium, is likely an underestimate. \*\*Per capita spending is only shown for the top 10 countries by total public research funding. Note that this is not a ranking of the top 10 by per capita spending, and that some countries in the top 10 by per capita spending are not displayed.

## French funding landscape

### Investment in France, by research funder, 2020-2025.\*

BpiFrance and the French National Research Agency (ANR) have led investment over this period, but no records of investment from either of these funders was found for 2024 and 2025. Funding in France was almost entirely directed to plant-based research.



\*Funding in France may be an underestimate due to limited published funding information.

# Publications: overall trends

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

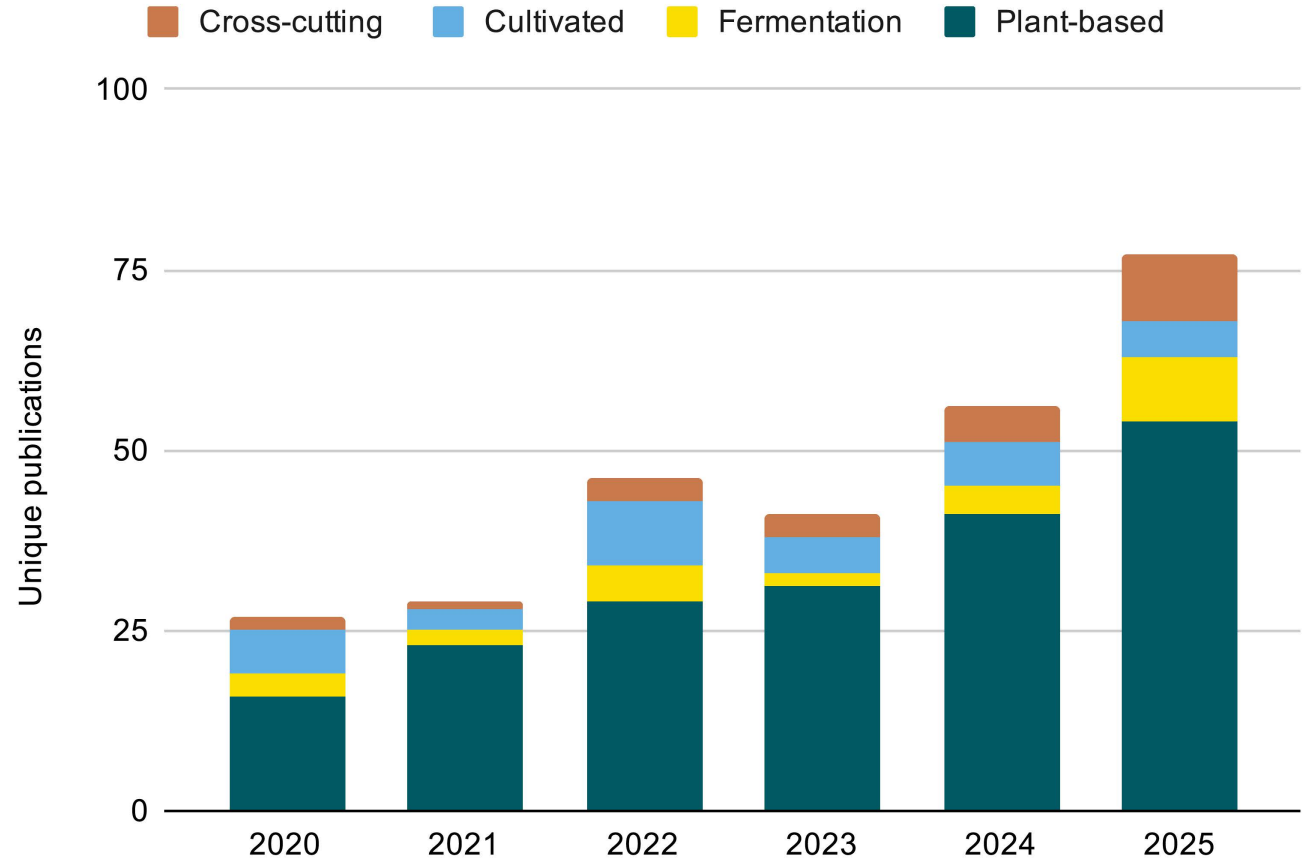
France has contributed to 276 publications on topics related to alternative proteins in the period 2020-2025 and ranks seventh overall in Europe.

Publication outputs grew by 26% per year on average but fluctuated over time.

There were 77 research publications in 2025 compared with 27 in 2020 – a 185% increase.

Breakdown of publications by alternative protein pillar:

- 70% plant-based proteins
- 9% fermentation-made proteins and ingredients
- 12% cultivated meat and seafood
- 8% cross-cutting topics



