

PLANT-BASED AND ALTERNATIVE PROTEINS: THE NEED OF THE HOUR

A market map of the players

FROM EIT FOOD CENTRAL AND NUTRITION HUB



PHOTO CREDIT: "New Traditions" from Tabea Mathern & Yannic Moeken / www.tabeamathern.com / www.famousformydinnerparties.com



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NUTRITION HUB

2020 was a record year of investment and increase in sales of plant-based and alternative proteins.

The COVID-19 pandemic made consumers more aware of the link between food, health, and sustainability, leading to a surge in the demand for plant-based nutrition. Investments in alternative proteins surged to a record-breaking **\$3.1 billion in 2020** according to *The Good Food Institute*. Sales of plant-based alternative protein foods in the U.S grew by **27%** to reach **\$7 billion in 2020** according to new *SPINS data by the Plant-Based Food Association and the Good Food Institute*.

This pales in comparison to the challenge that lies ahead: “Feeding 10 billion people by 2050” which cannot be tackled without a transformation in the nutrition sector (*EAT, 2019*). We need change, and we need it now. At the epicenter of the solution, the growing demand for alternative proteins meets widespread consumer goals for eating more healthily while also providing a diet that has less impact on the environment.

“*Research to increase the availability and source of alternative proteins is key to the transition into a sustainable food system.*

- European Commission, 2020

”

In this paper, we map the key players from our networks - from startups to research institutes, organizations, and expert voices - who lead us into a more economically, socially, and environmentally sustainable future. There are also many established corporations driving the market such as the *EIT Food partners*, *Nestlé*, *Danone*, or *DSM*. In this paper, however, we exclusively map startups and research institutes, organizations, and expert voices.

Let's start with:

WHAT ARE ALTERNATIVE PROTEINS?

Proteins, derived from non-animal-based sources, such as from plants, insects, algae, and in vitro or cultured protein (*Sciencedirect, 2021*). Humans consume proteins from food made from plants or animals. These foods contain different amounts of amino acids, which are the building blocks of proteins and define the nutritional quality of a protein (*British Nutrition Foundation, 2012*).

WHAT ARE THE DRIVERS TO OPT FOR ALTERNATIVE PROTEINS?

Alternative Proteins are rising in popularity and are foreseen to have tremendous growth in the coming years. Here are some key factors driving this trend:



HEALTH

Replacing animal-source foods with plant-based ones improves nutrient levels and lowers premature mortality by 12% in high-income countries (*Lancet, 2018*).



ENVIRONMENT

If 10% of the global animal market was replaced by alternative plant-based products, by 2030 176 million tCO₂ emissions could be avoided, equivalent to 2.7 billion trees (*Blue Horizon, 2020*).



ANIMAL WELFARE

80 billion animals are slaughtered globally every year (*Our world in data, 2019*). With a shift to alternative proteins in our diets we can reduce this number.



CURIOSITY

54% of Gen Z and Millennial population are interested in variety and trying new textures, tastes, and hence, are a driving force for alternative protein consumption (*Sciencedirect, 2021*).

WHAT ARE THE CHALLENGES AND OPPORTUNITIES OF ALTERNATIVE PROTEINS?

In order to boost the acceptance of alternative proteins in human diets, food producers have to take on the following opportunities (*Sciencedirect, 2020*):



REDUCE RAW MATERIAL & PRODUCTION COSTS

High processing requirements and dependence on functional foods makes production an expensive affair.



ECONOMIES OF SCALE NOT YET REACHED

At present, alternative proteins are produced on small scales compared with traditional animal proteins. If large groups of consumers are to repeatedly purchase alternative proteins, the cost must match or be less than that of traditional animal proteins.



IMPROVE TASTE & TEXTURE

Appearance, mouthfeel, and taste are crucial factors affecting acceptance and consumption of alternative proteins on a regular basis. The products must effectively imitate the sensory perceptions of natural meat (taste, texture, feel).



OVERCOME REGULATORY DELAYS

Due to regulatory delays, products based on alternative proteins are not yet commonly available in the market as opposed to other protein sources.

