



The New Paradigm V

Alternative Proteins

Shaping The Future Plate: Can alternative proteins lead the change against climate change?

we're working for **the future of food**

Kök Projekt is an agri-food startup accelerator and an innovation partner for **the food, agriculture and water sector companies.**

We work together with companies, NGO's and governmental organizations to establish interfaces for entrepreneurs to reach beyond their potential.



we work through the food value chain

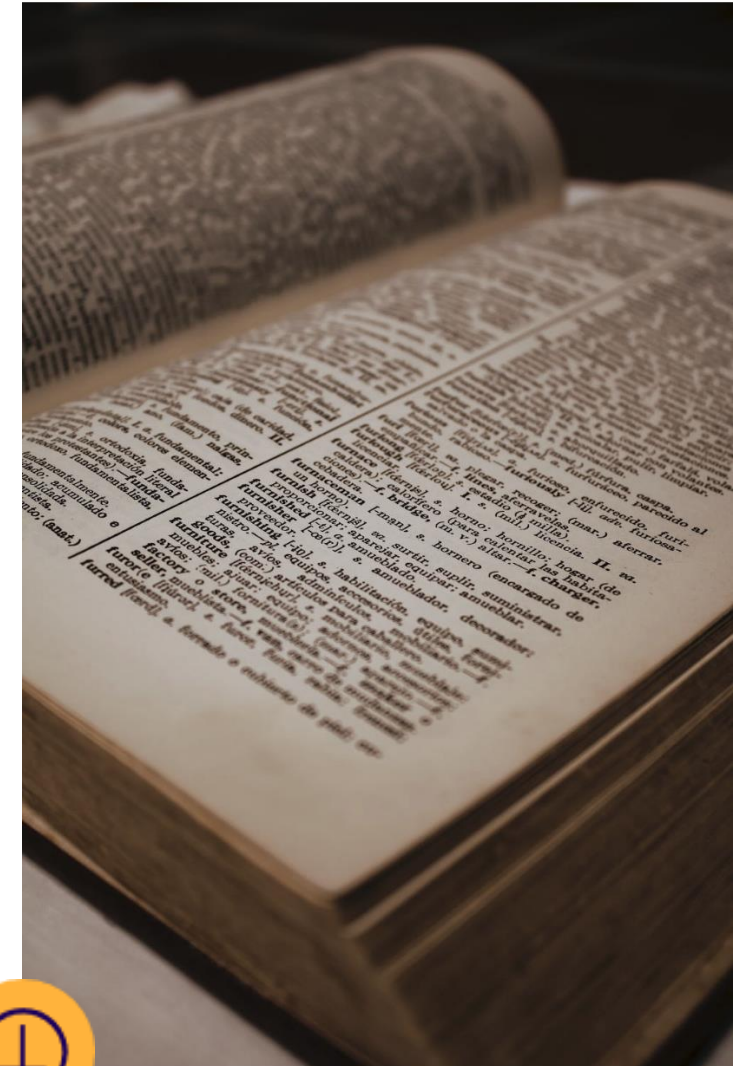


 **The New
Paradigm V**

Understanding The Global Issue

Overview of the Current Food System

- The food system faces numerous obstacles related to sustainability and food security.
- The world population is going to be nearly 10 billion people by 2050. It will become increasingly urbanized and wealthier, increasing the demand for more resource-intensive, animal-based foods.
- Climate change will have a growing effect on food production, especially due to an increase in the frequency of storms, droughts, and other extreme weather events.
- The big question is how to feed this growing population sustainably while creating economic development and tackling the challenges of climate change.



Meat Production From 1961 to 2022

Meat production, 1961 to 2022

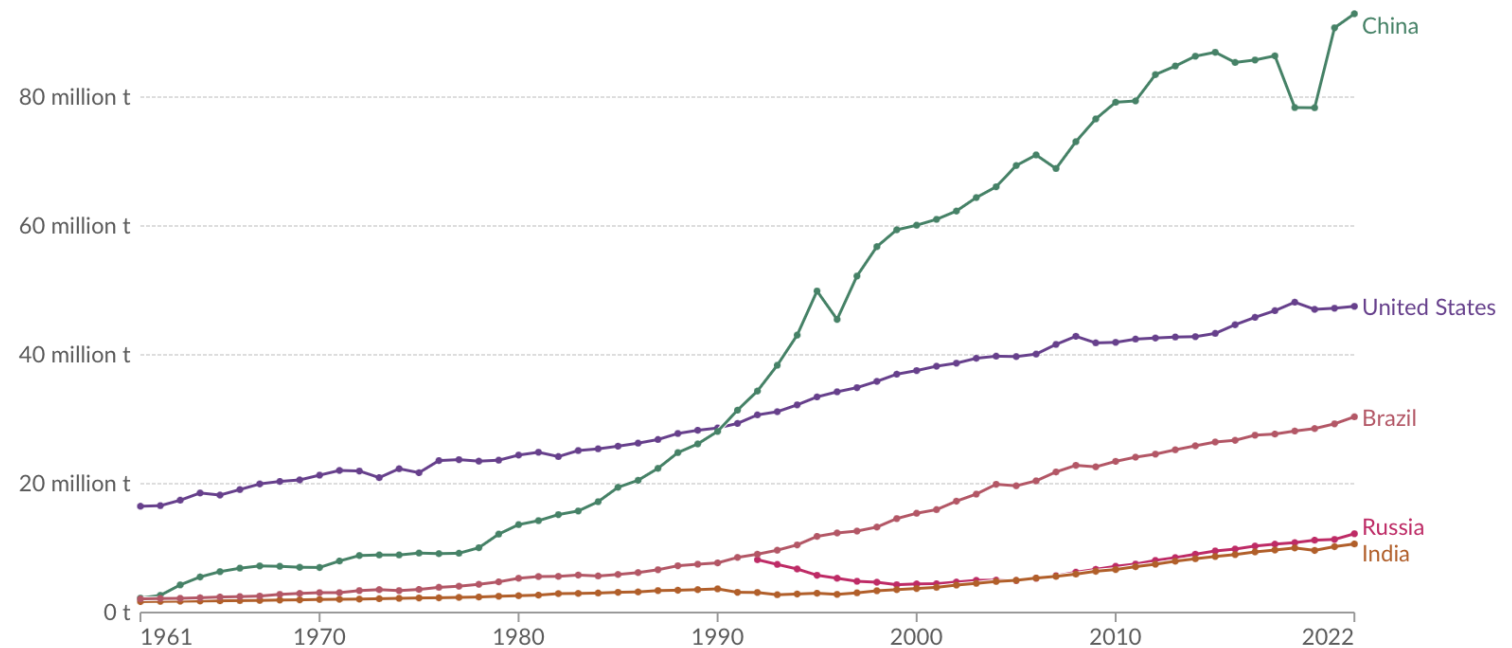
Expressed in tonnes. Includes cattle, poultry, sheep/mutton, goat, pigmeat, and wild game.