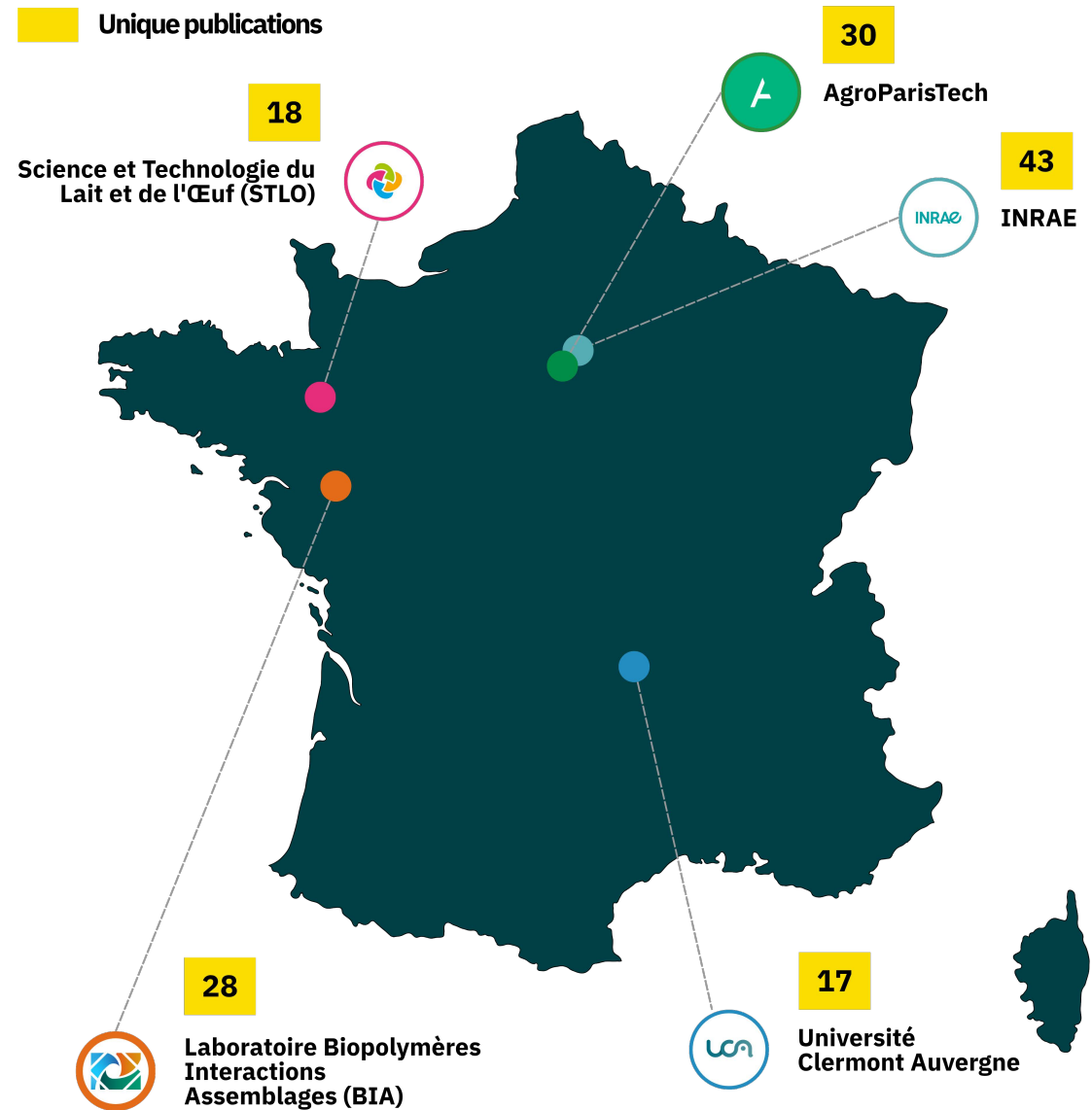
# Leading research-performing organisations

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

Nine of the top 100 most-productive European research performing organisations in alternative protein research are in France.

The most highly ranked French organisation is the National Research Institute for Agriculture, Food and Environment (INRAE), which ranked 19th in Europe for total publications in 2025 and 22nd for the period 2020-2025.

France is relatively competitive across all three alternative protein pillars, ranking seventh for total plant-based publications, 10th for fermentation, and fifth for cultivated meat and seafood. However, most of the publications on cultivated meat are non-technical and largely focus on consumer studies.



## Patents: overall trends

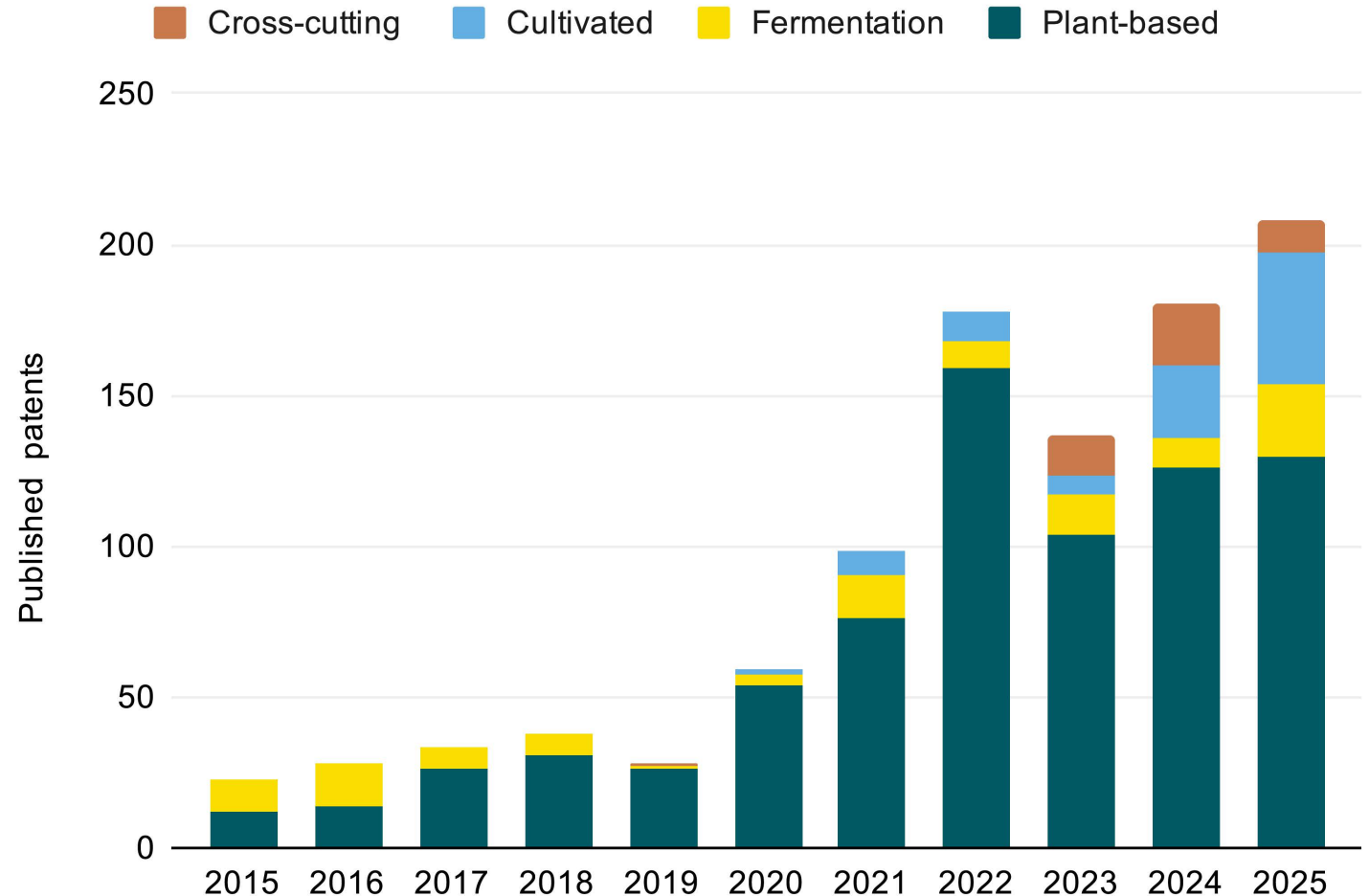
**This chart shows the overall number of alternative protein patents published by French innovators in the years 2015-2025 inclusive, stratified by alternative protein pillar.**

Aside from a dip in 2023, the number of patents published grew each year from 2019, reaching 208 in 2025.

