Smith School of Enterprise and the Environment

UNIVERSITY OF OXFORD

# Corporate venturing in alternative proteins: a database of transactions

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The views expressed in this paper represent those of the authors and do not necessarily represent those of the Smith School or other institutions or funder. The paper is intended to promote discussion and to provide public access to results emerging from our research. It may have been submitted for publication in academic journals. It has been reviewed by at least one internal referee before publication.

## Acknowledgements

This project was conceptualised and led by Dr Alex Money, with instrumental input from Julian Cottee and John Andrews on the design and development of the database. Other key contributors include Prof Sir Charles Godfray, Prof Cameron Hepburn, Dr Michael Clark, Molly Foster, Saloni Basrur and Roberta Franchi. The database was comprehensively updated in 2023 by Manon Johnes. The authors are grateful to Prof Sam Fankhauser at the Smith School of Enterprise and the Environment, for his internal review of this working paper.

# Introduction

Food systems account for as much as one-third of all anthropogenic greenhouse gas emissions. One of the most impactful ways in which these emissions could be reduced is by decreasing the proportion of protein in our diets derived from animal proteins, in favour of alternative protein sources. Increasing consumer awareness and rising demand for meat and dairy analogues have supported the fast growth of the alternative proteins sector, which has been underpinned by innovation in plant-based and cell-based technologies.

In 2021, the Oxford Smith School of Enterprise and the Environment published a paper[1] that explored the emerging role of established food companies as investors and drivers of alternative protein innovation. We noted that corporate investment is becoming a significant source of capital funding to the sector, and by analysing the disclosures from an index of established food companies, we attempted to develop a systematic basis for understanding how corporate venturing into the alternative proteins sector may influence progress towards a net-zero emissions trajectory.

Our hypothesis was that with a credible route to market – a core element of the corporate venturing proposition – meat and dairy analogues that look the same, taste the same and cost the same (or less) as the 'real thing' could transform the protein mix in human and animal diets within a single generation.

To help test this hypothesis we set out to build a dynamic, longitudinal, searchable and open-source record of corporate venturing into alternative proteins. This paper accompanies the publication of that database today. We recorded reported transactions between large food corporations and alternative protein companies since 2016. Recognising that the market landscape has changed over this period, we also performed some comparative analysis of the data; distinguishing between transactions that took place before 2021, and reported transactions from January 2021 to September 2023.

Sourcing accurate investment transaction data within this sector presents various challenges and the authors do not warrant that this database provides a complete or comprehensive record of relevant transactions. However, we do believe that the database – to our knowledge, the first of its type – offers some utility for understanding the trends and dynamics in this evolving area.

Access the database: www.smithschool.ox.ac.uk/alternative-proteins-database

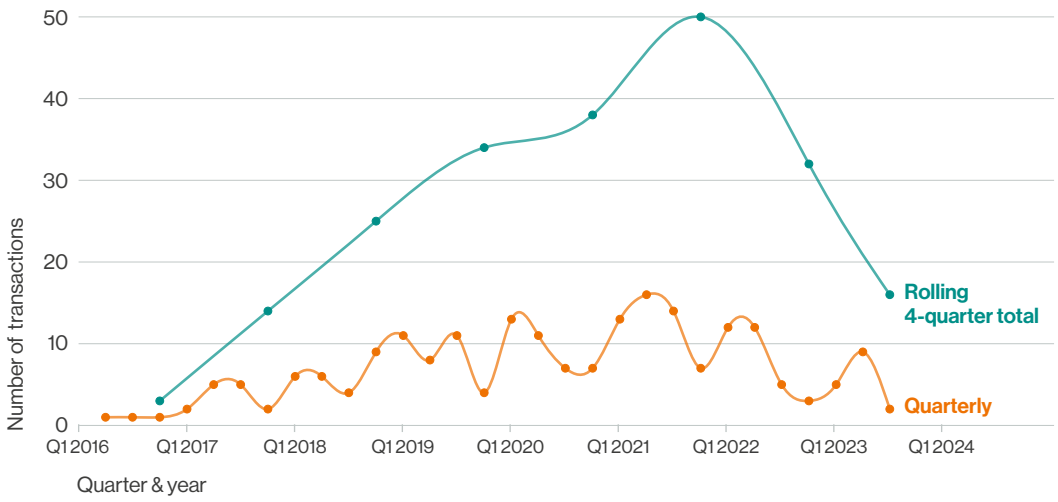
1 Money, A. and Cottee, J. (2021). Bull market? Corporate venturing and alternative proteins. Oxford Smith School of Enterprise and the Environment. Working Paper 21-03. ISSN 2732-4212 (online)