Our World
in Data

Table Map Chart

Edit countries and regions

Settings



Data source: Food and Agriculture Organization of the United Nations (2023) – [Learn more about this data](#)

Note: Figures are given in terms of dressed carcass weight, excluding offal and slaughter fats.

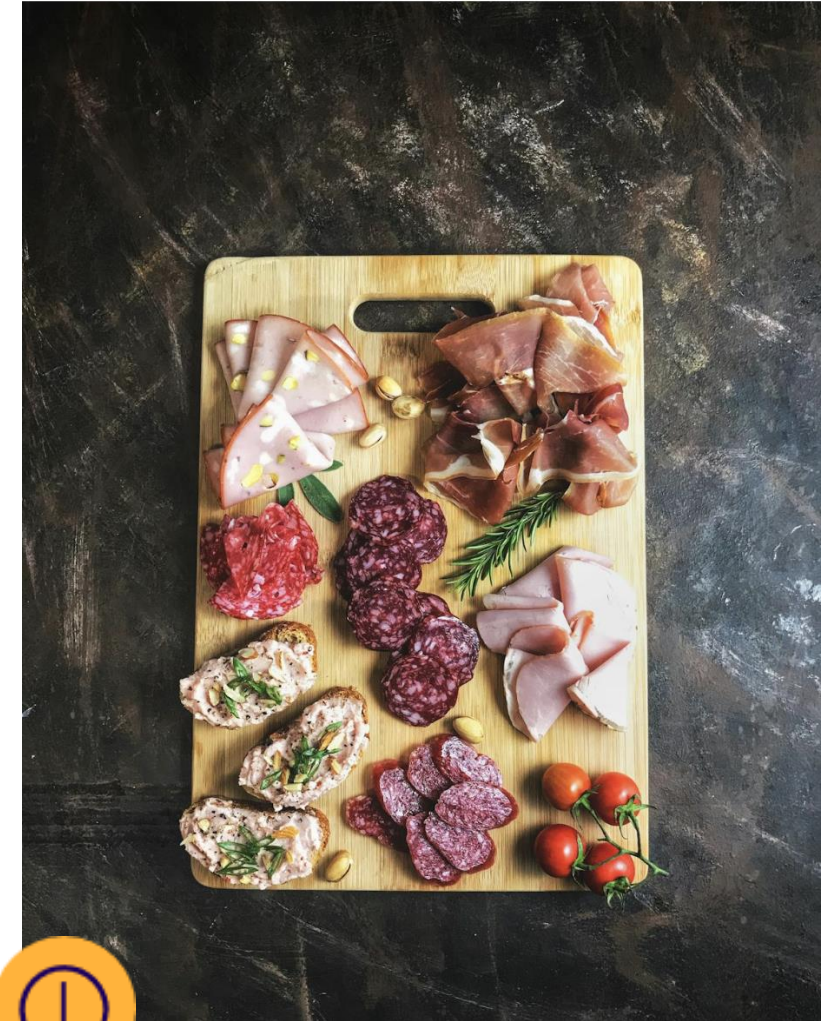
OurWorldInData.org/meat-production | CC BY