There were 1,010 total patents published by French innovators in the period 2015-2025 – the third highest total in Europe.

Breakdown of patents by alternative protein pillar:

- 75% plant-based proteins
- 11% fermentation-made proteins and ingredients
- 9% cultivated meat and seafood
- 5% cross-cutting topics



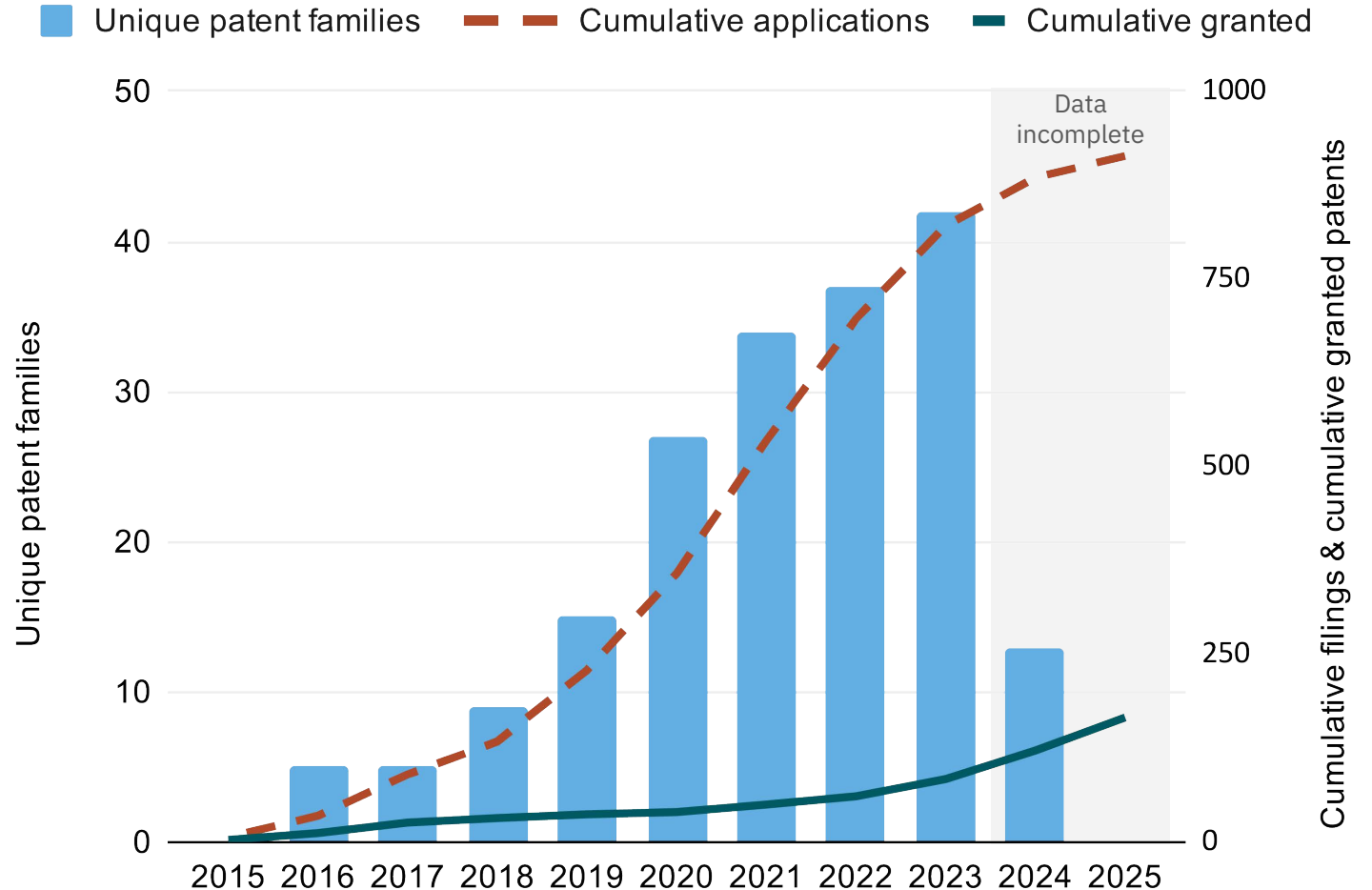
## Patents: overall trends

**This chart shows trends in unique patent families and cumulative patent filings by French 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 2018 and peaked at 42 in 2023.

Overall, a total of 914 patents have been filed since 2015, with 2021 seeing the highest number of filings at 177.

The number of patents granted has also risen, reaching 44 in 2025, with 166 patents granted in total.