# Database attributes

## 1. Number of transactions

While it accounts for one-fifth of venture funding globally, corporate venture capital is at the earliest stages of engagement with the alternative protein sector. In this database, we identify 214 distinct transactions between large food corporations and alternative protein companies between January 2016 and September 2023. The database records transaction data for 126 discrete alternative protein companies. We searched for transaction data from 172 food companies globally, of which 58 reported at least one qualifying transaction.

The largest number of transactions recorded on the database were reported in 2021. There has been a subsequent decline in the number of transactions that we have identified each quarter, which is consistent with broader trends in venture investing since the turn in the interest rate cycle. While the rationale of corporate venturing typically assumes that companies take a longer-term, more strategic perspective on making venture investments; in practice transaction activity is likely influenced by similar factors associated with investors targeting shorter-term financial returns.

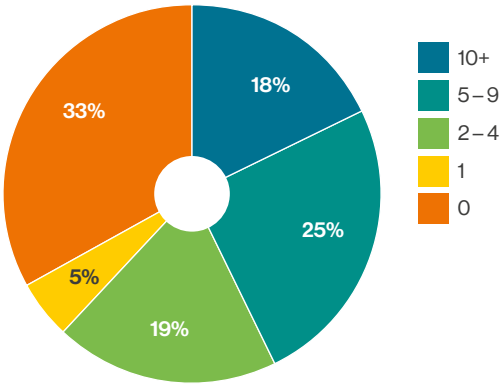



● **Figure 1**: Number of transactions into alternative protein companies by year and quarter.

## 2. Concentration of activity

Corporate venturing activity in the alternative proteins sector appears to be fairly concentrated, with four food companies (ADM, Tyson, Cargill, and Danone) accounting for 18% of all transactions recorded in the database. The most active ten companies account for 63% of all transactions. Since 2021, the level of concentration has become slightly less pronounced, although one-third of the largest food companies by market capitalisation still have no identified transactions.

Concentration is also evident amongst target companies, with five ventures (Aleph Farms, Beyond Meat, MycoTechnology, Nature's Fynd and Upside Foods) accounting for 20% of total investments by value. We note however that transaction values were not always disclosed in the corporate filings, either due to different jurisdictional requirements, or more commonly because the transaction value was too low to meet regulatory disclosure thresholds.



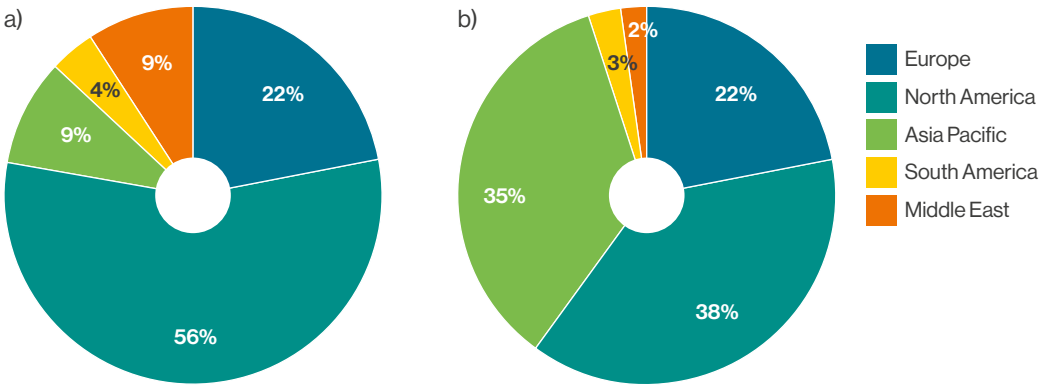

- **Figure 2**: Number of relationships between large food corporations with alternative protein companies.