What we see today is only the beginning of the protein transformation. The food industry is on the brink of a decade of profound change.

The alternative proteins market is expected to reach \$27.1 billion by 2027 globally, growing at a CAGR of 11.2% according to *PR Newswire*. The plant-based meat and dairy alternatives market is projected to grow to € 7.5 billion by 2025 in Europe and UK according to the *ING report, 2020*. Alternative proteins are a key to a sustainable food system and also strengthen food security by opening up new means for food production and using resources more efficiently.

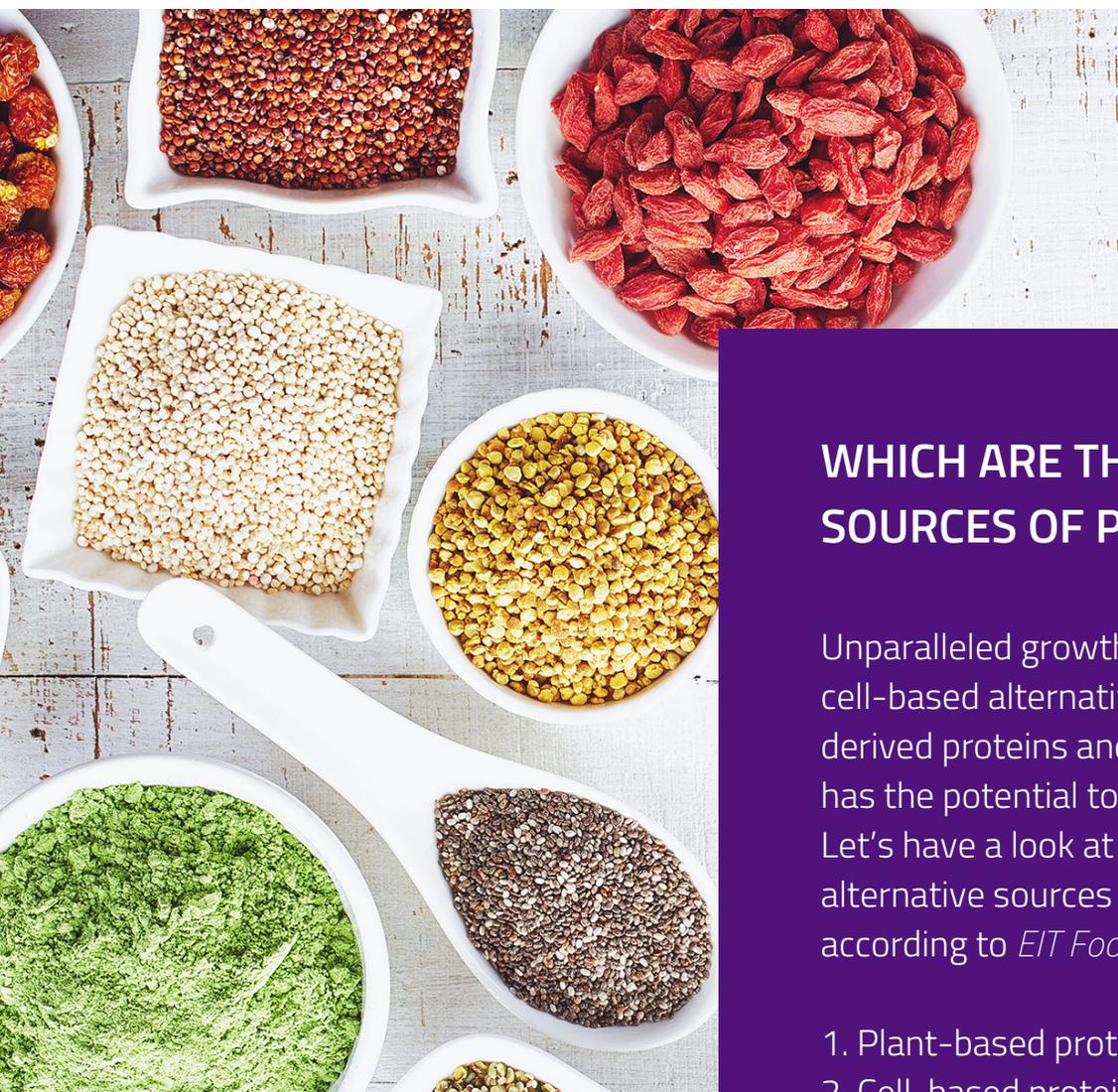


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WHICH ARE THE ALTERNATIVE SOURCES OF PROTEINS?

