Challenge Labs Central Eastern Europe

trends in the agri-food sector

eit Food

Co-funded by the European Union

Introduction

Recent years have been a time of dynamic changes in many aspects of life and business, including the agri-food industry. Such a reality makes it crucial to notice the transformations that are taking place and to adapt accordingly. Of course, it is often quite a challenge for entrepreneurs and other representatives of the agri-food industry, accustomed to long-term practices, food standards, particular standards of production and distribution.

Currently, the main drivers for change are climate problems, the development of new technologies, changing tastes and possibilities of consumers around the world, and finally the development of new trends. As a result, people's food needs are also evolving. Proper addressing, recognizing and considering these needs is an important factor in the success of producers from around the world. Understanding what challenges modern consumers face, who they are, and how we can help them alleviate the discomfort associated with the consumption concerns that affect them is especially significant.

EIT Food is the world's largest and most dynamic food innovation community. Supported by the European Institute of Innovation and Technology (EIT), a body of the European Union, it invests in projects, organisations and individuals that share their goals for a healthy and sustainable food system.

EIT Food aims to design such innovations for the agri-food sector that take into account the perspectives and needs of the consumer. The Design Thinking method is based on the same assumption. The user of a given product is placed in the center of the design process, and the solutions that are created are aimed at ensuring satisfaction from the use of specific products. Following these assumptions, we conducted workshops on designing future solutions for the agri-food industry (Challenge Labs CEE) in accordance with the Design Thinking philosophy.

The event, attended by over 60 participants divided into 11 interdisciplinary teams, was held in the formula of a 24-hour design marathon, taking place between September 29 and October 15, 2022. Experienced specialists from various fields designed 11 innovative solutions, consulting their concepts with industry experts and the target recipients of the solutions, i.e. consumers.

In this report, we summarized the main directions of development of the agri-food industry and the challenges associated with them, classifying them into six thematic areas on which EIT Food focuses its attention.

Alternative proteins

Targeted nutrition

Digital traceability

Sustainable agriculture

Circular economy

Sustainable aquaculture

Business challenges for Challenge Labs CEE

The challenges described were identified based on the indications of over 20 experts we interviewed, and were confronted with research data and industry reports. This provided us with a set of current key business challenges that the agri-food industry faces in the coming years. To inspire the reader, under each chapter, we have included a list of start-ups that support the above-mentioned areas related to the agri-food industry with their innovative solutions.

Method

The data presented in the report comes from qualitative research that was carried out between July and September 2022. We conducted an hour-long interview with each expert, in which we asked them to share their perspective on the challenges in the subject areas of expertise for each person. Following the interviews, we summarised the data collected, identified the most common trends and contrasted them with data from academic research and industry reports. As a result, we obtained selected trends in the development of the agri-food industry in the coming years based on the perspective of prominent experts from Central and Eastern European countries and supported by empirical data.

Authors

The interviews with experts, conducted to prepare the following report, were carried out by the Generator Pomysłów team, consisting of Wiktoria Dyrała, Paulina Zawadka, Weronika Hryniszak and Tomasz Chyrchel. The content presented in the report was developed by Alina Windyga-Łapińska with the great support of Aneta Buczak, an English language expert. The text was proofread by Alicja Krakowska and Paweł Ciach from EIT Food. The graphic design was created in cooperation with a graphic designer, Adrianna Gajdziszewska.

We wish you a pleasant reading and interesting reflections.

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Design Thinking

Application in the agri-food industry

Many companies believe that they know their customers very well. However, frequently, this belief is verified when we elaborate on the values, needs, and expectations of consumers. Then the companies realize that they perceive consumers through the prism of large groups of the population, without considering their specific needs. But what the companies offer should align with the consumers' needs, thanks to the appropriate adaptation of products and services.

Otherwise, there is a discrepancy between what the designer proposes, and how users make use of his solutions. A key question arises here: when was the last time I verified the customers' experience?