# 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 France.*



# Research categories: Plant-based



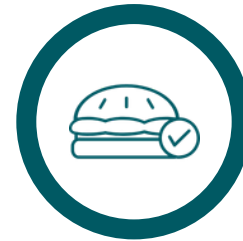
## Crop development

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



## 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.



## End product formulation

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



## Impact assessments

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



## Health and nutrition

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



## 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.



## Food safety and quality

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



## Consumer and market research

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

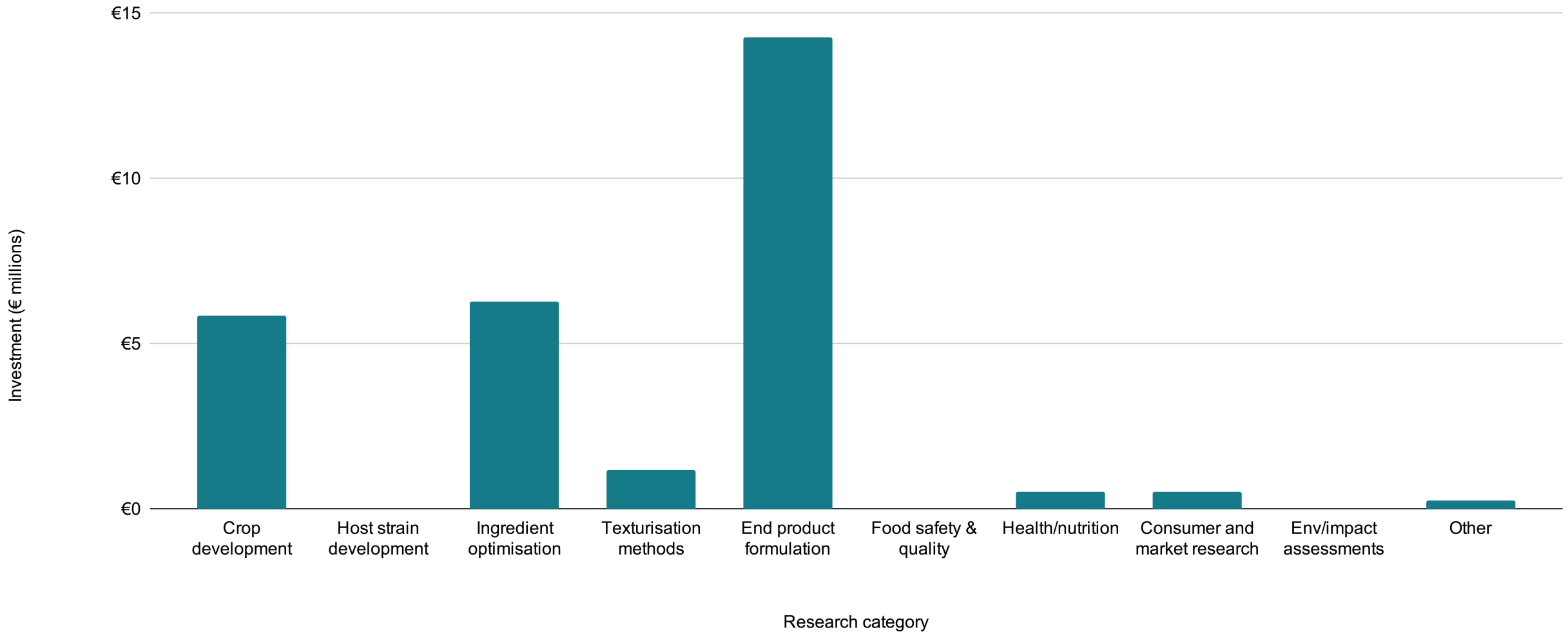


## Strain development

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

# Plant-based funding: research categories

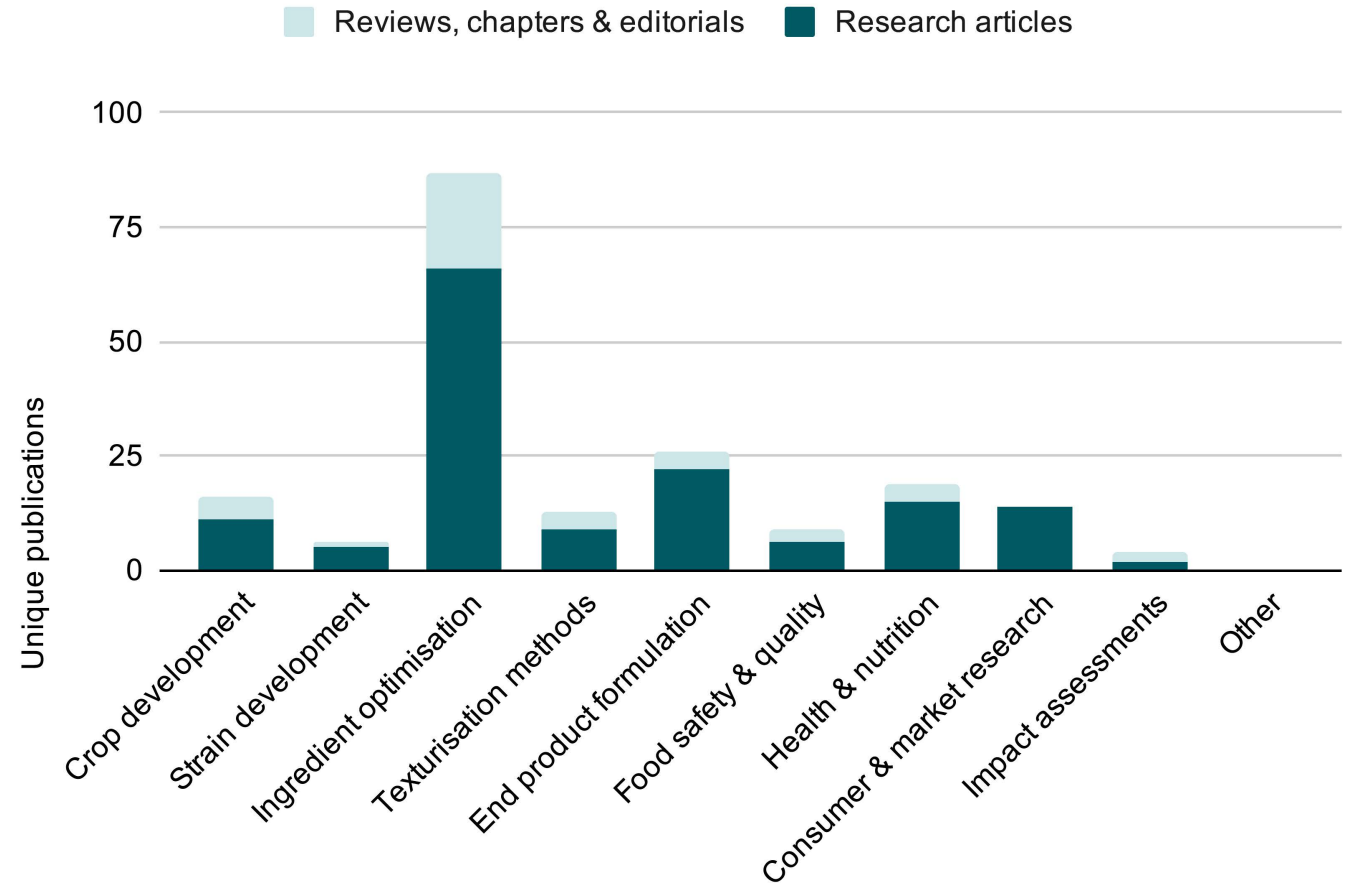
**Plant-based investment in France, by research category, 2020-2025.**  
 French research priorities are similar to those seen in funding across Europe. Alongside crop development, food science topics such as formulation have been the most well-funded areas.



## Plant-based publications: research categories

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

Almost half (45%) of plant-based publications were assigned to the ingredient optimisation research category, but French researchers have also been exploring a range of other topics across the value chain.