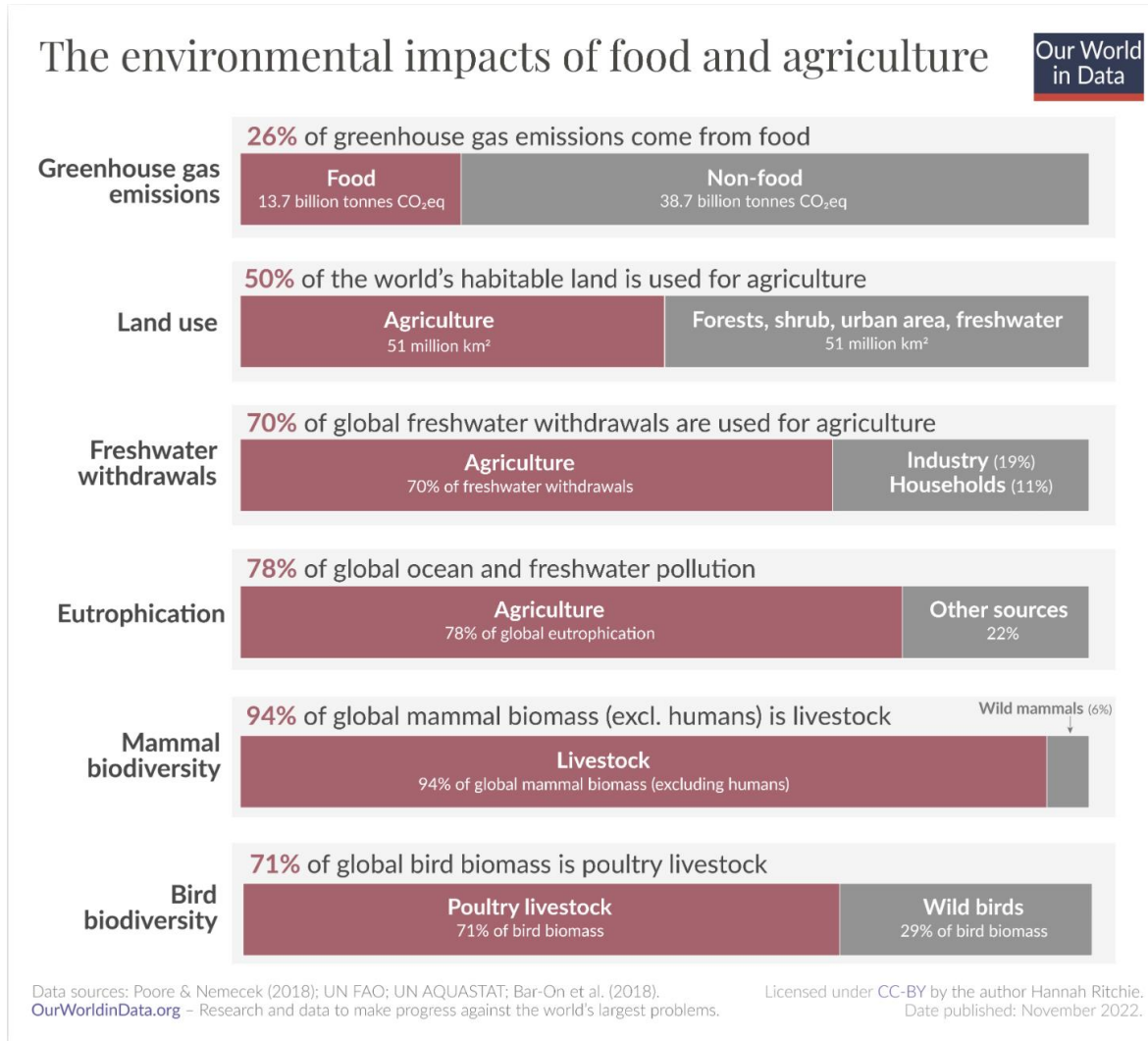
The Challenge of Meat

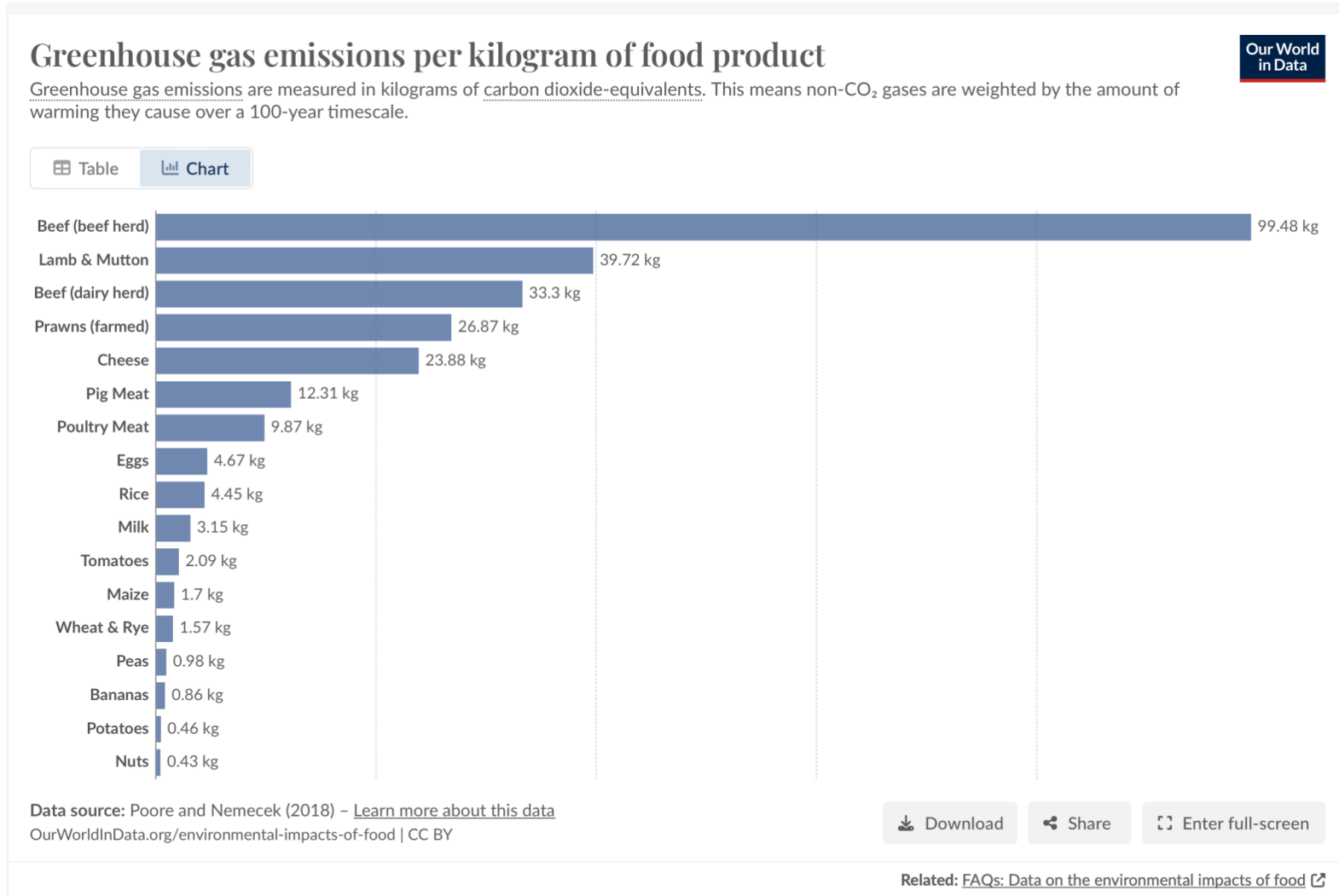
Production, Consumption and Impact I

- Meat production is highly resource-intensive. Ruminant meat consumption, which includes goat, lamb, and cow, is expected to increase by 88% between 2010 and 2050. (WRI)
- The impact of animal production varies greatly between livestock types and production systems. Due to the creation of methane during ruminant digestion, the production of red meat (cow, sheep, and goat) is a particularly significant source of greenhouse gasses. (WEF, White Paper)
- Livestock production accounts for about 15% of anthropogenic greenhouse gas emissions. (WEF, White Paper)
- According to WRI, beef, the most commonly consumed meat, requires 20 times more land and emits 20 times more GHGs per gram of edible protein than common plant proteins.



