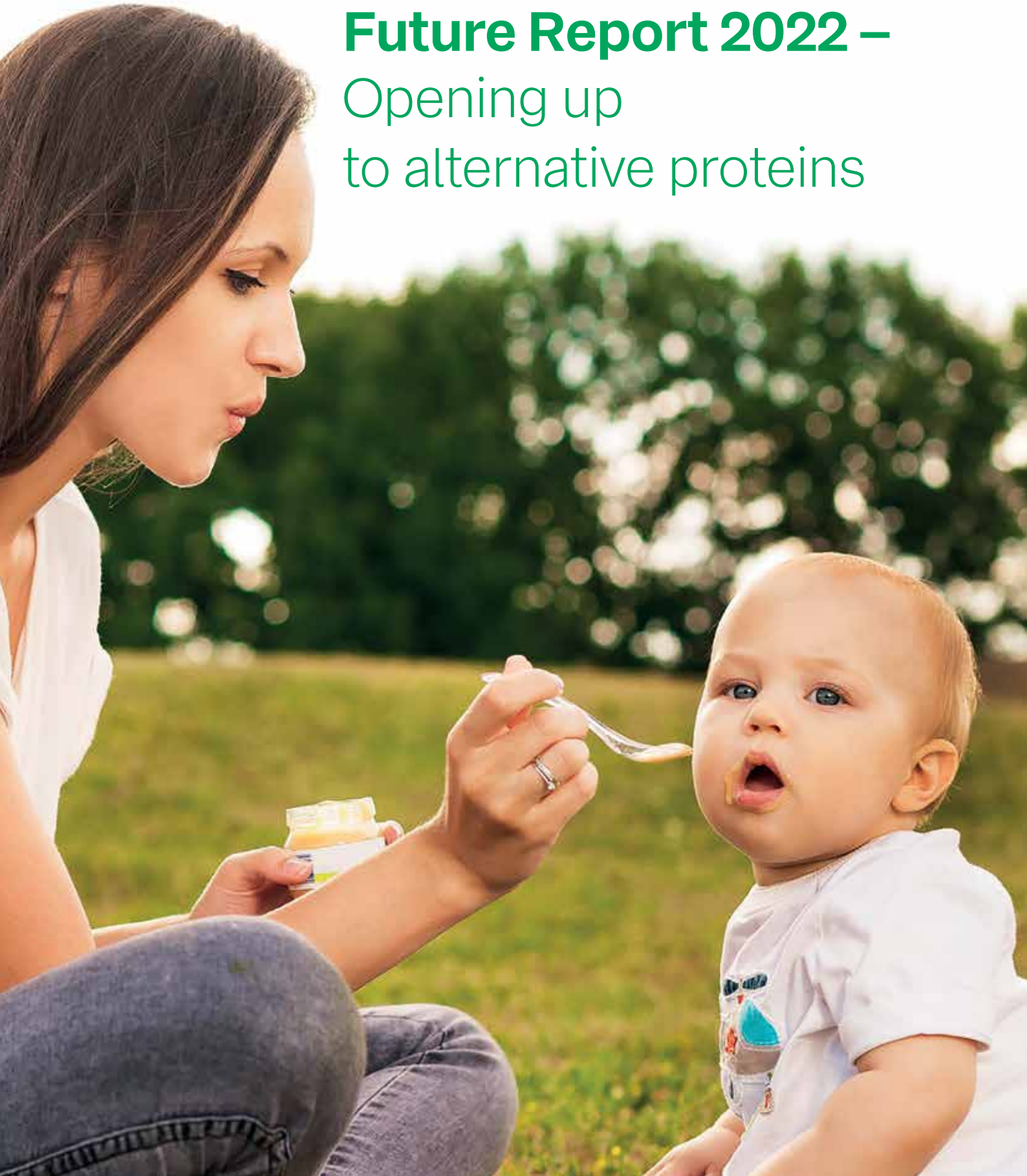
BayWa

BayWa Protein Future Report 2022 – Opening up to alternative proteins



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We collaborate to integrate!

Reflection and Outlook

Foreword

Topic

The BayWa Protein Future Report 2022 is a qualitative study that investigates market potential and customer needs in the field of alternative protein sources. In it, we analyse and assess the extent of the market- and consumer-driven shift away from animal-based sources of protein to animal-free alternatives.

We have prepared an unbiased customer-centric analysis that contains important information for businesses, investors and private individuals to enable the data-supported appraisal of market developments, investment opportunities and acquisitions.

The BayWa Protein Future Report 2022 analyses the impact of the shift to alternative proteins on the entire food industry value chain.

The objective of this report is to shine a light on the status quo while also taking a look ahead at the food market of the future. Demand for alternative proteins is rising among producers and customers alike. Respected forecasts and our own market research indicate that we are on the cusp of a plant-based revolution and a fundamental transformation in our food system.
BayWa is rising to the challenge and intends to do its part to sustainably secure the protein of the future.

For improved readability, gender-specific wording and formal reference to all gender identities are not used. The selected form stands for all genders (m/f/other).

All sources are listed at the end of the document. To enhance readability, they are not mentioned directly in the text.

Definitions

- Proteins: Proteins play an important role in our diet and are made of amino acids. They can come from various animal- and plant-based sources.
- Alternative proteins: The food we eat and the diet we customarily consume are based on animal proteins. Technology and innovation make it possible to produce dairy and meat analogues using non-animal, alternative sources.
- Plant-based protein alternatives: Also referred to as “plant-based” and “vegetarian” products. Plant-based and vegetarian products are foods that are normally based on animal protein sources but can also be made alternatively using plant-based sources of protein.
- Impact investing takes the social and environmental impacts of investments into account alongside risk and return.
- ESG stands for environmental, social and governance criteria, which are used to evaluate corporate social responsibility.
- Environmental footprint: Environmental footprint refers to the amount of land or space that a person, company or entire country needs to meet its daily need for resources. An environmental footprint is an indicator of sustainability.
- Alternative protein technologies are production methods for extracting and harvesting plant-based and microbial proteins.

Team

This report would not have been possible without the tremendous support of BayWa and a group of individual people who have offered us their time and knowledge. Over 350 BayWa employees were involved in performing the observations, surveys and interviews on which this report is based. In addition, five outside experts were interviewed to round out our work and to support our assumptions and draft versions of this report.

Our gratitude should not be taken to indicate that they agree with all (or some) of our assumptions and findings.

Any errors are our own.

Author: Kristal Golan

Contributors: Daniel Kreutzer, Antonia Struve, Wolfgang Hering, Silke Schmidt

Robles-Golan Kristal
Head of New Protein Solutions

Daniel Kreutzer
Junior Manager Corporate Venture

Antonia Struve
Corporate Strategy & Innovation

Wolfgang Hering
Agri Trade & Service, Products

Silke Schmidt
Corporate Marketing

Management Summary

In the next 40 years, we will need to produce more food than in the past 8,000 years.

1. **Our food system is under tremendous pressure. We are consuming more resources than ever before instead of using fewer in production. Climate change is already having an impact. Environmental disasters and the urgent need to protect the climate are forcing us to take a critical look at our approach to consumption and make radical changes.**
   - Livestock farming alone is responsible for roughly 15% of all global greenhouse gas emissions.
   - Eighty percent of the world's waste water is disposed of in nature without treatment.
   - Storms, floods and droughts are three times more likely to occur today than just 30 years ago.

2. **A sustainable approach to handling the world's resources is one of the greatest challenges facing global economic systems. Future-proof entrepreneurship is based on profit, sustainability and social justice alike.**
   - The world is home to roughly 7.89 billion people (as at August 2021). According to UN forecasts, the number of people living on earth will increase to 9.74 billion by 2050.
   - In less developed economies, political decision makers have to strike a balance between food, affordability and sustainability.

3. **Even in developed countries, food and diet are therefore also a question of sustainability and available alternatives rather than just taste, quality and habit. In the interest of protecting resources, a shift towards increasingly plant-based nutrition is both necessary and possible.**
   - Making changes to our diet on a broad basis could eliminate a quarter of global emissions.
   - According to the Meat Atlas, livestock and fish farming, along with feed and land use, are responsible for 14.5% of global greenhouse gas emissions.

4. **Consumption is largely driven by price and taste, making those factors the core requirements for alternative products. The key motives behind consumers' individual purchasing decisions are increased awareness of their own health, sustainability expectations and animal welfare.**
   - The main factors that inspire consumers to try alternative protein products are health, sustainability, animal welfare and curiosity. However, 52% of all repeat buying decisions are motivated by taste – closely followed by price!
   - In 2021, the overall market in the US grew by 6% to USD7.4 billion. Of that amount, USD2.6 billion was attributable to dairy alternatives, with USD1.8 billion being accounted for by meat analogues.

5. **The food industry is on the cusp of a cultural transformation. Plant-based protein alternatives are more than just a trend or fad. Healthy and sustainable dietary protein will play an essential role in meeting the nutrition needs of a growing circle of consumers in the future.**
   Development has gained momentum in western countries and among eco-conscious consumers. A mass market should emerge as the flavour profile of a diverse range of high-quality products improves.
   - In 2021, one in five new products in the food industry was vegan.
   - In Germany, the market volume of vegetarian and vegan analogues is projected to have stood at roughly €2 billion in 2021.