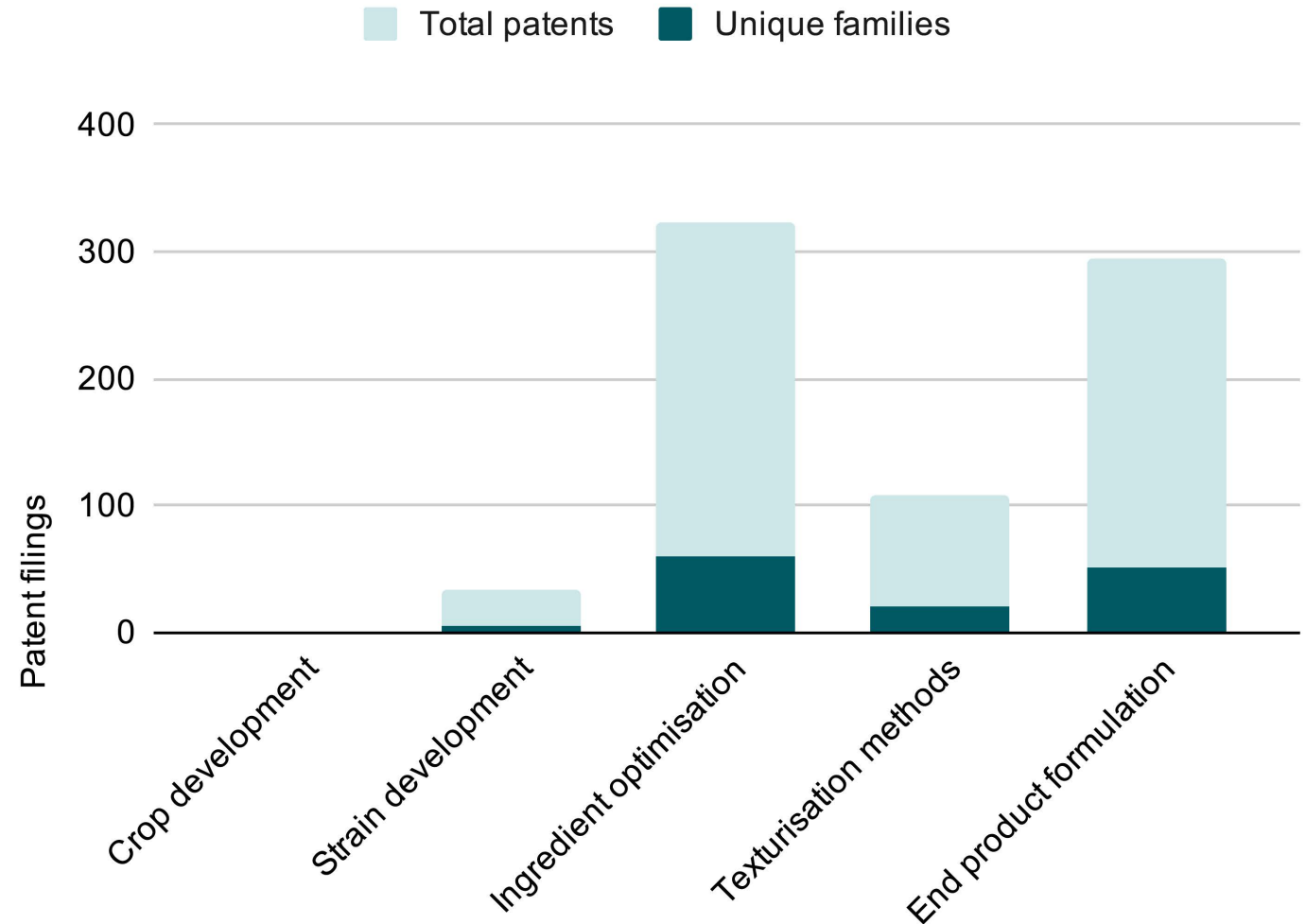


## Plant-based patents: research categories

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

French innovators filed patent applications mostly in relation to ingredient optimisation (43% of all filings) and end product formulation (39%).

The development of improved protein crops has been neglected by the French innovation ecosystem to date.