**Food production
accounts for over a
quarter (26%) of global
greenhouse gas
emissions.**





> “ **Livestock production accounts for about
15% of anthropogenic greenhouse gas
emissions.** ”

Source: WEF, White Paper

The Challenge of Meat

Production, Consumption and Impact II

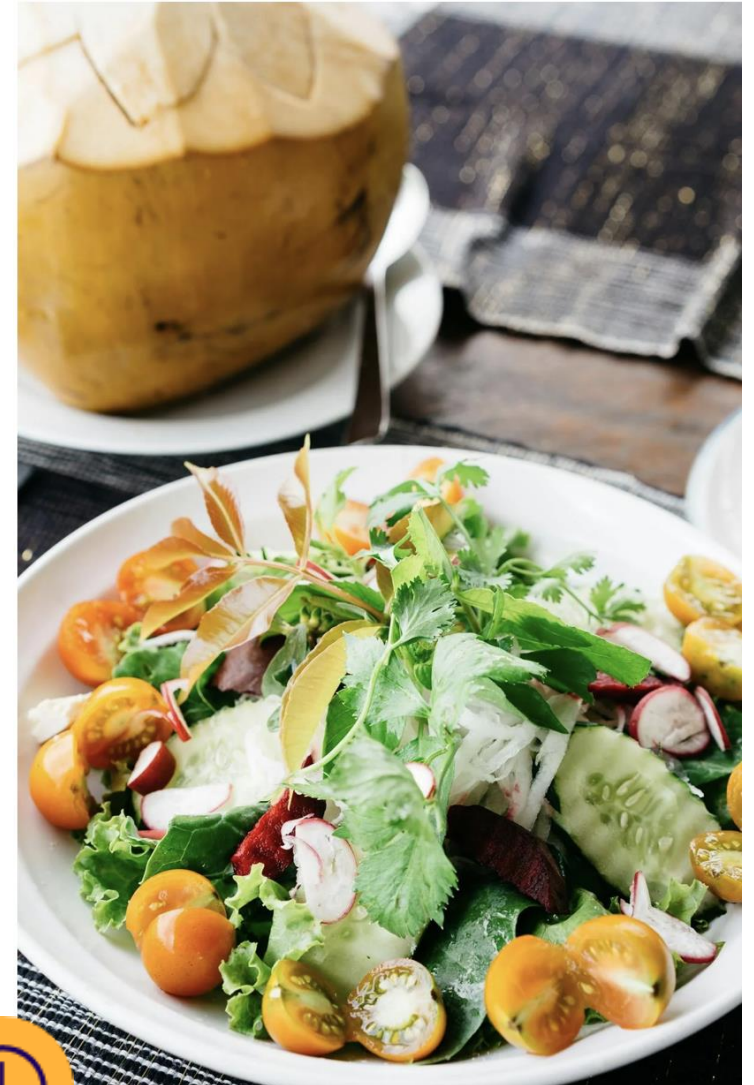
- Grazing and growing animal feed is the single most important driver of deforestation with consequences for greenhouse-gas emissions and biodiversity. (WEF, White Paper)
- Although meat production and consumption have negative effects on the environment, millions of livelihoods depend on rearing, distributing and selling animal-sourced food for living. According to estimates, agriculture accounts for about 3% of the world's gross domestic product (GDP), with 40% coming from animals. About 1 billion people, most of whom are located in low-income nations, including some of the world's poorest, rely on it for their livelihoods. (WEF, White Paper)
- Thus, while discussing the challenges of meat production and consumption we also need to remember many livelihoods depend on it.



The Challenge of Meat

Production, Consumption and Impact III

- How do we meet the increasing demand for animal-based foods while lowering emissions?
- Existing pasturelands can be managed more productively by using improved fertilization, higher quality cattle feed, and rotating livestock grazing areas. Moreover, changing diets and consuming more plant-based proteins other than animal-based ones can contribute to global sustainability.
- Another option is alternative proteins, what are alternative proteins and how can they help to create more sustainable environment?