6. **In the dairy segment, plant-based protein alternatives have gained a strong foothold on supermarket shelves in Europe and the US. Meat, sausage and cold cut analogues have the potential to take on a comparable role in certain product groups in the years ahead. The wide range of products already available is set to grow and evolve constantly in this category and others.**
   - In 2020, companies in the EU manufactured 214,000 tonnes of meat analogues and 1.5 tonnes of alternative dairy products.
   - Plant-based dairy alternatives accounted for 15% of total dairy sales in the US in 2018. In Germany, that figure stood at roughly 4% in 2019.

7. **For some time now, vegans and vegetarians have not been the only target customers for meat, milk and dairy analogues. In fact, flexitarians are the main group of consumers. Further innovation will be necessary to accommodate the needs and preferences of flexitarians in the long term and achieve sustained growth.**
   - Flexitarians account for 90% of plant-based customers.
   - Approximately 75% of the people in Germany have tried a plant-based alternative at least once.

8. **Technological progress in the processing of plant-based proteins and in exploiting new sources of protein is advancing rapidly. Alternative proteins are in demand among the market and customers. Their development is also being driven just as strongly by technology and innovation.**
   - Investments in alternative proteins totalled over USD5 billion globally in 2021 alone. Of that amount, half (2.5 billion) was attributable to Europe – five times the capital expenditure seen in 2020.
   - Eggs were the fastest-growing plant-based alternative category in the US in 2021. Revenues involving such products increased by 42%, compared to a 4% decline in revenues from conventional eggs.

9. **Alternative products must offer a price and taste experience that is identical to their meat-based counterparts in order for sustained growth to be possible. It is difficult to predict when that moment will come and which products will be affected. However, the fact is that such growth will need to take place.**
   - Two-thirds of consumers would prefer a non-animal alternative if the prices for animal-based and alternative products were the same.
   - Respected studies predict that at least 10% of global meat demand will be met with non-animal alternatives in 2035 – in a conservative scenario!

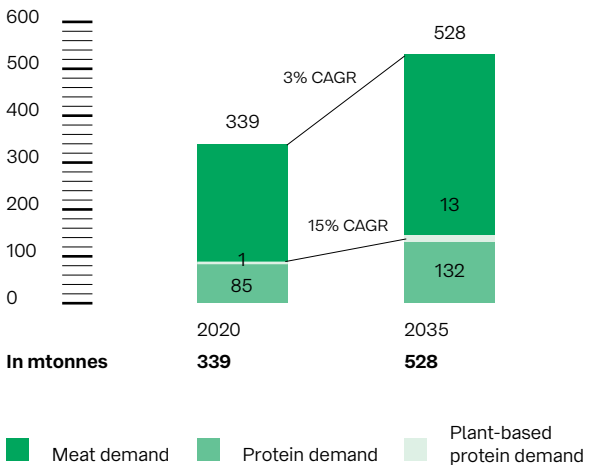
10. **BayWa recognises the necessity and potential of a fundamental shift in the way we grow, produce and consume food and intends to do its part to secure the protein of the future.**
    - A fundamental change in our agricultural and dietary systems will make our planet and its inhabitants healthier while also delivering financial and economic benefits.

The world's hunger for meat over time

Why today's meat-based diet won't keep us fed tomorrow

Global meat and protein demand

In mtonnes



* Expected meat and protein demand growth between 2020 and 2035 (source: BayWa, based on own research)

Did you know...?

Did you know that we produced 339 million tonnes of meat for human consumption worldwide in 2020?

Did you know that we will have to produce 528 million tonnes of meat for human consumption in 2035 if meat consumption stagnates in industrialised countries and prosperity increases in certain emerging markets?

Did you know that we would need a second planet to produce that much meat, making it absolutely essential to find alternatives?

Meat is (still) a symbol of prosperity

The way we eat has changed significantly over time, constantly adapting to the circumstances and the advancement of civilisation. Two million years ago, our ancestors were hunter-gatherers, nourishing themselves from nuts, mushrooms and honey, as well as whatever game and fish they could catch. Livestock and grain farming did not develop until people stopped being nomadic. For a long time, what people ate was limited by external conditions. Food shortages and hunger were a part of life for many generations. The desire for meat did not start to rise until the current era of growing prosperity. Meat used to be reserved for special occasions. In 1950, for example, a worker had to pay 1.6% of his monthly net income for 1 kilogramme of pork. The average monthly wage at the time equated to €150 – compared to almost €2,500 today. As it stands now, everyone can afford meat every day. Here in Germany, we eat 60 kilogrammes of meat per person every year. That is twice the amount recommended by nutrition experts.

We generally tend to associate a high-quality, animal-based diet with a high standard of living. Meat has become a symbol of prosperity among nearly all cultures. That is one of the reasons why developing countries strive to emulate this ideal. It also helps to explain why demand for protein is rising by such a substantial margin in these regions. Global demand for meat stands at 339 million tonnes today. According to estimates, however, that figure could rise to 538 million tonnes by 2035 (see chart).

Nevertheless, this growth has its limits, and the intensive use of natural resources for land and livestock comes at a cost. Alternatives are urgently needed. In more than one respect, plant-based alternatives offer the opportunity to feed a growing global population in a healthier fashion.

New innovations and technologies are already making it possible to produce healthy and sustainable plant-based sources of protein that are high-quality, appealing and boast a better environmental footprint than meat. For BayWa, alternative proteins are an exciting new market with tremendous potential for development going forward.

The plant-based revolution is here to stay

Oat milk and tofu cutlets are on the menu today

With vegan cutlets on supermarket shelves, veggie burgers at famous fast-food chains and cappuccino with oat-milk foam at Italian restaurants, nearly everyone has already come into contact with plant-based alternative products at some point.

Plant-based protein is a high-profile trend that is visible in everyday life. But that trend is more than just a fashion craze. It is the sign of a far-reaching change that will shape the way we eat for decades to come.

Behind this transformation is a necessary shift towards greater sustainability that goes hand in hand with an innovative spirit and creativity in product development. We need to change the way we eat if we want to take a responsible approach to the use of resources. The way we eat has to change to promote a more responsible approach to the use of resources. New and innovative categories of products give us a greater selection without forcing us to limit ourselves. Plant-based products may be hitting shelves as a trend, but they are here to stay as a revolution.

A few years ago, such products still occupied a clearly defined niche, with only a small number of consumers expressing any real interest. When they did, it was usually for ethical reasons rather than because of the taste. But the successive rise in demand has created an incentive for product development and competition. The result is an attractive market that appeals to a wide range of customers through high-quality, high-value products offering flavour, availability and lower prices (thanks to economies of scale).

Today, the market for plant-based products is growing rapidly. The flywheel effect has gained unstoppable momentum, pushing alternative proteins onto the mass market at an increasing rate!

The flywheel effect:

According to the legend, the flywheel effect started life as a doodle on a napkin by Amazon founder Jeff Bezos to explain his company's new business model. Growth is the driving force behind the effect. The idea? As more and more customers start using a platform, the number of providers selling products on that same platform rises. One factor fuels the other, accelerating the rate of growth. Once the flywheel has gathered enough momentum, there is no stopping it.

An illustration of the flywheel effect (source: BayWa)

The pros and cons of alternative proteins

What are the arguments for and against meat analogues and dairy alternatives?

Yes **75 %**

No, thank you **25 %**

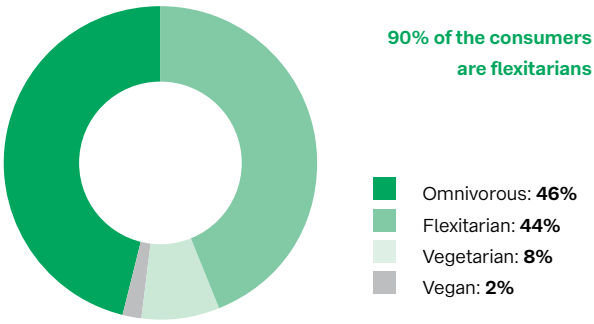
Who is consuming plant-based products?

Alternative products are so well-established today that they attract a broad and growing customer base. Contrary to expectations, vegetarians and vegans are not the main target group. The main consumers of plant-based analogues are a group known as "flexitarians", who have made a conscious decision to limit their consumption of animal-based products. Roughly 90% of the products are consumed by this group. Flexitarians cite a variety of reasons and motivations for their purchasing decisions. Profiles that illustrate who consumes alternative products, and why, have been created for the consumer group study discussed in this publication. While the profiles present merely a general outline, they still relate to relevant character traits and motivations that allow the reader to understand the people behind them.

What is keeping consumers from buying plant-based?

The plant-based alternatives to animal-based products have yet to gain a stable footing in the mass market. Many non-consumers still see them as a passing fad. One of the greatest obstacles from the customer's perspective is price. The majority is not prepared to pay a higher price for a tofu cutlet than for a "regular" once made of veal. A certain prejudice against the ingredients, processing and additives also plays a major role. Even consumers who believe in the concept behind plant-based alternatives and want to buy them are often prevented from doing so by a lack of selection in supermarkets. Alongside price, the taste and mouthfeel of the products likely remain the greatest obstacle, as customers tend to avoid buying food that they do not enjoy eating.