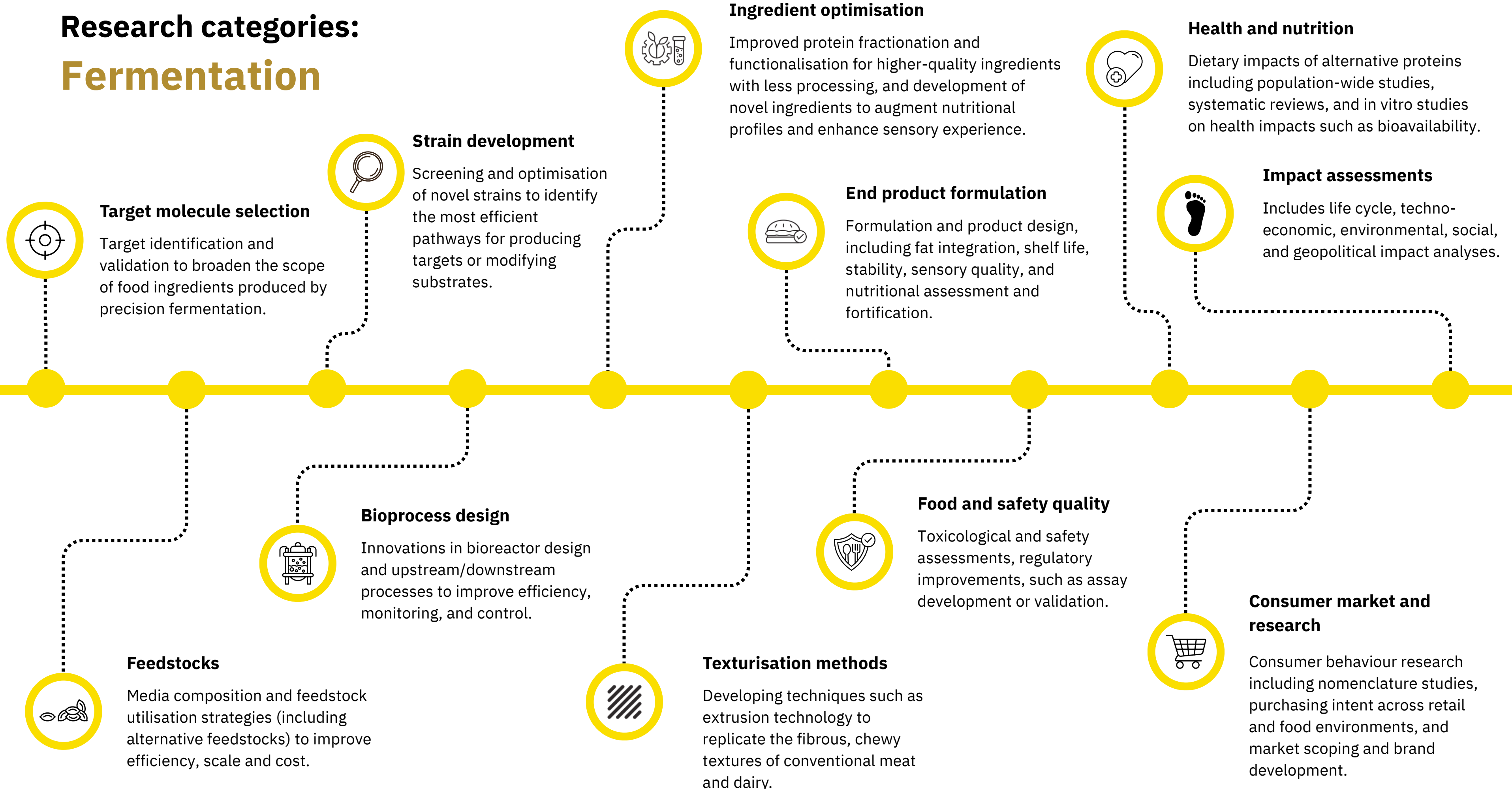


# Deep-dive: Fermentation

*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 France.*



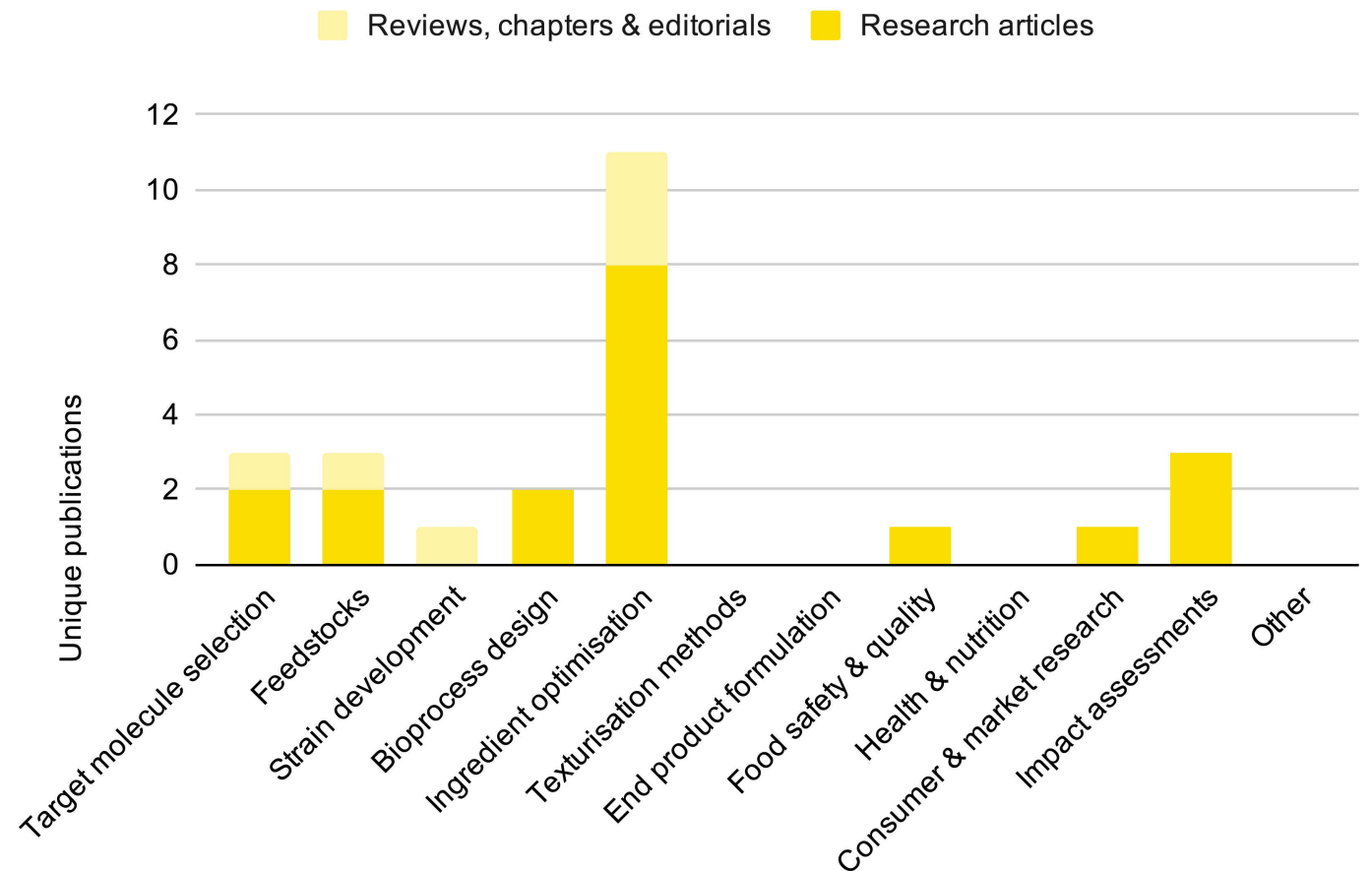
# Research categories: Fermentation



## Fermentation publications: research categories

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

Almost half (44%) of fermentation publications involving French researchers have focused on ingredient optimisation.