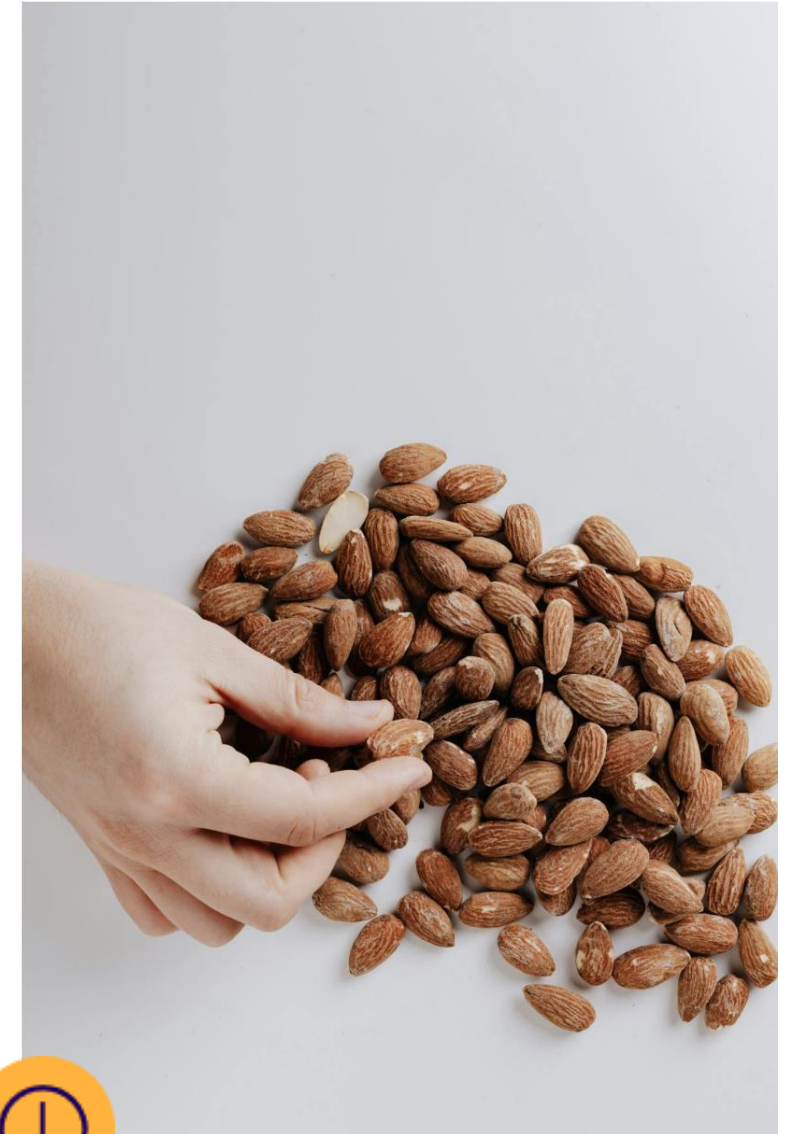


Understanding Alternative Proteins

I-Definition

"Alternative proteins are proteins produced from plants or animal cells, or by way of fermentation. These innovative foods are designed to taste the same as or better than conventional animal products while costing the same or less. Compared to conventionally produced proteins, alternative proteins require fewer inputs, such as land and water, and generate far fewer negative externalities, such as greenhouse gas emissions and pollution. Some of these products are available to consumers today, including numerous plant-based and fermentation-derived options. Others, such as cultivated meats, remain primarily in development."

(Good Food Institute, Defining Alternative Protein <https://gfi.org/defining-alternative-protein/>).



Understanding Alternative Proteins

II- Types of Alternative Proteins I

Plant-Based; Plant based meat is produced directly from plants. Like conventional meat, it is composed of proteins, vitamins, fat, and minerals. Today there are many plant-based meat options that looks, cooks and tastes like conventional meat.

Cultivated; is a meat produced directly from cells. The process of developing cultured meat involves taking muscle cells from livestock and applying a protein that promotes tissue growth outside the animal body. It is a form of cellular agriculture.

Fermentation has been use for food production since ancient times. Fermentation for alternative proteins can be categorized as traditional fermentation, biomass fermentation and precision fermentation.

(Good Food Institute, Defining Alternative Protein <https://gfi.org/defining-alternative-protein/>).



Understanding Alternative Proteins

II- Types of Alternative Proteins II

Traditional Fermentation can be used to improve the flavour or functionality of plant ingredients that are used in alternative protein production. Biomass fermentation efficiently makes large amounts of protein rich foods. Precision fermentation helps alternative protein producers to make specific proteins, enzymes, fats, pigments and etc.

According to Good Food Institute, we can think that plant-based, cultivated and fermentation derived products as an intersecting venn diagram rather than as three distinct categories. For example, ingredients made with fermentation can be combined with plant-based ingredients to make better products. Moreover for the cultivated meat precision fermentation can help efficiently produce cell culture media. (Good Food Institute, Defining Alternative Protein).

Categorizing alternative proteins under three section is from Good Food Institute. According to FAO, alternative proteins also include microbial proteins (microalgae and mycoproteins) and also insect-based proteins. (FAO)