Unparalleled growth in plant, animal-cell-based alternatives, fermentation derived proteins and insect proteins has the potential to drive this change. Let's have a look at the 4 main alternative sources of proteins according to *EIT Food*:

1. Plant-based proteins
2. Cell-based proteins
3. Fermentation derived proteins
4. Insect-based proteins

- **What:** A food source of protein that is derived from plants such as pulses, legumes, and other protein rich plants without any involvement of animals (*Plant-Based Food Association, 2020*).
- **Growth Predictions:** It is estimated that plant-based proteins will have a consumption of 69 million MT by the year 2035 (*BCG & Blue Horizon, 2021*).

LETS LOOK AT THE PLAYERS:

STARTUPS



ORGANIZATIONS



RESEARCH INSTITUTIONS, PROJECTS, & EXPERTS ACTIVE IN THIS FIELD



Forschungsinstitut für
pflanzenbasierte
Ernährung

"Forschungsinstitut für pflanzenbasierte Ernährung (IFPE)" led by nutrition scientist Dr. Markus Keller.



smart protein

"Smart Protein", a European-funded Horizon 2020 project worked on by nutrition/social scientists: Prof. Armando Perez-Cueto, Dr. Kai-Brit Bechtold, and Dr. Hans De Stuer.



"Protein2Food" project, coordinated by Dr. Svend Christensen from University of Copenhagen



UNIVERSITÄT
HOHENHEIM

"V- place- Enabling consumer choice in Vegan or Vegetarian Food Products" project worked by Dr. Beate Gebhardt, scientific associate at University of Hohenheim.



WAGENINGEN
UNIVERSITY & RESEARCH

"Plant Meat Matters" a project led by Ariette Matser from the Wageningen University & Research

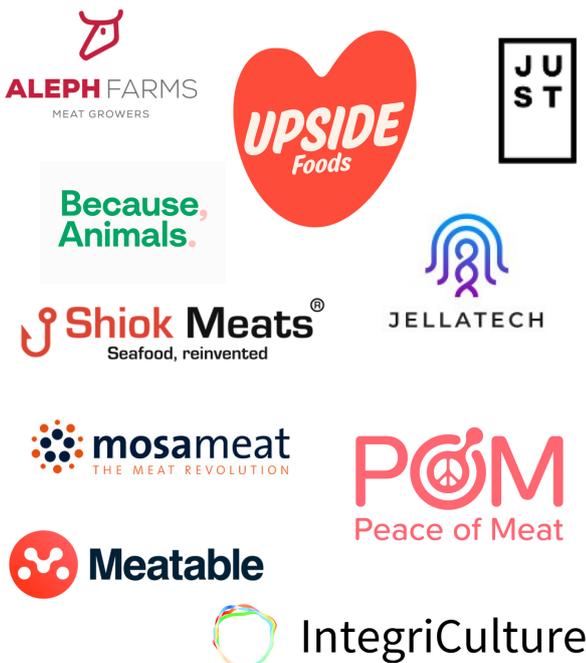
Researchers and nutrition science communicators working towards more plant-based and sustainable nutrition: Sherene Chou, Dr. Tara Garnett, Dr. P. K. Newby, Martin Schlatzer. Check out also the 10 Nutrition Experts list by NUTRITION HUB.

- **What:** Cell-based proteins are made by extracting stem cells from an animal, growing them in nutrient-rich conditions, and structuring them using bioreactors into desired shapes (*Nature, 2020*). In the paper, we focus on meat replacement, although cultured dairy and cheese products are also on the rise.
- **Growth Predictions:** The Global Cultured Meat Market is projected to reach \$94.5 billion by 2030 (*Businesswire, 2021*). Singapore is the first country to approve the sale of lab-grown chicken to the general public in 2021.