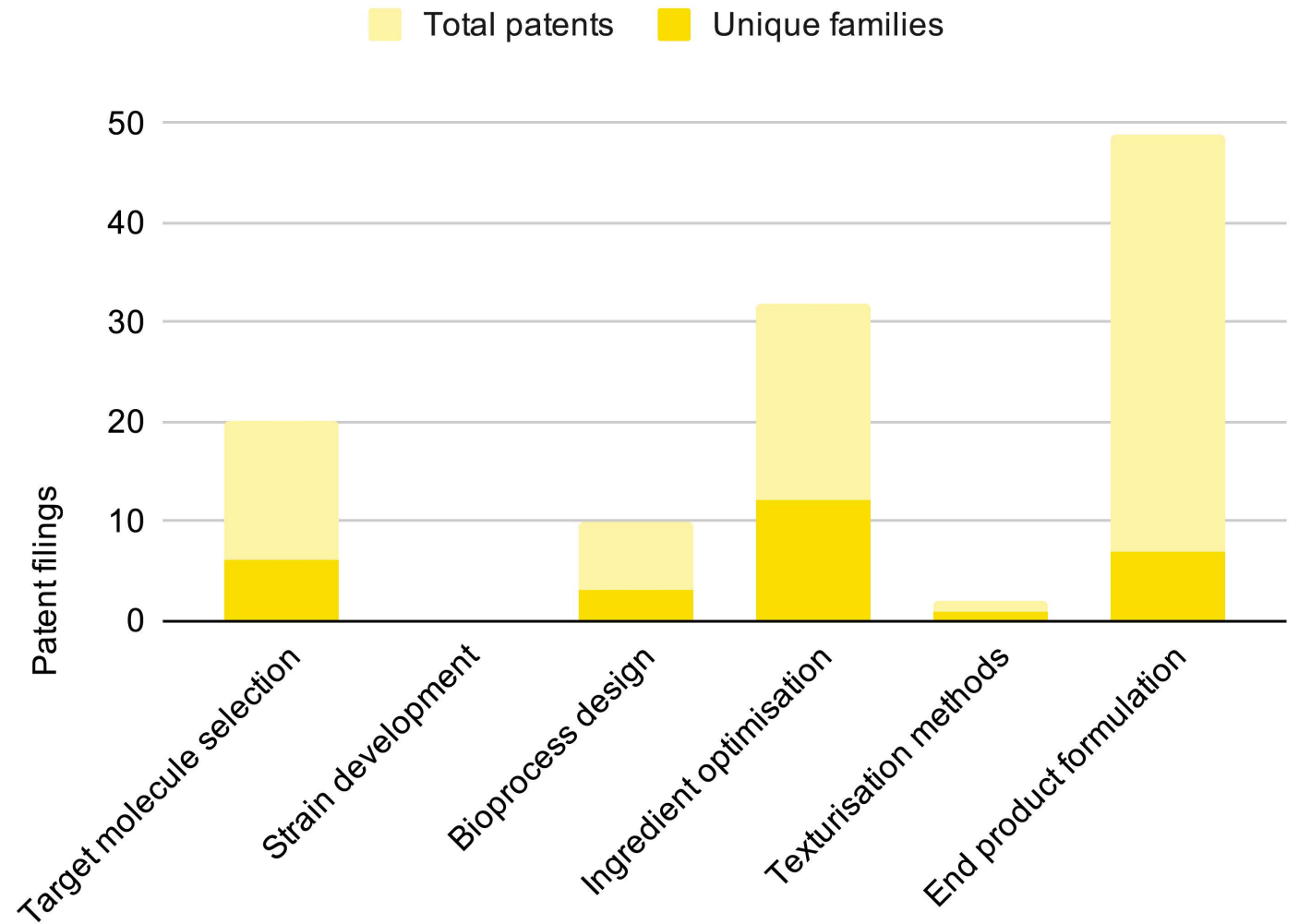


## Fermentation patents: research categories

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

French innovators filed patent applications on a range of research categories in fermentation, with end product formulation (43% of all filings) and ingredient optimisation (28%) the most common.

Target molecule selection is also a relative strength of the French innovation ecosystem.