Who is buying plant-based?



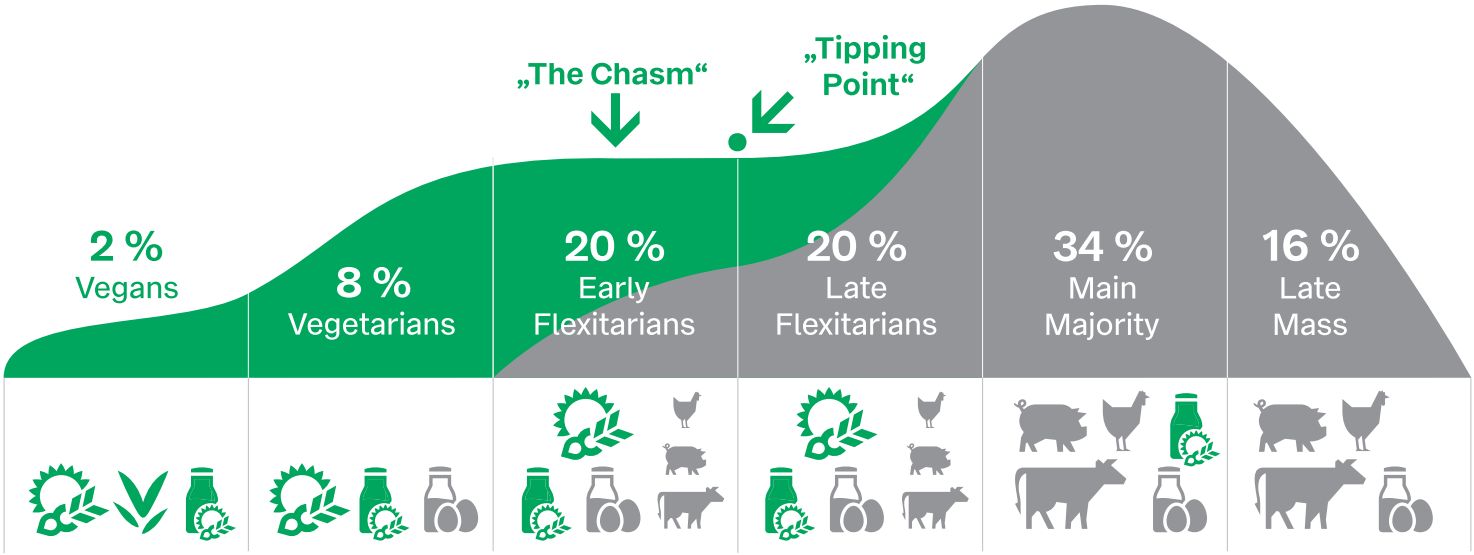
Share of consumer groups buying plant-based products (source: BayWa)

- **Explorers** – The trend scouts
- **Vegans** – "I don't need animal-based products"
- **Vegetarians** – "Animals shouldn't die for me"
- **Changemakers** – The environmentally-conscious
- **Healthineers** – The health-conscious
- **Happymakers** – Satisfaction through flavour


GO VEGAN
GO VEGAN
GO VEGAN

New sources of protein on the way to becoming a mass market

Customer groups and products: from early adopters to laggards



User profiles	Vegans	Vegetarians	Changemakers Healthineers	Explorers Happymakers	Non-consumers with potential	Non-consumers without potential
Purchasing criteria	Ethics and health	Ethics and health	Ethics and health	Curiosity Taste	Taste and price	Price
Product categories	All products due to small selection	Meat, dairy and fish alternatives, small selection	Meat and dairy alternatives, mainly processed products (convenience, cheese, cold cuts)	Plant-based drinks		

Chart above: adoption curve for plant-based products (source: BayWa, based on own research)

New technologies and innovations seldom break through all at once. Instead, they gradually gain traction among the populace according to a pattern that can be visualised as an adoption curve. The early adopters are the first to try out new technical advancements or products before nearly everyone else does.

The first buyers of alternative proteins include a small section of the population with a conscious approach to consumption made up primarily of vegans and vegetarians who are keenly interested in innovation and making smart food choices.

As time goes on, an increasingly broad segment of the population whose interests are less specific and more in line with standard tastes starts buying the products. In the food industry, those consumers include flexitarians, who have made a conscious decision to eat fewer animal-based products and find alternatives to replace them. Depending on their openness to changing their habits, a distinction should be drawn between early and late flexitarians. The latter opens the door to the mass market. The ability to attract enough consumers decides whether a concept or product makes it through the “valley of despair” to reach the tipping point (see chart).

It is worth pointing out that alternative proteins do not constitute a homogeneous product portfolio. As a result, the adoption of one particular product or product category among the general public may not be indicative of another. Oat-based milk alternatives, for example, are a fixture on supermarket shelves and have gained widespread popularity. By contrast, alternatives to cheese or fish products are still battling for acceptance among consumers. Meat analogues land somewhere in between both poles.

Vegans and vegetarians
Not just hipsters and hippies any more

Vegans – "I don't need animal-based products"

"No animals have to suffer for my healthy lifestyle – and no resources are wasted."

Character
Gen Z/Millennials, largely female-identifying

Goals and needs
- Complete rejection of animal-based products
- Health and well-being
- High quality, transparency, short ingredient lists
- Plant-based products as fast food

Incentives for first purchase
- Driven by ethics
- Clean label, organic seal
- Recommendations from the community

What convinces them to buy again?
- Nutritional value and ingredients, acceptance by peers

What vegans had to say in the BayWa survey:
"I eat an entirely plant-based diet for ethical, environmental and health reasons, but I try to do without meat analogues and consume mainly natural, vegan foods."
"They shouldn't be advertised as a replacement for animal-based products, but should instead be seen as a new type of food."

Vegetarians – "Animals shouldn't die for me"

"Just because I'm in the mood for a burger, doesn't mean an animal should have to die."

Character
Young, convicted, sense of connection with nature

Goals and needs
- Extensive awareness of animal welfare and sustainability
- High-quality, fresh, healthy food
- Convincing taste (can also taste very plant-based)

Incentives for first purchase
- Motivated by ethics
- Open to new ingredients
- Influenced by peers

What convinces them to buy again?
- Taste and preparation

What vegetarians had to say in the BayWa survey:
"Plant-based is definitely better for animals, the environment, the economy and the climate."
"I don't want an animal to have to die because I was hungry."
"Comparatively easy to prepare (in contrast to legumes, chickpeas, et cetera)"
"It doesn't necessarily have to taste like meat, nor should it. Otherwise I would just eat meat."

Flexitarians –
the part-time vegetarians

Flexitarians are people who are more conscientious than average when it comes to food and nutrition. As a result, they make careful decisions about what they eat. Their main focus is on taste and pleasure. Because meat or other animal-based products are no longer seen as being absolutely necessary for a balanced diet,

Changemakers – The environmentally-conscious

"I want to enjoy eating my burger, but still save the world in the process."

Character
Grew up with an enhanced level of awareness and extensive information on food and nutrition

Goals and needs
- Protect the environment, not support factory farming
- Convincing and familiar taste without animals having to suffer

Incentives for first purchase
- Increased awareness of animal welfare and ecology
- Targeted purchase
- Sustainable packaging (carbon footprint)

What convinces them to buy again?
- Taste

What changemakers had to say in the BayWa survey:
"Because cows take up too much space and food as livestock."
"To keep animals from suffering and damage the environment as little as possible."

Healthineers – The health-conscious

"A balanced diet, with an optimum amount of protein, is an important part of my life."

Character
Disciplined, health-conscious

Goals and needs
- Price-sensitive, optimum nutrition to meet nutrient and protein needs
- Easy, fast preparation

Incentives for first purchase
- Sceptical about animal-based proteins (unhealthy)
- Good nutritional values, high protein content, low in calories

What convinces them to buy again?
- Taste, price and convenience

What healthineers had to say in the BayWa survey:
"Usually I compare calories and choose the product with fewer calories, no matter whether it's a dairy product or a dairy analogue."
"Analogues offer many advantages, such as proteins and minerals. They're also easier to digest."
"Because plant-based products have less cholesterol and fewer unhealthy fats."

flexitarians are also open to other sources of protein. Their reasons for choosing plant-based analogues vary greatly, but often include sustainability. At around 90%, they are by far the largest customer group in this market.

Happymakers – Satisfaction through flavour

"If I can make other people happy with good food, then I'm happy too."

Character
Caring, middle-aged, open for new recipes

Goals and needs
- It has to taste good
- A healthy and balanced diet for all
- Simple preparation and tasty flavour

Incentives for first purchase
- Open to new (tasty and healthy) products
- Motivated by others

What convinces them to buy again?
- Taste and price

What happymakers had to say in the BayWa survey:
"It's all about the mix – a balanced diet that includes plant-based products and meat."
"You can eat it straight, and it still tastes nice. Another reason is the longer shelf life of plant-based dairy, for instance."
"Brings variety to the diet, and different tastes for different dishes."

Explorers – the trend scouts

"I'm always up to date and never miss a trend."