LETS LOOK AT THE PLAYERS:

(In-vitro dairy and cheese alternatives are not mentioned here)

STARTUPS



RESEARCH INSTITUTIONS, PROJECTS, & EXPERTS ACTIVE IN THIS FIELD

Bio.Tech. Foods.

"Meat4all" a European-funded Horizon 2020 research and innovation programme coordinated by Biotech foods SL in Spain



"Hallmark Research Project Initiative Future Food" project by Dr. Jenn Lacy-Nichols at University of Melbourne

ORGANIZATIONS



"WING" (Science and Innovation for Sustainable Poultry Farming), by scientific director Dr. Hans-Wilhelm Windhorst, at the University of Veterinary Medicine Hannover.

Fermentation derived proteins

- **What:** The process of using microbes such as microalgae, mycoprotein, and fungi to produce protein biomass, and improve plant proteins (*Good Food Institute, 2020*).
- **Growth Predictions:** It is estimated that fermentation derived proteins will have a consumption of 22 million MT by the year 2035, the fastest-growing segment among alternative proteins (*BCG & Blue Horizon, 2021*)

LETS LOOK AT THE PLAYERS:

STARTUPS



Clara Foods

AIR PROTEIN™



SOLAR FOODS



ORGANIZATIONS



RESEARCH INSTITUTIONS, PROJECTS, & EXPERTS ACTIVE IN THIS FIELD



"NextGenProteins" a European-funded Horizon 2020 research and innovation programme



"Pro Future", a European-funded Horizon 2020 research and innovation programme coordinated by the Institute of Agrifood Research and Technology (IRTA) in Spain



"PROFERMENT" project led by Microbiology and Fermentation expert Prof. Dennis Sandris Nielsen from University of Copenhagen



"Use of Fermentation to Enhance the Use of Plant-Based Proteins" research by Food Science researcher Dr. Ruben Morawicki from the University of Arkansas System

- **What:** Insect species are used whole or as an ingredient in processed food products. Insect proteins are sustainable and high in protein, fiber, and minerals (FAO, 2021). In 2021, dried mealworms have been approved as novel foods by the European Food Safety Authority (*European Commission, 2021*).
- **Growth Predictions:** The global insect protein market is projected to grow at a CAGR of 26.5% from 2020 to reach \$4.6 billion by 2027 (*Intrado Globenewswire, 2021*).

LETS LOOK AT THE PLAYERS:

STARTUPS



ORGANIZATIONS



International Platform of Insects for Food and Feed



RESEARCH INSTITUTIONS, PROJECTS, & EXPERTS ACTIVE IN THIS FIELD



"Green insect" project, led by Prof. Nanna Roos from the University of Copenhagen.



"MIGHTi" project, led by Dr. Valerie Stull at Global Health Institute - University of Wisconsin-Madison



"Susinchain", a European-funded Horizon 2020 research and Innovation programme, coordinated by Wageningen University & Research, where Mariam Nikravech, Dr. Birgit Rumpold, Dr. Nina Langen are the researchers associated with the project



"Santa Barbara Bugs" project by researcher MacKenzie Wade at the University of California

The food industry is undergoing fundamental disruption driven by consumer demand, signaling a bright future for plant-based and alternative proteins. In the future, technology will be utilized even more to engineer food and drinks that are delicious, environmentally friendly as well as nutritious. Sustainability is intrinsic to plant-based products, and this will increasingly link together brand authenticity, product transparency, and corporate integrity.

“ *Every tenth portion of protein is very likely to be plant-based or alternative by 2035.*

- BCG & Blue Horizon, 2021

”

What will happen next?