## 3. Activity by geography

In terms of the location of corporate venturing companies, alternative protein ventures and other (non-food) syndicated investors, there is a significant concentration in North America, which is consistent with the relative size of the market. Fifty-nine percent of transactions in the database involve corporate venturing arms of food companies based in North America, while 56% of alternative protein ventures are headquartered in North America.

Overall, 78% of transactions by North American corporate venturing companies are directed to alternative protein ventures that are also based on that continent. Of the 24% of transactions that involve corporate venturing companies based in Europe, nearly half are directed to ventures that are based in North America (48%), followed by Europe (35%) and Israel (17%). Corporate venturing companies based in Asia Pacific have a less pronounced bias to North American ventures (35%) relative to Israel (23%), with the balance predominantly into ventures in their own region (29%). The Sankey chart indicates the flow of funds from source region (left) to destination region (right).


- **Figure 3**: Regional investment flows from food corporations to alternative protein companies.



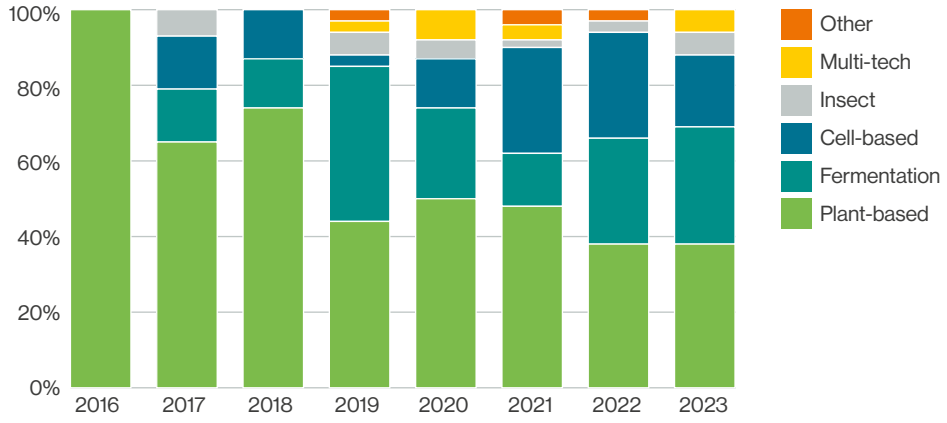

- **Figure 4**: a) HQ region of alternative protein companies and b) HQ region of food corporations.