Character
Open to new things, trend-conscious, well connected, mostly young

Goals and needs
- Try new things, follow new trends, belong
- Appealing brands and easy availability
- Good food that tastes good

Incentives for first purchase
- Spontaneous decision or influenced by others

What convinces them to buy again?
Taste, price, hype

What explorers had to say in the BayWa survey:
"You have to try it out to be in on the conversation."
"I buy things out of curiosity to see if it actually tastes good :) recommended by my dietician when I was trying to lose weight."
"Ever since I switched to oat milk and soya yoghurt, my skin's gotten better."

Is everyone going to be a flexitarian in the future?
A conservative look ahead

Are we all going to stop eating meat in the future – or will we even be allowed to?

Just because the percentage of flexitarians, vegetarians and vegans is likely to keep rising in western societies, does not mean that people are going to stop eating meat altogether.

Food producers and retailers will need to find new ways to win over current non-consumers. The main challenge will be continuing to remove the obstacles currently still in place. Apart from the preconceived notions or concerns that many people have about plant-based analogues when it comes to things such as additives and processing, price and taste still play a pivotal role.

Many of the analogues available today are still 50% to 100% more expensive per kilogramme than their animal-based counterparts. What is more, the sizes of the units on offer tend to appeal to smaller and more elite circles of consumers, (still) putting off price-sensitive potential buyers. The current non-consumers are not willing to pay more for ethical or environmental reasons. As a result, providers need to make their products as expensive or less expensive than animal-based ones going forward in order to appeal to these customers too. New production technologies and higher sales volumes should make it possible to achieve this goal.

Another obstacle lies in customer expectations regarding regional production and the ingredients used in analogues. Complaints often include extensive processing, overly long lists of ingredients and excessive additives. New recipes and ingredient traceability will make it possible to cater to such demands in the future.

Alongside price, taste and mouthfeel are among the most frequently criticised properties of plant-based analogues. Customers miss the feeling they associate with meat. They also dislike the texture and undesirable "off taste", as well as the lack of similarity with animal-based products. However, there are significant differences from one product category to the next. Future advances in technology and new ingredients are expected to result in major improvements to taste as well, with products growing objectively better and consumers becoming subjectively more accustomed to the slightly different flavour.

Even if the makers of the products succeed in further optimising their offerings in future, people are not going to stop eating meat altogether. Flexitarians, for example, have usually made the conscious decision to eat both animal- and plant-based products, without categorically ruling out any one type of food. While plant-based alternatives are expected to account for an ever-growing share of food consumption and gain additional market share on meat and dairy in the next 10 to 20 years, animal-based products are not going to disappear from supermarket shelves.

What non-consumers had to say in our survey:

"I see no reason to do so. I don't want any intensively processed food in my house."

"The taste and consistency have to be comparable with the animal-based product. The raw ingredients need to be produced in Europe, ideally in Germany."

"They have to be healthy alternatives to the corresponding meat products. They also have to taste the same or similar and shouldn't cost three times as much."

"Thanks to evolution, the human body is used to eating meat."

Going bananas?
Alternative proteins: hype, revolution or evolution?

If there is one thing to be learnt from looking back at the history of food revolutions it is this: things are rarely as serious as they seem. Bananas were a luxury good when they first arrived in Europe in the 1920s. In no time flat, the tropical fruit became the object of extreme hype. Critics warned that bananas could soon become a staple and that no one would want to buy apples or pears any more as they had for centuries. In hindsight, we can see that bananas have indeed become a regular item in grocery stores and are the second-most popular fruit in Germany after apples. But other fruit varieties continue to have their place in the market. Bananas were followed by other exotic fruits such as mangoes and papayas. All of them help bring diversity to the range of fruits on offer.

However, there are consumers who buy only fruit that grows domestically despite the wide selection.
A similar scenario is conceivable when it comes to alternative proteins. In the future, there is likely to be a wider offering of various different protein-rich foods from a variety of protein sources. Together, they make the product range more diverse and help meet consumers' growing need for protein without elbowing each other out of the market. Animal- and plant-based proteins will have their place.

Plant-based products – a culinary cornucopia

Images from over 80 self-tests and observations with more than 1,700 data points

Collage of tested products (source: BayWa)

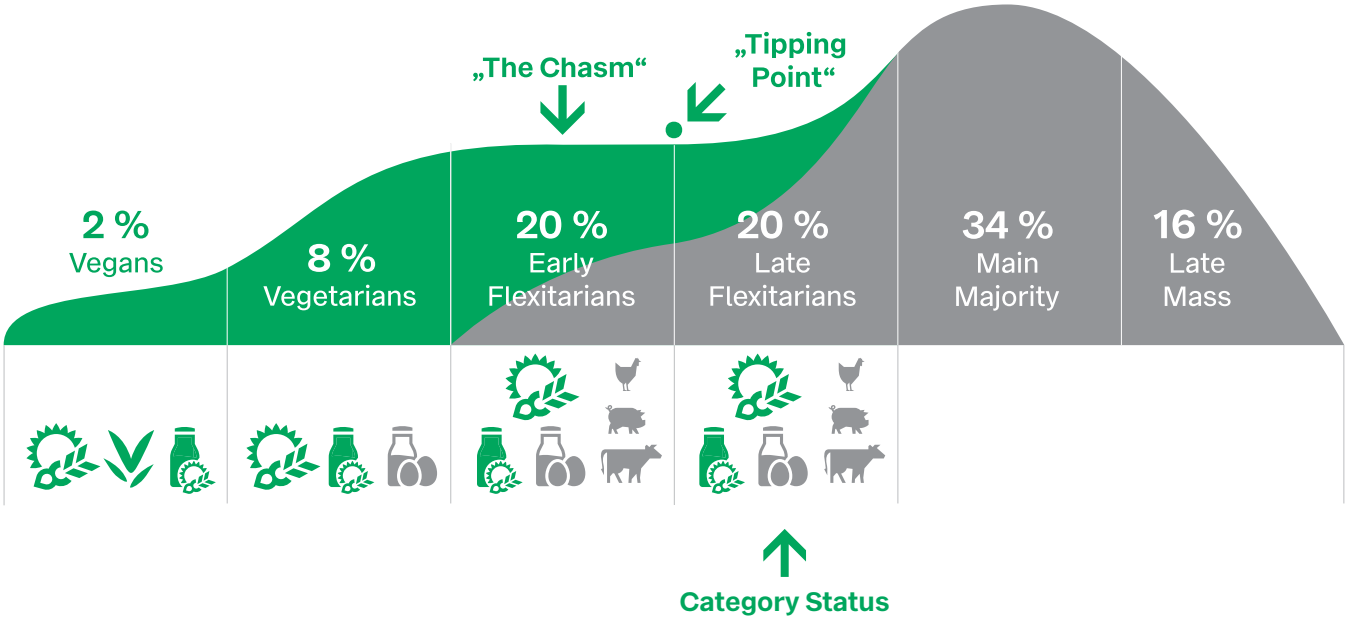
- Germany leads the way in Europe when it comes to the launch of new vegan products, with 15% of all new food and drink products labelled vegan in 2017 and 2018.
- As part of this study, we became consumers, testing over 80 products – a small share of today's overall market.
- The products were evaluated in terms of their taste, texture and handling. Additional factors included satisfaction and the likelihood of making a repeat purchase. Another important criterion was the net promoter score. *

FYI: *The net promoter score (NPS) is used as a key performance indicator in this study. It describes the answer to a specific question on a 10-point scale ("What score would you give to a specific category of alternative protein?"). The figure is based on the number of participants awarding 9 or 10 points ("promoters") less the participants giving 6 points or less ("detractors"). The NPS may vary from -100 to +100. A positive score means that the majority of respondents liked the product or would recommend it to someone else.*

* The products came from the overall portfolio of alternative products currently available in supermarkets, from dairy and meat alternatives to fish and cheese analogues.

The oat drink boom

Milk alternatives and their pioneering role



Protein sources

- Shift in main ingredients currently under way to oat
- Oat, almond, soya, coconut
- Oat milk is most popular, followed by almond milk

Present

- 1/3 of organic milk products on offer is plant-based
- Milk alternatives are the highest-revenue category for alternative products
- 54% of people in Europe consume plant-based milk alternatives
- Already firmly established among a broad consumer base; products usually do not seek to mimic the taste of milk, as consumers have already grown accustomed to a plant-based flavour
- Revenues in Germany stood at €396 million in 2020 (up 42% year on year)

Future

- Growing range of different ingredients (such as potatoes), blends of various ingredients and new ingredients made by fermentation
- Presence in grocery stores: right next to animal-based products, sometimes even in the refrigerator aisle

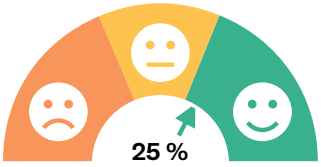
How popular are milk analogues?