- First, we have to ensure consumers trust plant-based and alternative protein products. Trust is built by transparent and reliable information about these products. EU food law has the objective to protect consumers from food fraud and make the market a leveled playing field. At least five regulations apply to plant-based and alternative protein products: the Novel Food Regulation, the GM Food Regulation, the Food Information Regulation, the Nutrition and Health Claim Regulation, and the Organic Food Regulation. A scientific discussion has started to **modify EU food law in a way that supports the market entry of sustainable innovations**: This may include a fast and widely accessible novel food process, permission to use referrals to customary names (e.g. burger) for vegetarian and vegan products, and the inclusion of new health claim rules such as 'preliminary evidence'.
- Second, plant-based and alternative protein products will have to prove **nutritional benefits**. In many countries, scientific evidence is lacking on how these products contribute to health. If we want these products to feed the world's population, let's make sure they are incorporated in official food-based dietary guidelines. This will open new distribution channels such as schools or universities.

“ *Transparency regarding the nutritional content of alternative proteins is needed to inform consumers, enabling them to make*

informed choices

- Sciencedirect, 2020

”

In 2015, the United Nations set the Sustainable Development Goals (SDGs) to achieve a better and more sustainable future for the people and the planet. Today, we have 9 years to reach the SDGs. Let's take this opportunity and turn sustainable healthy eating into reality.

Authors and contact

EIT FOOD

EIT Food was set up by and is financed by the European Union. EIT Food's vision is a world in which everyone has access to sustainable, safe, and healthy food - with trust and fairness from farm to fork. EIT Food creates a sustainable, trustworthy multi-stakeholder community of diverse food sector partners, to drive innovation and entrepreneurship across Europe.



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EIT Food Central Project Team: Dr. Kerstin Burseg and Dr. Georg Schirrmacher.

NUTRITION HUB

NUTRITION HUB is a think tank and leading community for food, nutrition, and health professionals. NUTRITION HUB brings together nutrition experts and scientists, the startup scene, and decision-makers from the industry who rely on science and technology to shape the future of nutrition. NUTRITION HUB is an associated partner of EIT Food.



NUTRITION HUB Project Team: Bhargavi Arvind, Roxanna Rokosa and Dr. Simone Frey.

INQUIRIES AND CONTACT



Dr. Kerstin Burseg,
EIT Food Central
Programme Manager Innovation
clccentral@eitfood.eu



Bhargavi Arvind
NUTRITION HUB
Scientific Editor
bhargavi@nutrition-hub.com

A BIG THANK YOU TO THE ARTISTS TABEA MATHERN AND YANNIC MOEKEN, WHO PROVIDED THE COVER IMAGE "NEW TRADITIONS":

The picture "New Traditions" was the winner of the art prize #Essenverändertdiewelt hosted by BIO PLANÈTE in August 2021. Tabea Mathern in collaboration with Yannic Moeken created the photograph to make the food systems transformation tangible and visible. "Our image of a 'Butcher's Shop' addresses thoughts such as: What changes can we accept to allow those who come after us to live rich lives full of memories and (new) traditions? Isn't a picnic with juicy, meaty tomato sandwiches instead of the ham we grew up with just as conceivable? Does a holiday meal really become less festive without the traditional roast? Change starts with imagination - and we humans have often proven how imaginative our species is."

Tabea Mathern is a photographer and visual artist with a strong love for fruits and vegetables. Camera and wild ideas have been with her since she was little. For years she has been working independently for various clients and on her own projects - many of them on social and ecological topics. For example, she has already realized an exhibition about food waste or the "Gelateria Distopia", an interdisciplinary exhibition about the effects of climate change. From the beginning, she was enthusiastic about Yannic's careful and creative approach to food and his way of talking about it.

Yannic Moeken studied literature but has been working with food for a long time. He works as a food stylist. He is behind the food-and-culture magazine "famous for my dinner parties" with Junshen Wu and Sandra Mayer. He collaborated with Tabea many times and is thrilled by her creativity every time.

Contact Data Tabea:

www.tabeamathern.com
hello@tabeamathern.com
Instagram @tabea.mathern

Contact Data Yannic:

www.yannicmoeken.com
yannicmoeken@gmail.com
Instagram @yanncmkn