## 4. Activity by technology type

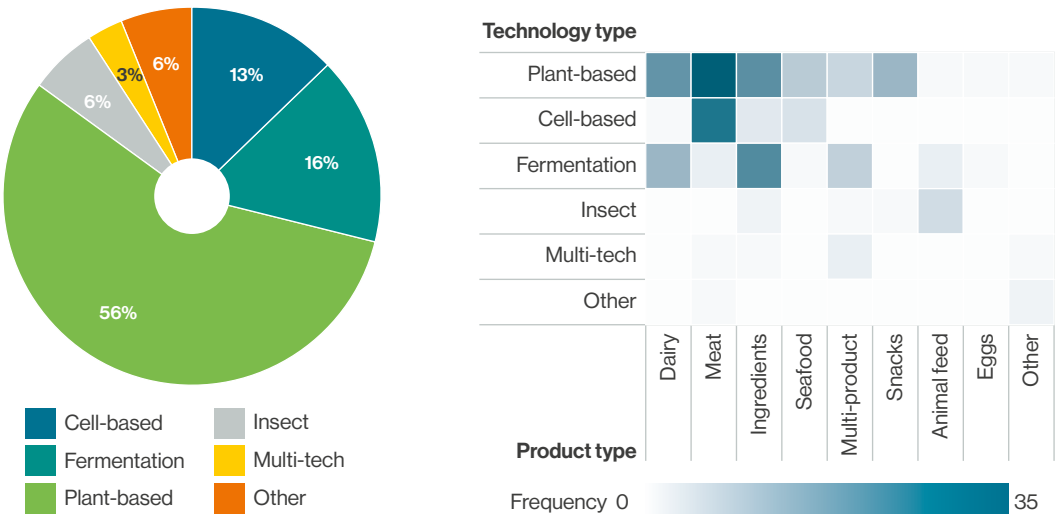
Transactions involving plant-based alternative protein companies are the most common in the database by value, accounting for 56% of the total, followed by fermentation technologies (16%) and cell-based technologies (13%). This concentration is evident in every year over the 2016-23 period, although there has been more diversification over time. Emergent areas such as insect protein (6%) and multiple-technology companies (3%) have seen recent growth, albeit still account for a small share.

Most alternative protein ventures use plant-based, fermentation-based or cell-based technologies. In terms of transactions by value (where this data is disclosed), plant-based technologies account for US $29 billion in total, followed by cell-based (US$ 2.3bn) and fermentation (US $1.8bn) technologies. The average investment round size for ventures using plant-based technologies is US$ 31 million, significantly lower than cell-based (US $96m) and fermentation (US$ 57m) technologies. This likely reflects the maturity of the respective technologies and factors such as the scale of capital investment required at an early stage.

Meat substitutes with plant-based technologies are the most popular technology and product type combination in the database, accounting for 33 transactions, followed by meat substitutes with cell-based technologies (27 transactions) and ingredients with fermentation-based technologies (22 transactions). Since 2021 a few transactions have been recorded involving cell-based technology ventures producing dairy alternatives and ingredient products.




● **Figure 5**: Technology type of alternative protein companies over time.

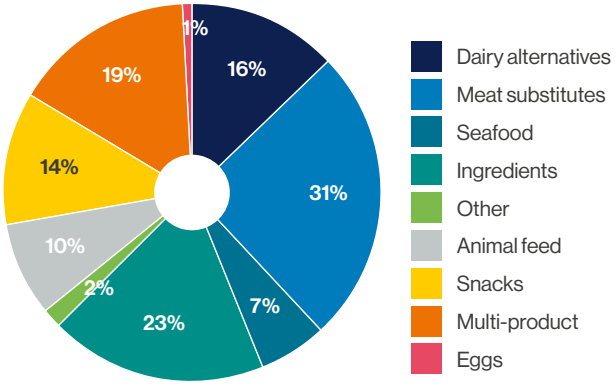



● **Figure 6**: a) Technology type of alternative protein companies and b) technology type vs product type of alternative proteins.