Understanding Alternative Proteins

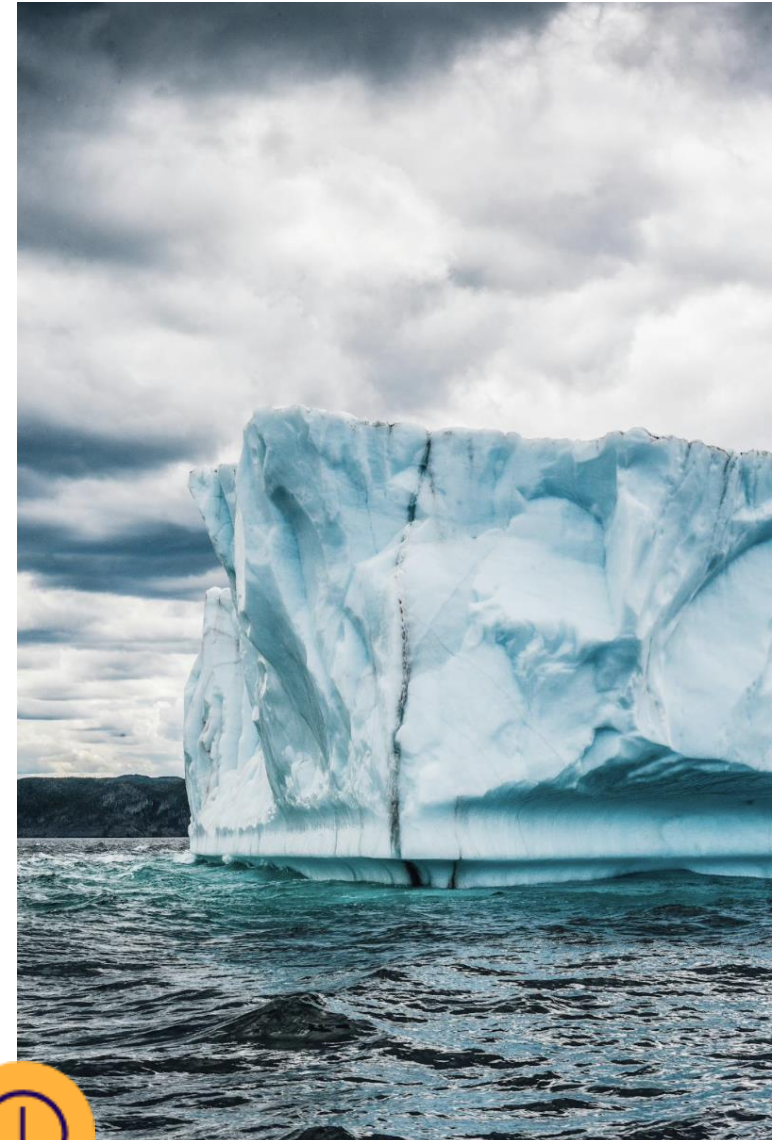
III- The Impact and Sustainability

In a 2019 report, the IPCC mentioned that alternative proteins could have significant potential to stimulate climate-smart food systems. (IPCC)

Alternative proteins; Require less land and water to be produced. They have a lower carbon footprint compared to traditional animal farming. Relieve the burden of producing crops for animal feed, and decrease the need for livestock production. (Future Learn)

According to GFI plant-based meat can reduce water usage by up to 99 percent and cultivated meat by 66 percent (compared to conventional beef).

However, some critics argue that most of the alternative products have high energy use and cost when produced on a large scale. Moreover, some of the alternative protein products are accused of being highly processed. Alternative protein products companies need to ensure their products are produced sustainably.



Understanding Alternative Proteins

III- Market Trends and Consumer Attitude

Meat has had an important role in human diets for centuries. It has social and nutritional functions. In many societies, it signals status and hospitality. However, things are changing. In countries with economic wealth, there is a growing concern about animal welfare, health, and environmental sustainability. This made way for growth in the alternative proteins market.

Today many technologies compete to replace meat, dairy, and other animal-based foods. The alternative protein market attracts many investors and entrepreneurs while being the subject of intense discussion.

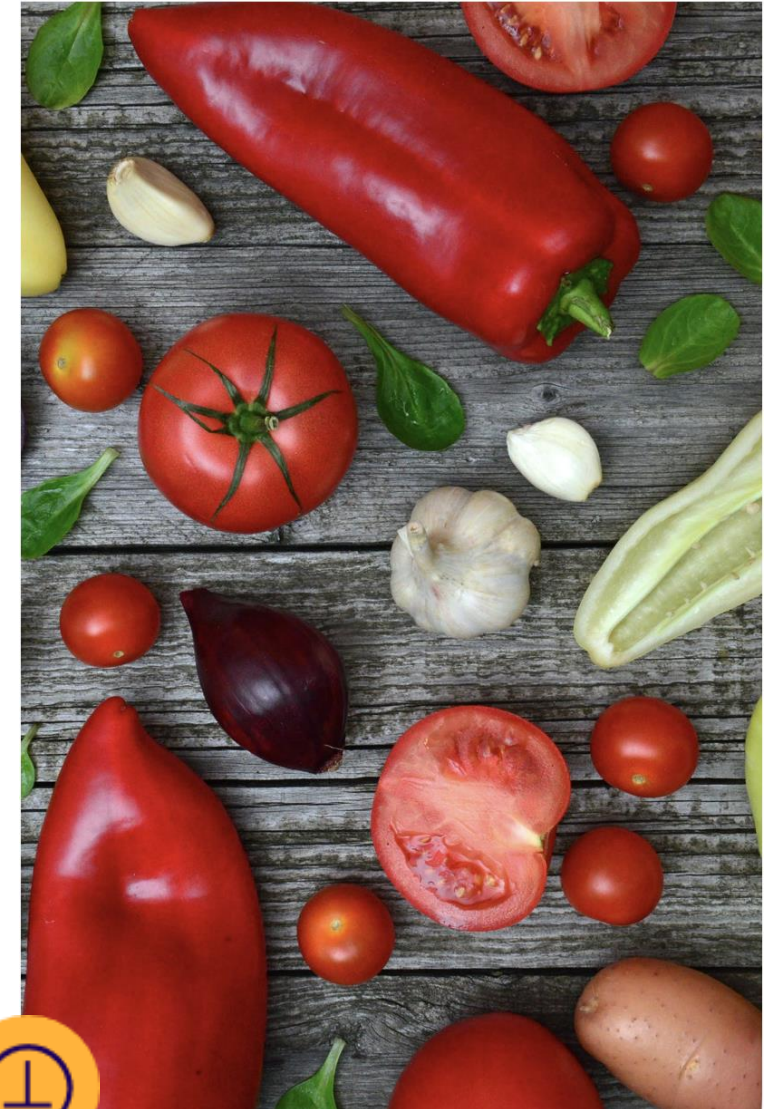
According to the BCG Report Alternative protein market is expected to reach at least USD 290 Billion by 2035. It will make up 11% of the protein market in the base scenario and could reach 22% if faster technological development and regulatory support realized. (BCG, Alternative-Protein Market to reach at least USD 290 Billion by 2035)