Insight: 77% of those surveyed have already consumed a milk alternative at least once

Yes: **192**
No: **57**

* Own survey, Q1 2022

Net promoter score for milk alternatives

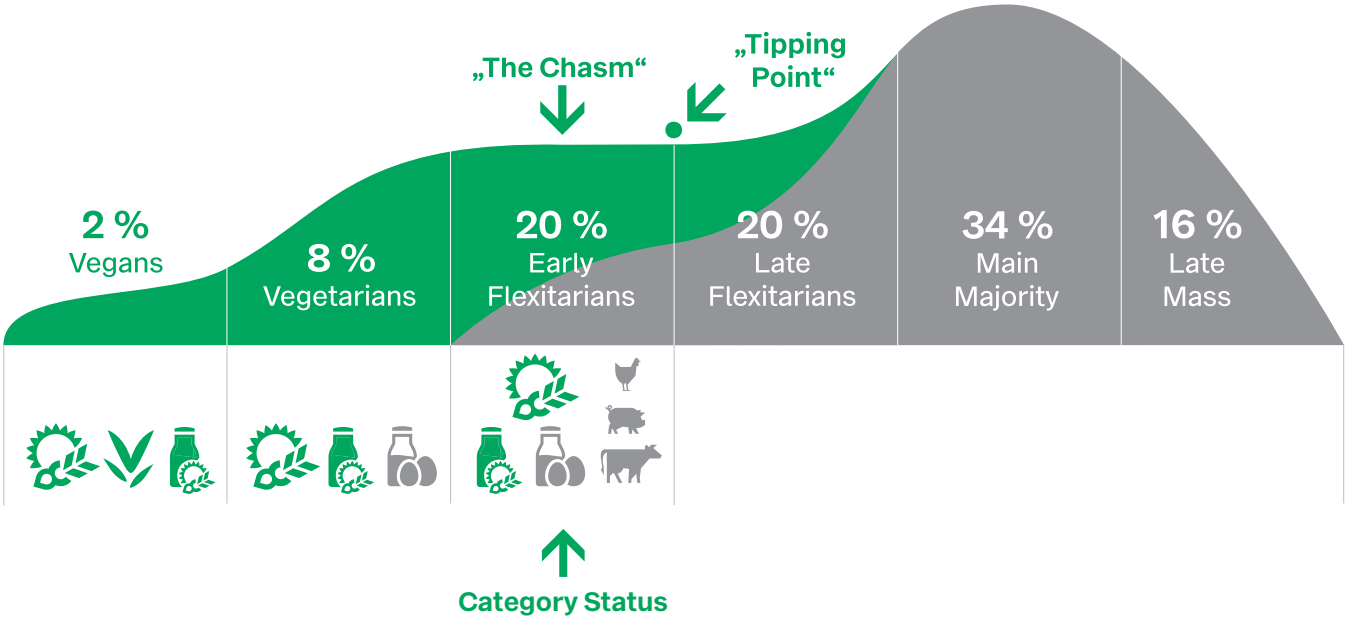


–100 to –25
–25 to +25
25 to 100

* Own survey, Q1 2022

Where's the beef?

Meat alternatives are gaining ground



Protein sources

- Wheat, soya, peas, broad beans, hen's eggs, sunflower, potato
- Mainly plant-based, some microbial, not yet cell-based

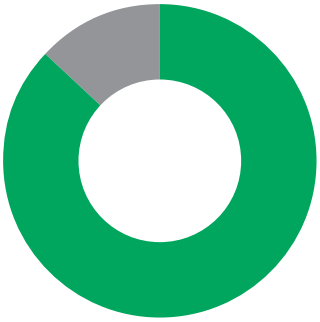
Present

- Second-most popular product category after milk alternatives
- Production up 39% in Germany between 2019 and 2020
- Value of meat analogues produced in Germany in 2020: €374.9 million
- More than half of the people in Germany have already consumed meat analogues
- The products often have long lists of ingredients and countless additives – something 33% of customers dislike
- The most popular products: cold cuts, burger patties, vegan nuggets and mince

Future

- Alternatives will account for at least 10% of global meat consumption by 2035
- European market expected to see processing bottle-necks in the near future in texturing (by 2025) and protein extraction from plant-based ingredients (by 2030)
- Price parity could be achieved as early as 2023
- New ingredients and processing methods could make it possible to optimise taste and texture, both of which must become more similar to meat before consumers get used to new profiles

Plant- or animal-based product?

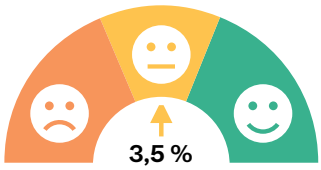


Insight: 87% of those surveyed would prefer plant-based alternatives to animal-based products if the price and taste were identical

Plant-based: **151**
Animal-based: **23**

* Own survey, Q1 2022

Net promoter score for meat alternatives



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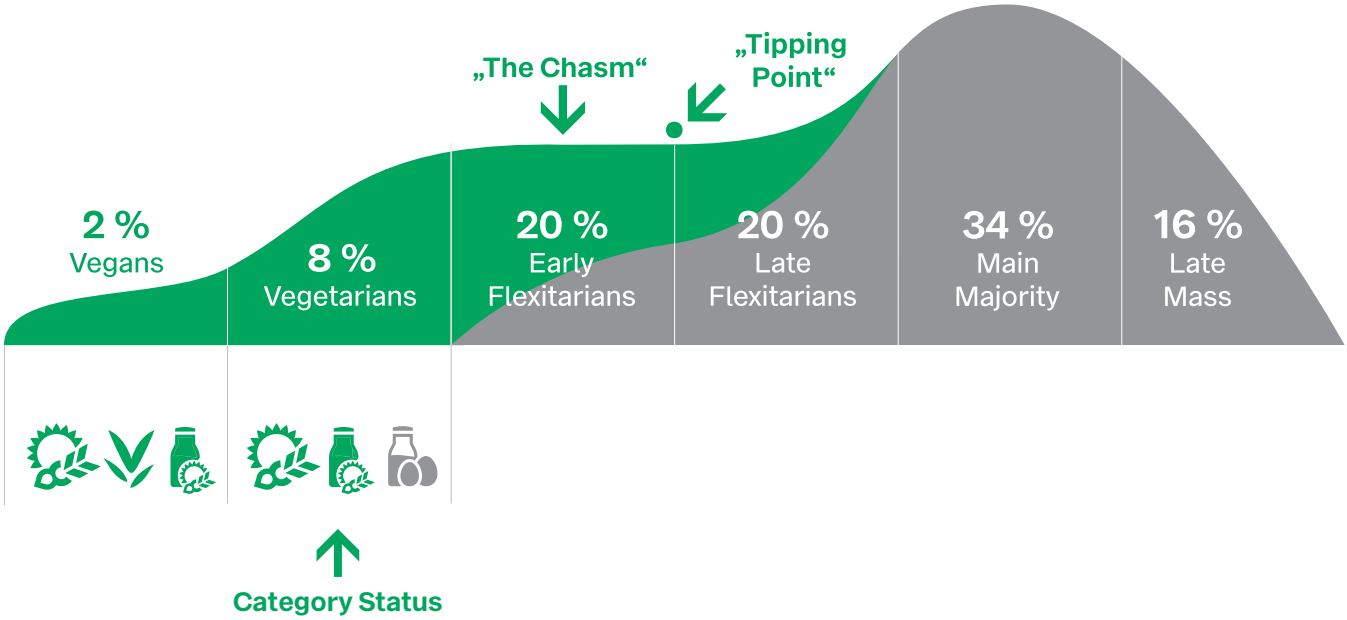
* Own survey, Q1 2022

(Don't) say cheese!

Soon to be normal? Camembert and Swiss cheese from plant-based protein sources



Protein sources

- Nuts, yeast, soya, cauliflower, sunflower, potato

Present

- Category still in an early stage of development, first product launches under way
- €44 million in revenues in 2020 (77% growth year on year)
- Sliced cheese is most popular, followed by cream cheese and grated cheese
- Complexity of production and fermentation processes varies depending on the kind of cheese
- Getting the taste, texture and functionality to be as close as possible to the original is the greatest challenge today

Future

- High-precision fermentation technologies to make products more similar to animal-based cheeses
- Use in a controlled, less price-sensitive environment (food services, health food stores, direct b2c marketing)

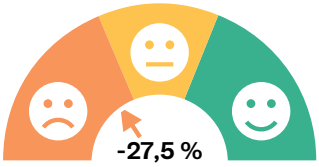
Animal-based or analogue?