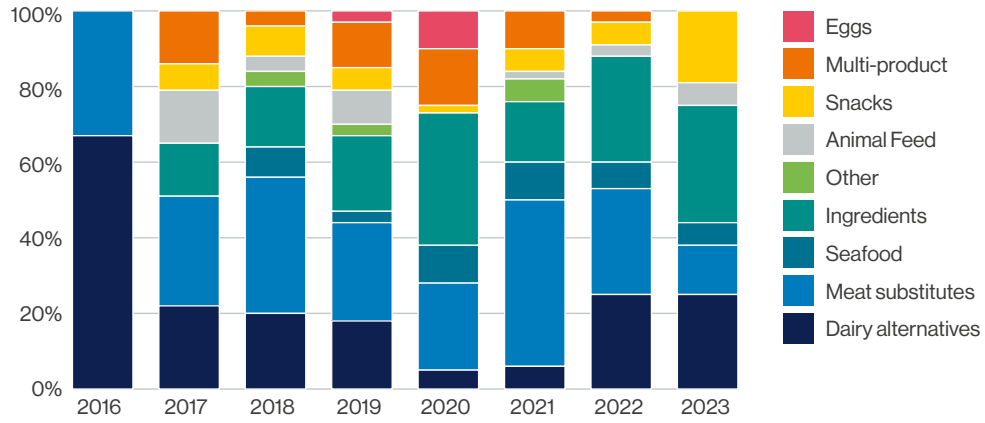
## 5. Activity by product type

Meat substitute products account for 31% of transactions by volume, followed by ingredients (23%) and dairy alternatives (16%). Alternative protein ventures developing ingredient products have increased steadily since 2017, and in 2023 accounted for the largest share of investments by product type. In contrast, investments into dairy alternative products have accounted for less than 6% of annual transactions since 2020. The share of investments into animal feed peaked in 2017 at 14%, despite more total investments into animal feed being recorded in 2019. Other product areas include seafood and snacks, which respectively account for 7% and 6% of total transactions recorded.

In terms of transactions by value (where this data is disclosed), meat substitutes account for US$ 14.2bn, of the total, followed by dairy alternatives (US$13.7bn), ingredients (US$ 958m) multi-products (US$ 697m), seafood (US$ 328m) and animal feed (US$ 266m). The average investment round size for ventures making meat substitute products was US$ 89 million, followed by multi-products (US$ 80m), dairy alternatives (US$ 51m), ingredients (US$ 33m) and seafood (US$ 32m).



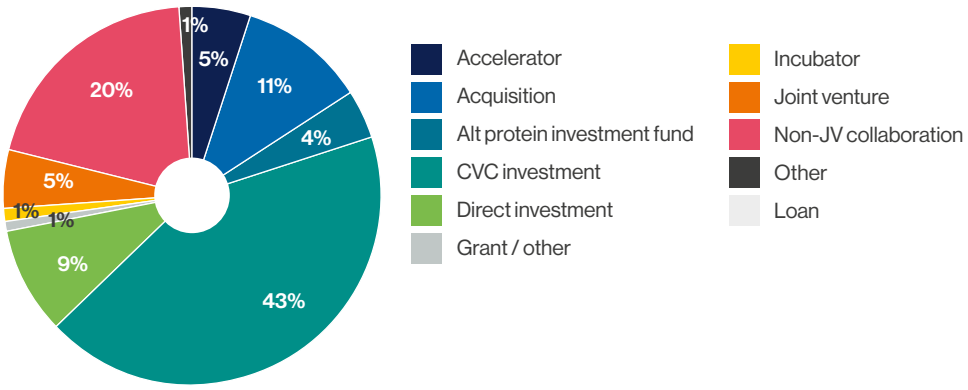

● **Figure 7**: Product type of alternative protein companies.