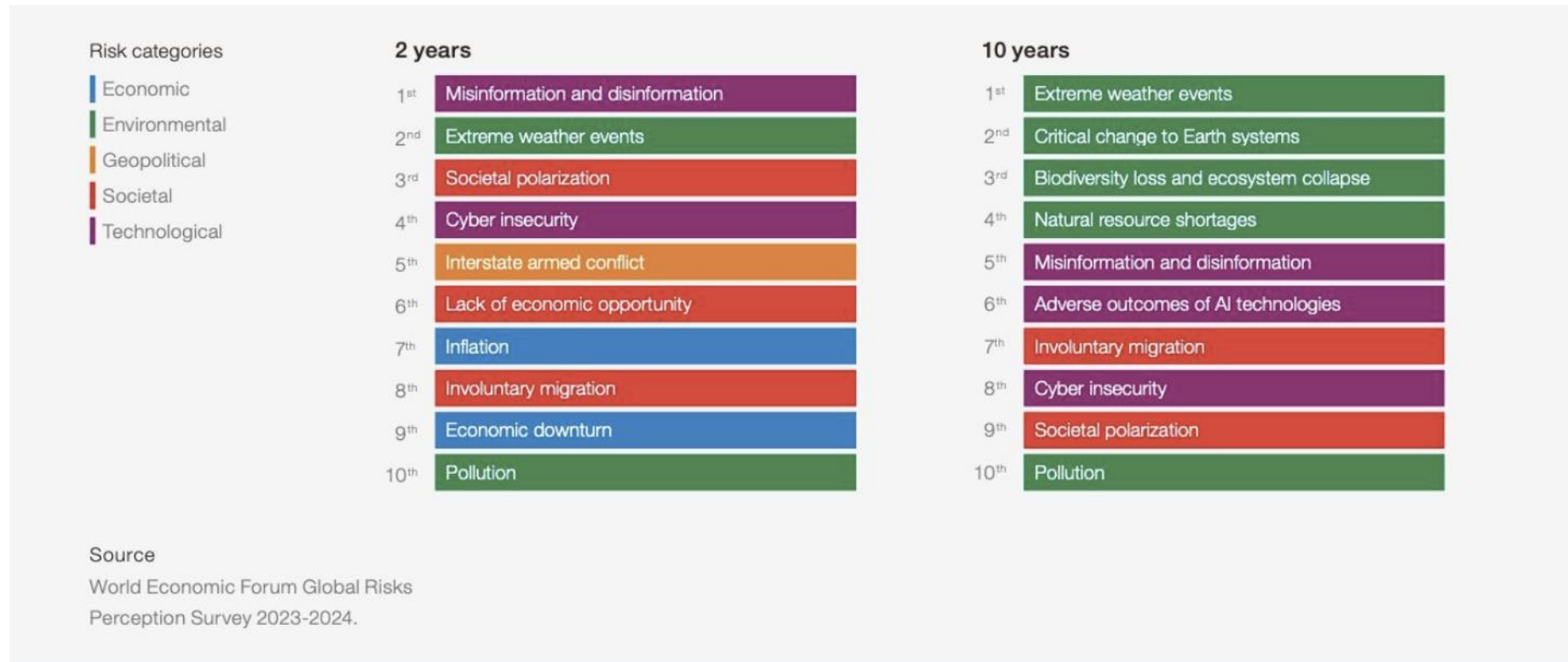
Changing Consumer Demands and Risk Perception

-World Economic Forum just released its global risk report with extreme weather events, critical change to Earth Systems, and biodiversity loss and ecosystem collapse ranking at the top of the list over the next 10 years. (WEF)

-Demand for sustainable, efficient, and fair supply chains is on the rise. International society is also willing to create a more sustainable, efficient, and fair food system. One good example is Green Deal where the EU is making promises to create an agriculture and food system respecting planetary boundaries.



Global Risks Perception Survey



Source: World Economic Forum Global Risks Perception Survey 2023-2024.

Understanding Alternative Proteins

III- Market Trends and Regulatory Framework

There are now over 1500 manufacturers and over 650 active ingredient suppliers in alternative proteins worldwide. (GFI)

Every country has a different point of view regarding the alternative protein market. With two cultivated chicken products hitting the market in 2020, Singapore became the first nation to allow the sale of cultivated meat. In 2023 US become the second country to authorize the commercialisation of cultivated meat. Italy banned cultivated meat. In the EU there is no cultivated meat sold and without authorization by the European Food Safety Agency (EFSA), no cultivated meat products can be placed on the EU market.

The successful development of alternative protein industry is dependent on the scalability and the acceptance of these products both by regulators and consumers. Most investments come from the private sector but public investments and regulatory frameworks will define the future of alternative proteins. Moreover, food safety, fairness, and clear labeling will drive consumer attitudes towards this growing trend.





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The New Paradigm V



> Impact of Technology

Technology in the service of paradigm shift

- Although technology can not be a silver bullet for the current food system problems, it may help to create more sustainable, efficient, fair, and healthy food supply chains.
- In our new paradigm report series, we search for tech solutions to tackle climate change while respecting the environment.
- For alternative protein technologies, we chose three startups that work to make a paradigm shift in the food system.





Cultimate

Cell cultivated ingredient for plant-based meat

- Founded in 2022 in Germany, Culminate is a biotech startup.
- The company creates a game-changing cultivated fat technology to provide alternative meats with authentic taste and texture.
- The biotech startup is based in Berlin's Biocube and Hannover.
- The company believes that through innovative technology, it can create the meaty flavors that consumers want while cutting down intensive animal farming and tackling climate change by reducing CO2 emissions.
- The company closed its seed round to scale up production processes and expand commercial collaborations and operations. The round was USD 2.3 million.



**STANDING
OVATION**
Animal-Free. Dairy Cheese.

Standing Ovation

Dynamic shelf life labelling to reduce food waste

- Standing Ovation founded in 2020 in Paris, France is an animal-free dairy cheese company.
- The company makes dairy ingredients without cows, by manufacturing their caseins through fermentation. The company aims to find sustainable solutions for food production which is responsible for greenhouse gas emissions, water usage, and land occupation.
- How does the process of making cheese without cows work?
- Step 1 Microorganism farming: The company generates protein-producing microbes and feeds them with plant-based sugars in their fermenters. Imagine a brewery, but for cheese. Step 2: They recover and purify the cheese proteins. Step 3: Mixing Ingredients; they mix the proteins with plant-based or mineral ingredients, and finally follow the traditional processes of cheese making curdling draining, molding, salting and ripening.