Insight: Only 30% of those surveyed have already tried a cheese alternative at least once

Cheese: **177**
Cheese alternative: **76**

* Own survey, Q1 2022

Net promoter score for cheese alternatives



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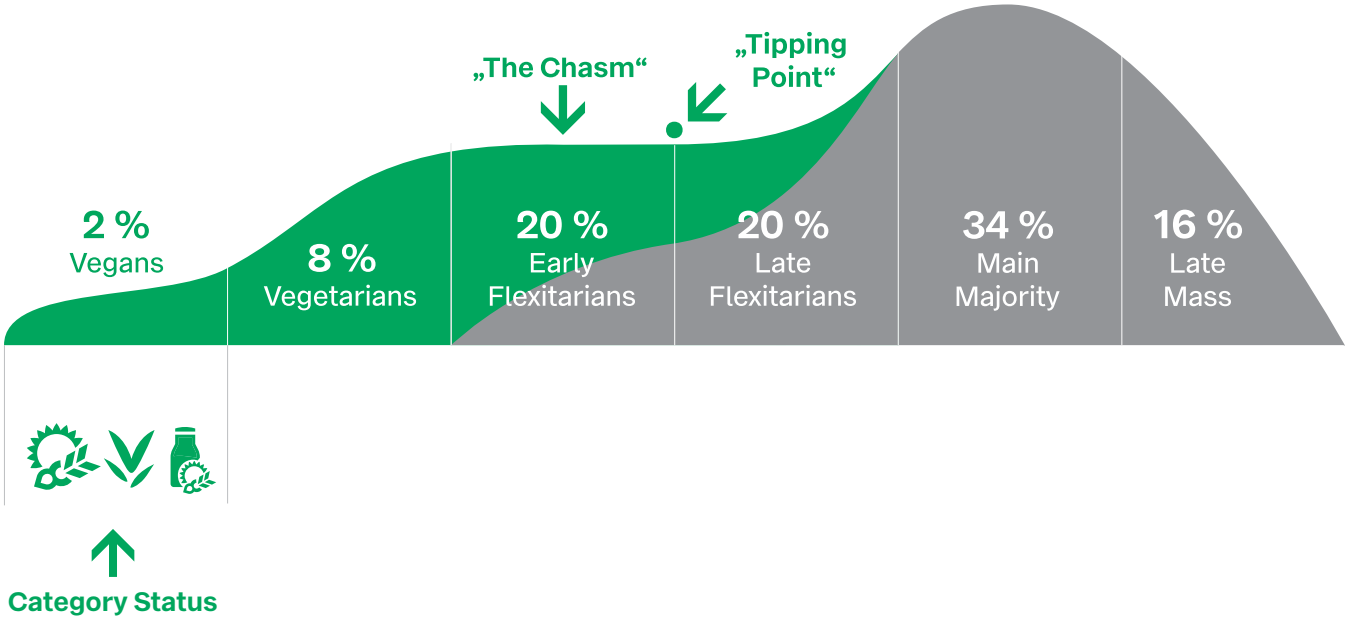
* Own survey, Q1 2022

Fish out of water – or the sushi of tomorrow?

Fish alternatives are (still) a niche product



Protein sources

- Wheat, peas, soya, seaweed

Present

- Available at discount supermarkets for the first time in 2020,
  revenues of €1.9 million in Germany
- Sales up more than 600% over the past two years
- Still a small niche with a limited selection
- Fish fingers, salmon and tuna alternatives already available in the market
- The pale colour and lamellar structure of fish are a steep challenge for current production technology

Future

- Technological advancement and new production processes offer a golden opportunity in product development
- Seafood alternatives such as shrimp and mussels will be the main product fields in the near future

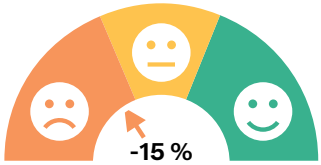
Likelihood of trying plant-based fish products

Insight: 51% of the plant-based consumers surveyed would like a sushi or fish fillet alternative

Yes: **86**
No: **89**

* Own survey, Q1 2022

Net promoter score for fish alternatives



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* Own survey, Q1 2022

The different types of alternative proteins

A brief overview of technology and challenges

Alternative sources of protein can be anything from seaweed and plants to insects. Four different technologies are used to harvest proteins that can be used in food and are suitable for human or animal consumption. Experts draw a distinction between plant-based, microbial, insect-based and cell-based proteins.

Plant-based proteins

Technology:
- Processing and conversion of plant-based ingredients to create products with a high protein content

Status quo and outlook:
- Production for the mass market already under way
- Strong growth on the horizon, set to remain a pillar of alternative products

Functionalities and opportunities:
- Cost-effective, widely available ingredients
- High level of consumer acceptance
- Broad range of uses

Challenges:
- Dependency on growing cycles and risks
- Development of processing capacities
- Need for innovation for certain functionalities (e.g. in seed-growing)

Microbial proteins

Technology:
- High-precision production of certain proteins in bioreactors using special microorganisms (algae, yeasts, etc.)

Status quo and outlook:
- Scaling-up of production and construction of initial industrial systems currently under way
- Strong growth on the horizon as a pillar for special functionalities

Functionalities and opportunities:
- Cost-efficient production, easily scalable
- High functionality and precise production
- Independent of growing cycles

Challenges:
- Consumer acceptance
- Development of production capacities

The various types of alternative proteins will all have their use and their market, depending on the demands, requirements and potential functionality. None of them appear likely to squeeze out the other methods or techniques in the foreseeable future.

On the contrary, the various alternatives have tremendous potential to complement each other and consolidate their benefits in hybrid combinations. Examples include cold cuts made of plant-based ingredients in combination with high-quality fats made by fermentation to achieve an improved texture.

In the short to medium term, plant-based and microbial proteins will act as a particularly important source for the production of meat and dairy analogues, as well as special products. That is why they are at the heart of the strategy being pursued by BayWa New Protein Solutions.

Insect-based proteins

Technology:
- Breeding and processing of certain insects to make protein products

Status quo and outlook:
- Scaling-up of production and construction of initial industrial systems currently under way
- Strong growth on the horizon as an important element of feedstuffs

Functionalities and opportunities:
- Natural source of protein
- Independent of growing cycles

Challenges:
- Consumer acceptance
- Development of cost-efficient production capacities with large-scale potential
- Attainment of specific functionalities

Cell-based proteins

Technology:
- Certain animal protein products with the help of specific cell cultures

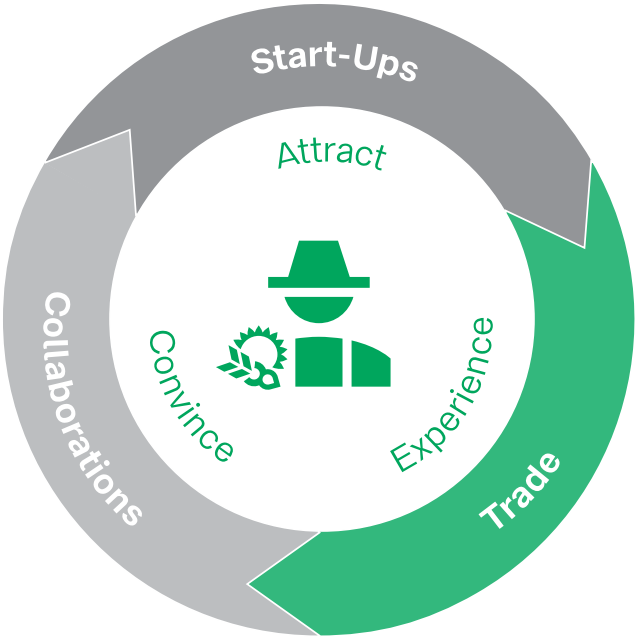
Status quo and outlook:
- Experimental production has seen initial success
- Time and development needed to gain relevance for the mass market

Functionalities and opportunities:
- Scalable production
- Functionality close to animal-based protein
- Independent of growing cycles

Challenges:
- Consumer acceptance
- Development and scaling-up will take a long time
- Regulatory concerns

New Protein Solutions – BayWa's new flywheel

Sustainably securing the protein of the future!



Technology-based protein start-ups

- Sustainable processing chains
- Innovative ingredients

Customer-centric protein trading

- Regional contract farming
- Innovative feed concepts
- Sustainable nutrition solutions

Partnership for integration

- Protein isolates
- Protein concentrates

BayWa is active in the rapidly growing market for vegetarian and vegan products through BayWa New Protein Solutions.

Our new business section combines agricultural production and technological food processing with a focus on human needs. The result is the BayWa flywheel for the sustainable protein production of tomorrow – thanks to customer-centric protein trading with a focus on plant-based ingredients, investments in technology-based protein start-ups and strategic partnerships to foster our integration into new processing chains.

Customer-centric protein trading

High-quality, sustainable and regional supply solutions from farm to fork

- **Regional production**
- **Sustainable cultivation**
- **Connected to farming**

We solve raw material and supply chain problems
with regional, sustainable and reliable supply solutions

Growing consumer interest in animal welfare and regional, traceable raw materials – as well as compliance with sustainability criteria – is set to transform the entire food supply chain in the long term. BayWa is a partner for farmers that acts as a link between production in the pen or on the field and the food processing industry. That connection continues all the way through to grocery store shelves.

Customer pull

Aldi to recentre its meat offerings around animal welfare

Aldi Nord and Süd plan to remove all meat from cows, pigs, chickens and turkeys raised and kept in pens from its shelves by 2030. The discount supermarket chain intends to already stop selling fresh meat from animals kept in the lowest-grade conditions in 2025.

www.agrarheute.com, 25/06/2021

“Geprüfte Qualität Bayern” label mandates regional feedstuff

From 1 January 2022, members of the “Geprüfte Qualität Bayern” certification scheme will have to source at least 50% of the feedstuff they use from Bavaria.

top agrar online, 15/12/2021

Eating for the climate! Good for you, better for everyone

Veganz

Could the raw material shortage slow the veggie boom? “What’s happening now is madness”

All producers could see supply problems in the next two to three years, says Michael Hähnel, managing director of Rügenwalder Mühle.

Tagesspiegel, 28/06/2021

Meat consumption fell by 4% in 2020.

The production of meat analogues increased by 39% to 84,000 tonnes.