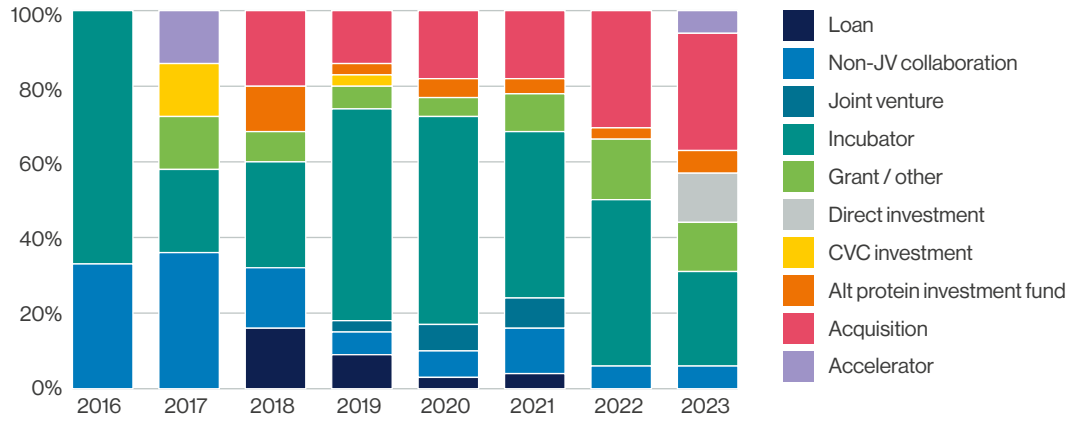

● **Figure 8**: Product type of alternative protein companies over time.

## 6. Transactions by type

While ‘vanilla’ corporate venturing investments are the most common by type recorded in the database, accounting for 43% of transactions, non-JV collaborations (20%) are also material, reflecting the plurality of approaches in the sector. Moreover, the proportion of transactions involving non-JV collaborations has been increasing recently. Other transactions by type and share are acquisitions (11%), direct investments (9%), joint ventures (5%), and accelerators (5%).




- **Figure 9**: Relationship type between food corporations and alternative protein companies.

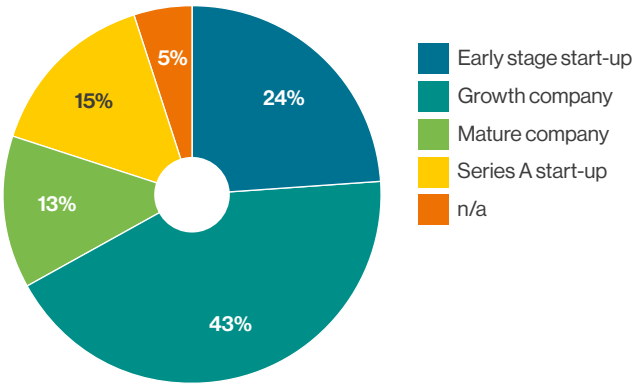



- **Figure 10**: Relationship type over time between food corporations and alternative protein companies.

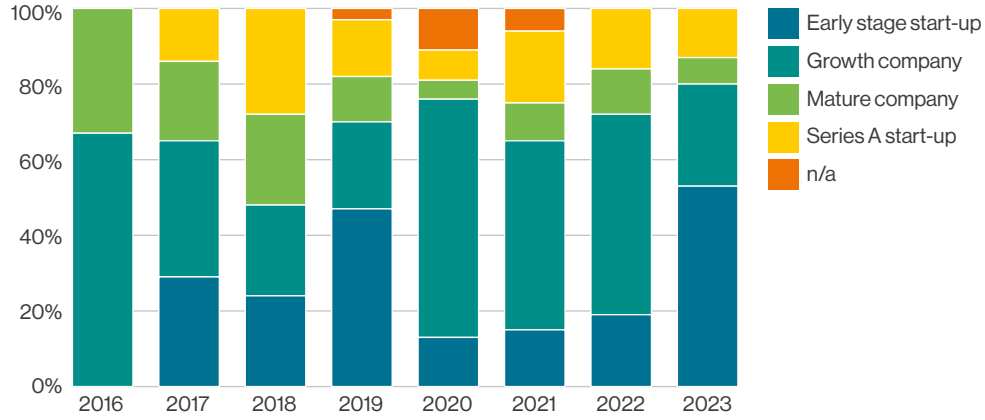
## 7. Maturity of alternative protein companies at point of investment

Transactions with ventures at the 'growth' stage of their development feature most commonly in the database (43%), followed by start-up (24%), Series A (15%) and 'mature' stage ventures (13%). The definitions used here are subjective, and in coding the database we generally referenced the terminology provided in the disclosures. Growth stage companies are typically those that have already secured Series A financing and are able to scale up production and distribution. However, given the heterogeneity of the ventures in the database, it would not be appropriate to over-generalise. More information on the definitions of maturity stage from a venture investment perspective is available from various online resources. In 2023, the share of transactions focussed on early-stage investments increased significantly, consistent with wider market trends of generally lower round sizes, reflecting prevailing conditions.