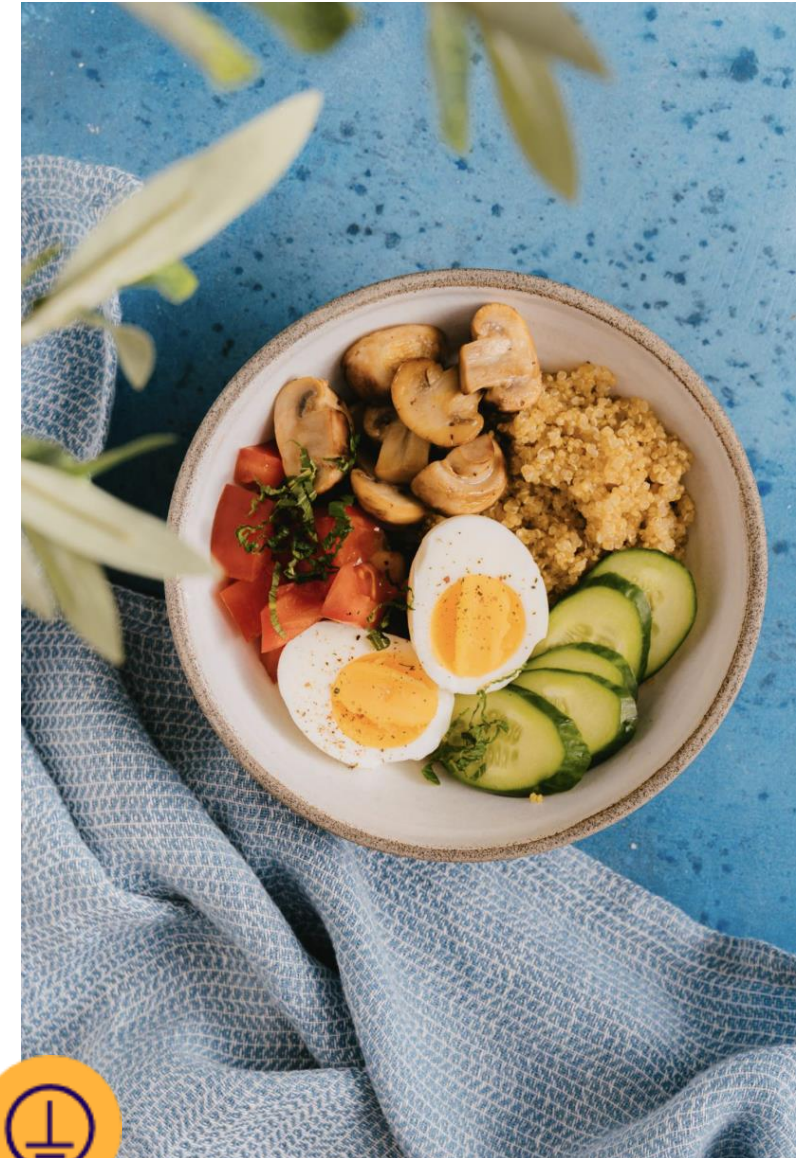


Onego Bio

Animal Free Egg Protein

ONEGO^{bio}

- Onego Bio is a Finnish food biotech startup producing animal-free egg protein with precision fermentation.
- The company is a spin-off from VTT Technical Research Centre of Finland.
- Onego Bio claims to shaping the future of food by harnessing living microorganisms for protein production. By using a sustainable and efficient precision fermentation process, they are producing Bioalbumen®, the animal-free egg white. Precision fermentation allows to production of bioidentical egg protein and thus provides people with food that is sustainable, tasty, and healthy—without cutting any corners or making any compromises.



- University of Oxford, Challenges Facing The Food System, Retrieved from; <https://www.futureoffood.ox.ac.uk/food-system-challenges> (Accessed: 22/04/2024).
- World Resource Institute (WRI), How to Sustainably Feed 10 Billion People by 2050, in 21 Charts, Retrieved from; <https://www.wri.org/insights/how-sustainably-feed-10-billion-people-2050-21-charts>, (Accessed: 07/05/2024)
- WEF, Meat: The Future Series, Alternative Proteins, Retrieved From; https://www3.weforum.org/docs/WEF_White_Paper_Alternative_Proteins.pdf , (Accessed: 07/05/2024)
- Good Food Institute, Defining Alternative Protein, Retrieved from; <https://gfi.org/defining-alternative-protein/> , (Accessed: 07/05/2024)
- FAO, The need for guidance on alternative proteins highlighted to Codex Alimentarius Commission, Retrieved from; <https://www.fao.org/in-action/sustainable-and-circular-bioeconomy/resources/news/details/en/c/1459357/#:~:text=What%20are%20alternative%20proteins%20and,meat%20substitutes%2C%20and%20dairy%20alternatives>. (Accessed: 08/05/2024)
- Future Learn, The Pros and Cons of Alternative Proteins, Retrieved from; <https://www.futurelearn.com/info/courses/engaging-with-controversies-in-the-food-system/0/steps/63410>, (Accessed: 08/05/2024)
- IPCC, Special Report, Chapter 5, Food Security, Retrieved from; <https://www.ipcc.ch/srccl/chapter/chapter-5/>, (Accessed: 08/05/2024)
- BCG, Alternative-Protein Market to reach at least USD 290 Billion by 2035, Retrieved from; <https://www.bcg.com/press/23march2021-alternative-protein-market-reach-290-billion-by-2035>, (Accessed: 08/05/2024)
- GFI, Alternative Protein Company Database, Retrieved from; <https://gfi.org/resource/alternative-protein-company-database/#ingredients-and-equipment> (Accessed: 08/05/2024)
- Our World In Data, Retrieved from; <https://ourworldindata.org/food-waste-emissions>, (Accessed: 17/01/2024).
- WEF, Global Risks Report 2023, Retrieved from; <https://www.weforum.org/publications/global-risks-report-2023/> (Accessed; 05/02/2024)

Startups

- SwapBox Startup Example, <https://www.swap-box.com/>, (Accessed:18/01/2024).
- Standing Ovation, Startup Example, <https://www.standing-ovation.co/>, (Accessed: 25/04/2024).
- OnegoBio, Startup Example, <https://www.onego.bio/>(Accessed:25/04/2024).
- All Images: <https://www.pexels.com/>

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