Federal Statistical Office of Germany, May 2021

Deforestation-free supply chains: agricultural production without forest destruction

One of the biggest drivers of forest destruction worldwide is the legal and illegal conversion of forests into farmland. This mainly affects forests in the tropics. To successfully protect forests internationally, agricultural commodities must be produced as sustainably as possible. This also means: without destroying forest areas.

bmel.de, 12/01/2021

Market leader

Rügenwalder Mühle sells more meat analogues than traditional sausage products for the first time

Rügenwalder Mühle’s decision to be one of the first to join the vegetarian meat analogue bandwagon has paid off. For the first time, the company has sold more analogues than traditional meat products.

top agrar online, 03/09/2020

Our job is to give B2B customers a taste of agriculture
and to translate their unique needs
into custom-tailored solutions

You want...

- Transparency for your raw materials on and off the field
- Production with a human face
- A strong voice for regional ingredients and crop rotation
- A commitment to regional, non-GMO, deforestation-free proteins
- A transparent and better footprint in feedstuffs and production
- Regional, sustainable and efficient preprocessing
- Tools to prevent shortages and bottlenecks when it comes to sourcing protein

Contract farming

Working together to meet customer needs and standards transparently

Farmer pool for special crops

Soya supply chain in Germany

Feed concept

Working together to find sustainable and independent feeding solutions

Climate-friendly feed projects

New circular feed flows

Nutrition solutions

Developing functional, sustainable and specific product solutions

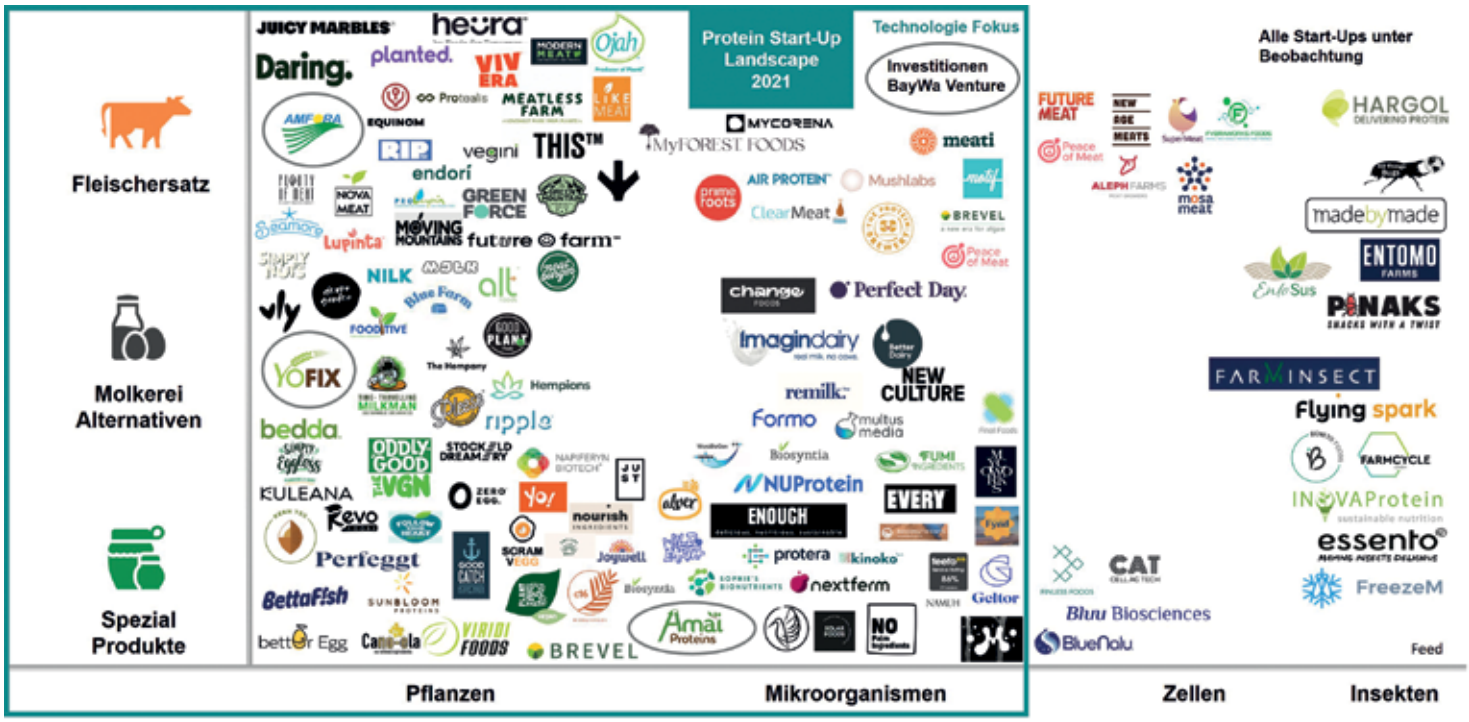
Sustainable grain qualities

Functional soya concentrates and pea protein isolates

Technology-based protein start-ups

Corporate venture capital investor with strategic assets

- Strategic investor
- Operating partner
- Shared growth



Investments in alternative proteins at an all-time high

Why interest in this alternative asset class is set to keep rising in 2022

The growth to date and the market for alternative protein products are based on more-or-less conventional processing methods.

Soon, however, innovative technologies will open up new opportunities in processing and will make it possible to create entirely new products and functionalities.

The result: better products, higher demand, a more mature market and more attractive investments!

Technology push

Record USD5 billion invested in alt proteins in 2021, surging 60% since 2020

Investor appetite for alternative proteins continues to grow amid a period marked by health and environmental crises, signalling sustained interest in planet-friendly alternatives

Source: Good Food Institute (GFI), 2022

Financing of alternative proteins: investments rise at German companies

At €121.5 million, 2021 was a record year for German companies in the alternative protein sector. Investments stood at €4.8 billion globally.

top agrar online, 08/03/2022

The global market for alternative meat and dairy products could grow from USD14 billion today to USD 1.4 trillion by 2050.

Sustainable Food Report, Credit Suisse, June 2021

Investments in alternative proteins at an all-time high

Ivo Rzegotta, GFI Europe

“The investments increasingly recognise the potential of cultivated meat and alternative proteins from fermentation.”

vegconomist, 02/03/2022

Beyond Meat shares: beyond the hype

aktiencheck.de, 24/02/2022

Veganz IPO in Frankfurt First German vegan food company on the stock market

ntv, 10/11/2021

Oatly shares post-flotation: how Oatly plans to spend its IPO billions

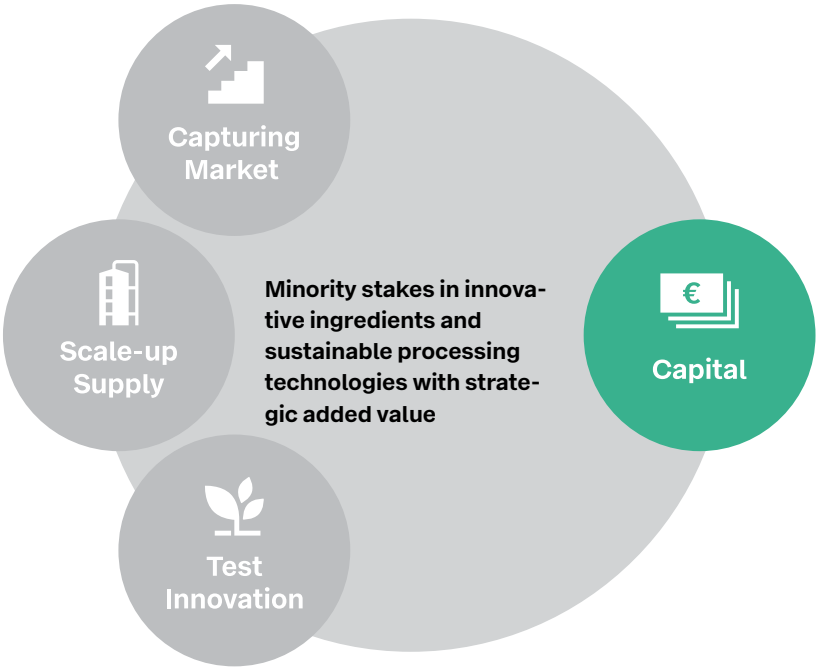
Finanzen.net, 28/05/2021

Add headline: By 2040, alternative sources of protein will account for 60% of meat consumption.

“How Will Cultured Meat and Meat Alternatives Disrupt the Agricultural and Food Industry,” Kearney, 2021

We invest in protein innovations and technologies

Seed to series A with venture capital and our strategically “unfair” advantages



Minority stakes in innovative ingredients and sustainable processing technologies with strategic added value

Seed and series A investment in food tech through BayWa Venture GmbH

We offer start-ups:

Venture capital – through BayWa Venture GmbH

We know that mere capital is no longer the only thing that counts in hyperliquid markets. That is why we focus on highly selective deals through co-investments with strong partners. We care about supporting start-ups and work with them in a spirit of partnership by providing venture capital and strategic added value that makes all the difference in developing new business. In cooperation with the start-up and the investors, we keep an eye on performance at all times.