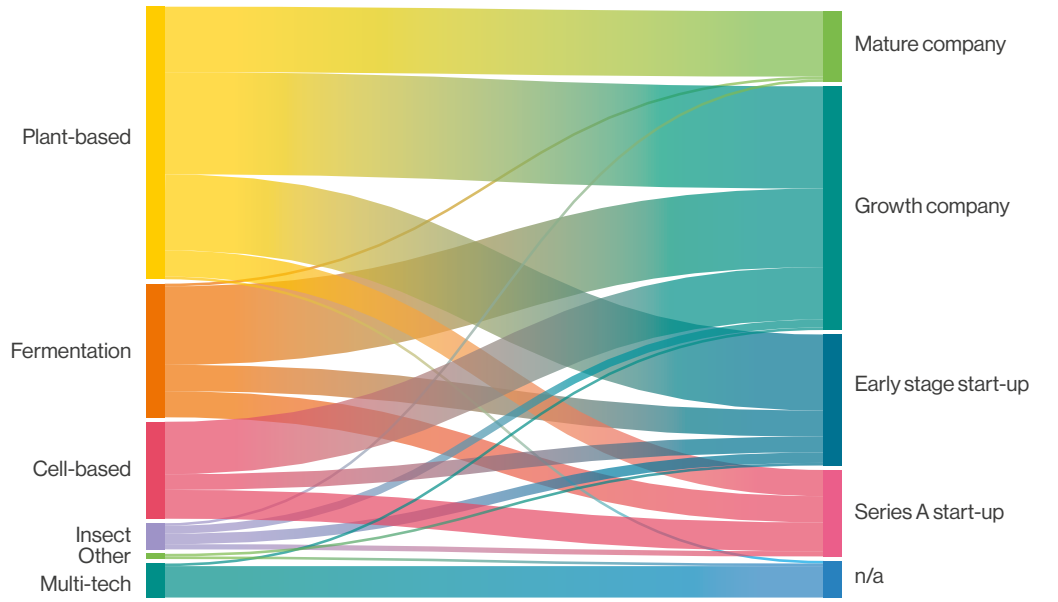
Transactions with ventures classified at the 'mature' stage of their development – predominantly using plant-based technologies – are concentrated on acquisitions, joint ventures, and non-JV collaborations.




● **Figure 11**: Maturity of alternative protein companies.




● **Figure 12**: Maturity of alternative protein companies over time.




● **Figure 13**: Transaction type vs maturity of alternative protein company.


● **Figure 14**: Transaction type vs maturity of alternative protein company.

# Summary

- We introduce a database to track the evolution of corporate venturing in the alternative proteins sector.
- Our hypothesis is that incumbent food companies have greater potential to accelerate the adoption of alternative protein technologies and products, relative to other providers of venture capital.
- This could have implications for policy and market strategies that seek to achieve a transition to net zero emissions.
- Corporate venturing into alternative proteins is still at an early stage, and this limits our current capacity for a comprehensive analysis.
- However, tracking the trends on the location, number, size, and type of transactions will provide insights both for ventures seeking investment, and for funders that deploy capital.
- Collating and disseminating this information on an open-source basis via a public database increases its general utility.
- Further research underway includes an analysis of motivations for the transactions, for example around non-JV collaborations.
- We are also exploring the potential to integrate this data into other projects related to food systems at the University of Oxford and beyond.

## Our vision

A healthy planet and a fairer, more prosperous world, supported by a sustainable global economic and financial system.

## Our mission

The Smith School of Enterprise and the Environment equips enterprise to achieve net zero emissions and the sustainable development goals, through our world-leading research, teaching and partnerships.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