# 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 France.*

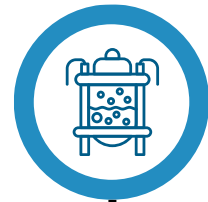


# Research categories: Cultivated



## 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.



## Bioprocess design

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



## Texturisation methods

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



## Consumer market and research

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



## Food safety and quality

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



## Scaffolding

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



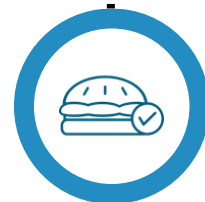
## Health and nutrition

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



## 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.



## End product formulation

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



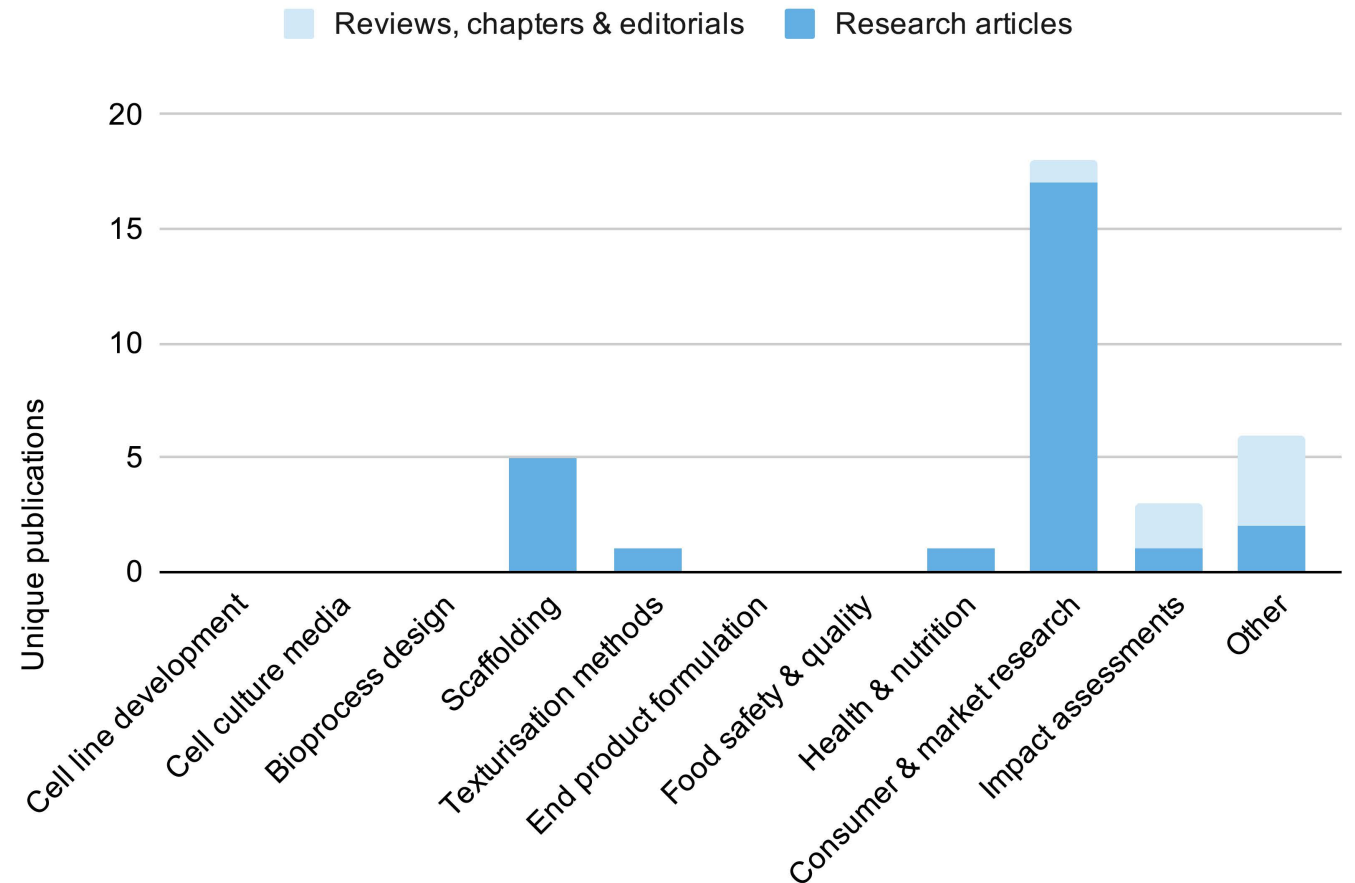
## Impact assessments

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

## Cultivated publications: research categories

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

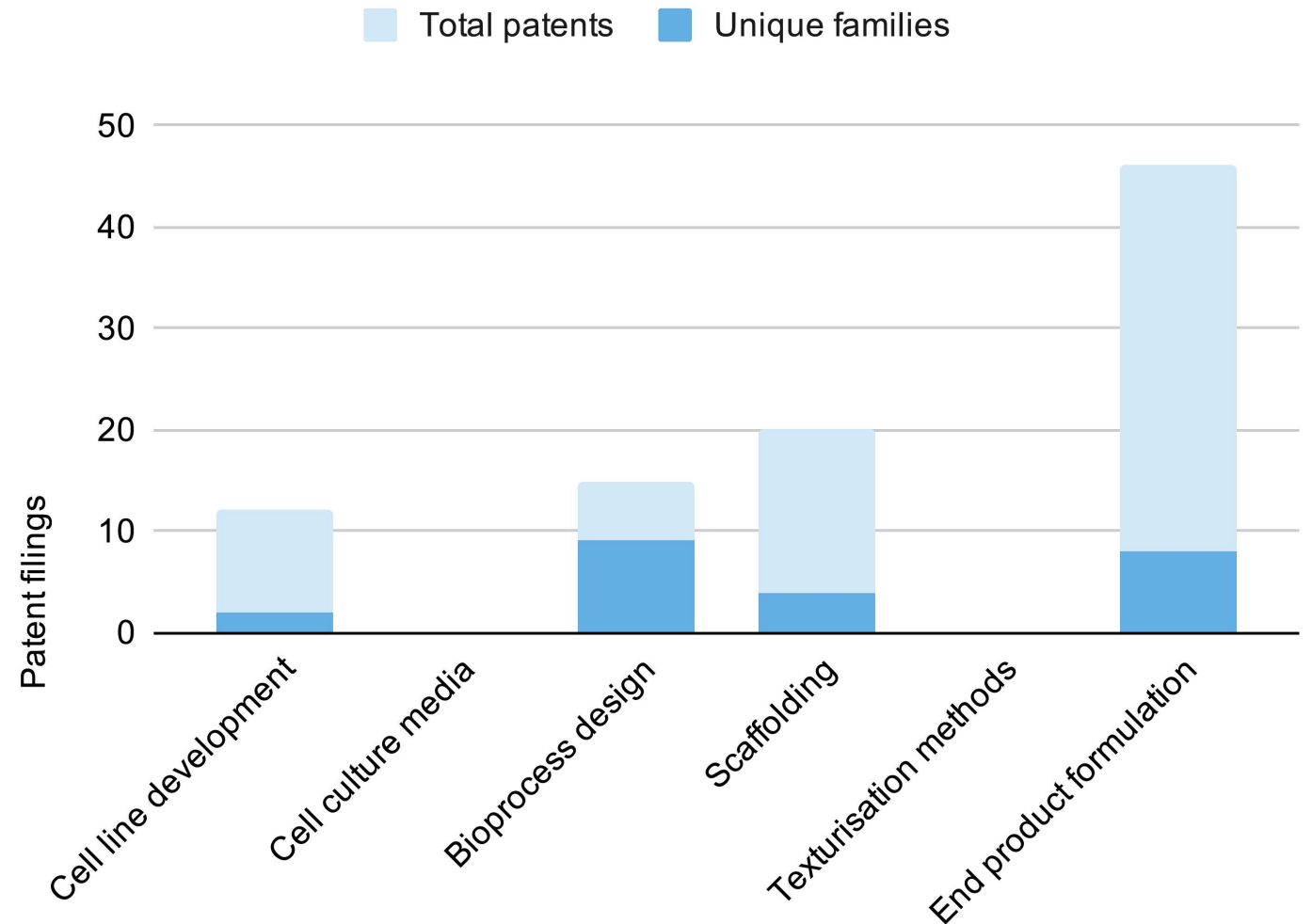
The French cultivated meat and seafood research community is still very immature and has mostly focused on consumer & market research (53% of all publications).



## Cultivated patents: research categories

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

French innovators filed patents across a number of technical categories in cultivated meat and seafood, with end product development (49% of all patent filings), scaffolding (22%), and bioprocess design (16%) the most common.



# 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, retrieved from [Dimensions.ai](#). Kernel Science contributed to data retrieval.

### 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.

## Key terminology: patents

|                            |   |
|----------------------------|---|
| <b>Patent</b>              | 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. |
| <b>Patent family</b>       | A collection of patents covering the same or similar technical content disclosed by a common inventor(s) and patented in more than one country.   |
| <b>Priority date</b>       | 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.                                |
| <b>Filing date</b>         | 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.  |
| <b>Publication date</b>    | 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.   |
| <b>Assignee</b>            | 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.   |
| <b>Jurisdiction</b>        | 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.  |
| <b>Patent legal status</b> | 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](#).

|  |  |
|--|--|
| <b>1. Formal examination</b>                     | The application is examined to ensure it complies with the administrative requirements set by the patent office.   |
| <b>2. Prior art search</b>                       | A search is conducted to identify prior art that will be relevant in determining the patentability of the claimed invention.   |
| <b>3. Substantive examination</b>                | 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). |
| <b>4. Notification</b>                           | 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.  |
| <b>5. Publication of patent application</b>      | The patent application is usually published approximately 18 months after the filing date.   |
| <b>6. Granting of patent</b>                     | If the outcome of the examination is positive, the patent office grants the patent.  |
| <b>7. Publication of granted patent</b>          | The granted patent is published and the invention is disclosed to the public.  |
| <b>8. Pre-grant and/or post-grant opposition</b> | 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

## Authors

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## Acknowledgements

Kernel Science contributed to the funding data collection.

## Citation

Child S., Hunt D., State of the alternative protein research and innovation ecosystem in France, 2020-2025 (2026). *GFI Europe*.

DOI: 10.5281/zenodo.20143921.

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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.