Our “unfair” advantage:

We test innovation
- Precision trials on 7,000 plots in Gründl, Germany
- Processing and product pilots with food processing companies

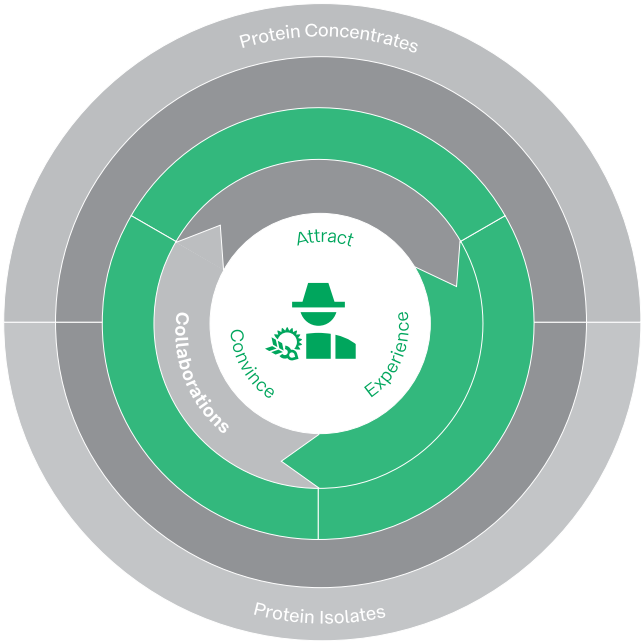
We guarantee supply
- 2.8 mtonnes of raw materials trading volume in Germany
- 130 collection points
- 1.3 mtonnes of grain warehousing capacity

We conquer markets
- Customers and partners in the food industry, all the way through to grocery store shelves
- Food tech accelerators, CVC and VC partner network

Learn more about **BayWa Venture** at **www.venture.baywa.com**.

Partnership for integration

We collaborate to integrate!



- Mindset
- Capital
- Secure raw material supply

Factory-farmed meat and the alternative: meat analogues

From industrial production back to more efficient commodities

**“Meat will be more expensive, but not a luxury.”
We’ve gone too far. Now it’s time to take a step back!**

Clemens Tönnies, Deutscher Fleischkongress 2021

“Privately owned meat processors such as Tönnies, Wiesenhof, Vion and Danish Crown have perfected their logistics and honed in on profit – probably even beyond the outbreaks of Covid-19.”

Tagesspiegel, 2021

Animal-based protein production has been scaled-up and optimised to achieve maximum efficiency in recent decades.

* Animal-based protein production value chain (source: BayWa)

**“Meat is everywhere. It is culture.
There is no escaping meat.”**

“Taste is emotional, it is linked to memory.
Habits are more deeply seated and are harder to change when it comes to food than with any other physical good.”

“The omnipresent availability of meat as a consumer good sets our modern era apart from every previous one.”

***Christian Kassung: Fleisch. Die Geschichte einer Industrialisierung,
Verlag Brill/Ferdinand Schöningh, Paderborn 2020.***

Functional plant-based proteins are needed
in an inefficient new value chain
that faces shortages and bottlenecks in processing

Forty percent of people in Germany want to cut back on animal-based foods.

Veganz Nutrition Report, October 2021

Demand for plant-based proteins is on the rise

But the new value chains so desperately needed face shortages and processing bottlenecks

Plant-based proteins have so far been used mainly in feedstuffs as a basis for producing animal proteins. Their extraction and texturisation for use in functional food products, especially meat analogues, requires an entirely new value chain – one that is currently in development and is largely compartmentalised and inefficient.

Animal-free protein production value chain (source: BayWa)

The other meat

The popularity of plant-based sausages, cold cuts and mince keeps rising

Frankfurter Allgemeine Sonntagszeitung, 6 March 2022

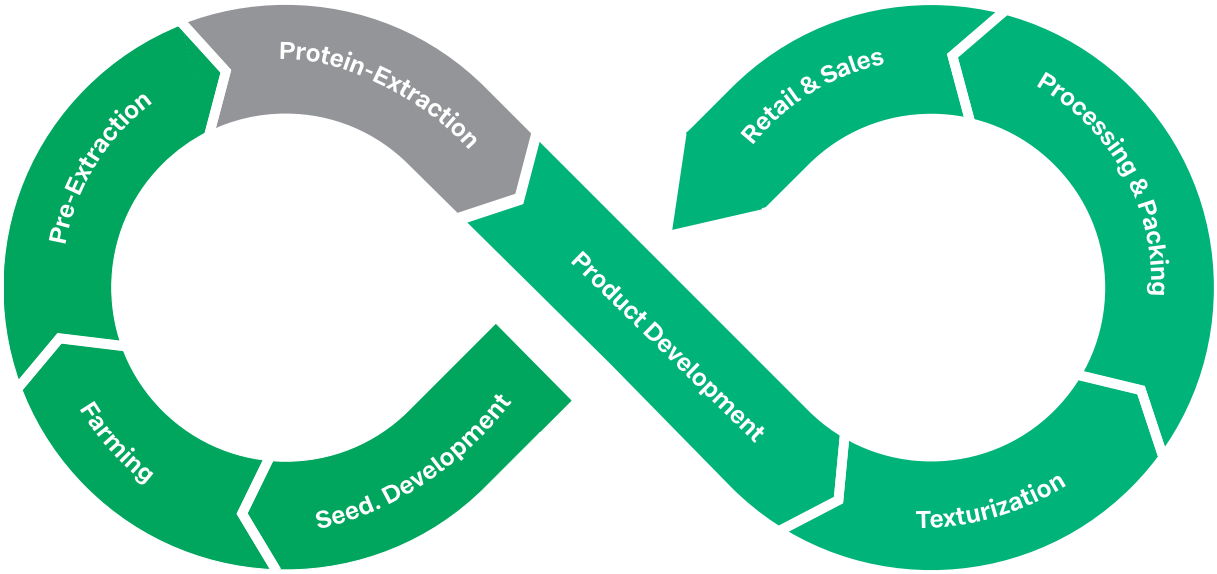
Meat alternative market sees strong growth – more competition for analogue pioneer Rügenwalder

More and more companies are looking to earn big on the veggie boom. Alternative products are set to cost no more than animal meat in the near future. But bottlenecks loom ahead.

Handelsblatt, 8 March 2022

We grow raw ingredients – from lab to farm to fork
and invest in partnerships for protein extraction!

A brand new value chain!



Development

- ✓ We meet special demands for meat analogue ingredients through targeted investigation, testing and seed propagation.

Cultivation

- ✓ We offer contract farming, separate collection and traceability back to the field for a food-quality, customer-centric protein portfolio.

Preprocessing

- ✓ We dry, peel, press and refine raw materials as desired for further processing.

Protein extraction

- ✓ We invest in wet chemistry isolation and/or mechanical concentration extraction methods

Recipe and product evelopment
Texturisation

- ✓ We listen to our customers from the food processing industry and work with them in a spirit of partnership to live up to their requirements, from seed to extraction

Production and processing
Sale and distribution

- ✓ We make alternative proteins available regionally and accessible to consumers

A question of conviction: climate change and food

How will we feed the world in the future?

For years now, the world has been in crisis mode. The impact of the Covid-19 pandemic and the consequences of the ongoing war in Ukraine continue to occupy us in 2022. Rising commodity and energy prices add to the tension. While economic growth remains low due to insufficient increases in productivity, humanity's environmental footprint is at record levels. At the same time, more and more people are beginning to realise that we cannot go on as we have in the past.

How can we end world hunger, reduce water consumption and protect the environment in the midst of an ongoing crisis?

And how can we do all of that while creating value? The answers to these questions will continue to demand our attention for some time to come.
The sharp growth in the world's population will also fuel the need for food. Alternative sources of protein will play an important role in allowing us to meet these needs.

Switching our diet to alternative proteins on a broad basis, especially in advanced economies, could cut emissions massively on a global scale while ensuring the supply of healthy food for people. The road to that goal is paved with taste, price and acceptance obstacles. It is going to take perseverance and the will to play an active role to successfully complete the journey.

What we eat also has an impact on our carbon footprint. The way we produce food has the potential to play an important part in the global fight against climate change. Three steps will be decisive in securing a sustainable supply of food: cutting back on animal-based food production and switching to plant-based products, converting to renewable agriculture, and promoting the reforestation and restoration of land being freed up through sustainable practices.

This first report by BayWa on the potential of alternative proteins is intended to provide food for thought and shine a light on new approaches in the promising fields of diet and nutrition.

The purpose of BayWa New Protein Solutions is to make a difference in the fields of agriculture and food while inspiring a new way of thinking. Alongside risk and return, we aim to take both the social and environmental impacts of our business development and investments into account. That is why we look beyond mere profitability to consider how all of our activities can positively affect ESG criteria and the UN Sustainable Development Goals. We believe that our philosophy make sense from both an ethical and financial perspective. Through this approach, we are adding an invisible heart to the invisible hand of the market that we have outlined and described in detail in this report. At BayWa, our heart beats for the people of this earth, the planet, and regional agriculture.

Four final messages from me personally:

- There will be no reset and no going back to a pre-crisis world, normal weather, the way things used to be – crisis mode is our new normal
- To save our planet, we need to cut our CO2 emissions – to do that, we also have to make radical changes to our food system
- Switching our diet to alternative proteins is one of the three links in a sustainable food chain
- Why are we doing this? Because we want to actively shape our future

Thank you very much for reading our report and for joining us as we look into the future. I look forward to your feedback, additional food for thought, opinions and ideas – to give us the opportunity to learn, grow and evolve.

Here's to positive and sustainable business.

Kristal Golan

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