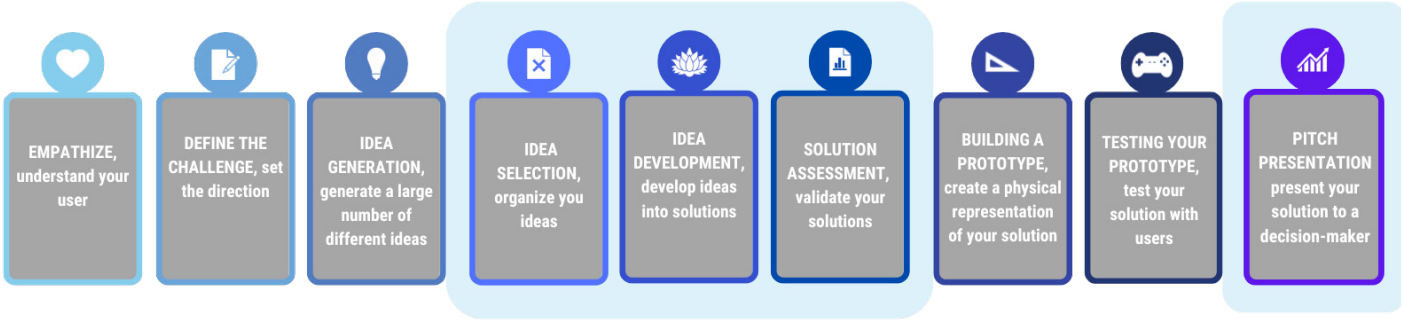
The answer to the challenges related to the question "what products should we create so that they are desired by our customers" is the use of the **design thinking method** in the process of designing innovations.

Design thinking tools give structure to the process of researching needs, analysing them, generating ideas and testing specific solutions. Thanks to it, the preparation of implementing innovative ideas in the environment of large companies is easier and simpler.

When we are looking for solutions that go beyond conventional and proven areas of activity (truly innovative products, technologies, processes), it will be difficult for us to find reliable data on similar solutions on the market or among competitors. Such a situation requires the use of another mode of action: before creating a concept of what we want to provide to customers, it is worth examining what their needs are. The important thing is not to chase the competition, but follow the way of thinking of your customers.

Challenge Labs is an event aimed at supporting entrepreneurs in developing ideas for new, innovative products, services, or technological solutions for the agri-food industry. The whole project is carried out in the spirit of customer-centred design.

This open innovation is a model to be used by enterprises. It is to integrate and apply internal and external information, and ideas in the process of generating, testing, validating and introducing innovations to the market. In other words, it is the involvement of people from outside the company. Experts, employees of other industries, students, researchers, etc. are to cooperate in creating new solutions – technologies, products, and process improvements.



One of the tools of this open innovation to use by business is the organisation of **hackathons**, i.e. workshops for which participants from outside the organisation are recruited.

After our previous experience in the implementation of similar projects, we decided to use the proprietary model of conducting the innovation process, which is based primarily on **Design Thinking, Service Design and Lean Start-up tools.**

The main characteristics that distinguish this method are:

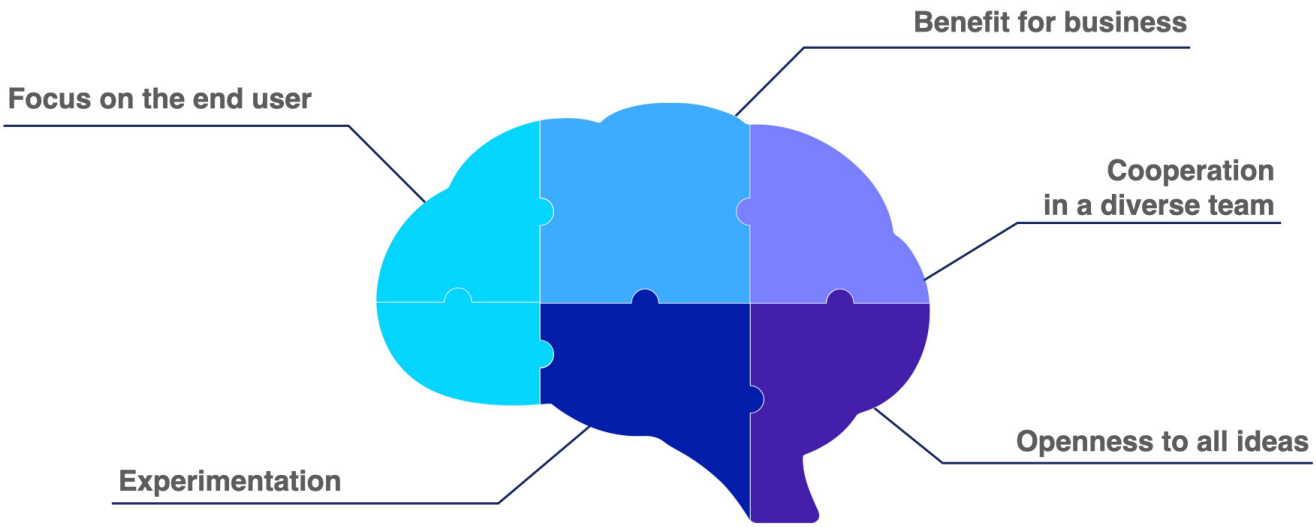
- **Focus on the end user** - that's why the first stage of the process, i.e. empathy, is so important. It is 'putting yourself in the shoes' of the end user to get to know their needs and problems as good as possible.

- **Openness to all ideas** - even those that seem unrealistic because the idea is treated in this approach as a source of inspiration to create the final solution.

- **Cooperation in a diverse team** - including in terms of position, specialisation, and professional experiece. This allows one to look at the issue from different perspectives.
- **Experimentation** - creating initial versions of ideas (prototypes), assuming frequent collection of feedback from users and experts.

- **Benefit for business** - preparation of a solution that will meet the needs of not only the end user but also the business, e.g. new sources of income.

Using this method during Challenge Labs CEE allowed us to select and define the challenges and difficulties that the consumer faces. The solutions developed by workshop participants, with the support of mentors, moderators, and thanks to consultations with experts and consumers, are well-thought-out, prospective, and business-profitable concepts.



Experts

Experts

prof. dr. sc. Đurđica Ačkar

full professor at the Faculty of Food Technology Osijek, Croatia

Đurđica's scientific research targets use of food industry by-products in the producion of extruded snacks, modified flours and chocolate and similar products. The aim of her scientific and professional work is to find solutions for nutritive improvement of confectionery products, reducing the impact of the food industry on the ecosystem, and increasing the efficiency of plant raw material use.

She has led several projects with this theme financed by the Josip Juraj Strossmayer University of Osijek, Osijek-Baranja County and Croatian Science Foundation, and published a large number of articles cited in Scopus (h-index 18).

Vesna Alič

Consultant and Researcher, Zavod ZRKP, zavod za razvoj kmetijstva in podjetništva, Zavod ZRKP, Institute for the Development of Agriculture and Entrepreneurship

She is involved in a wide range of implementation, research, investment and training projects at Zavod ZRKP, Institute for the Development of Agriculture. Her research focuses on systems, good corporate and entrepreneurship practices and digitalisation.
She has gained experience in the implementation of numerous research, investment and training projects in cooperation with farms, companies and research institutions. She has also carried out evaluations and made recommendations on innovations implemented by start-ups and other companies in Slovenia and abroad.

Iga Czubak

CEO at Planteris Sp. z o.o.

Master's of Cognitive Neuropsychology fascinated by food science, new technologies and their implementations in order to minimise the negative effect of food production on the planet. Changes consumers' eating habits and perception of plant-based products using strategical and neuropsychological thinking, while creating the best meat alternatives on the market using locally sourced beans, Apollo Roślinny Qurczak®.

Katarzyna Gębala

CEO at Well Well Group

Co-founder and President of the Well Well Group, which includes two cult brands of vegetarian products Polsoja and Well Well. She knows practically everything about the category of plant-based meat substitutes, as she started building it when veganism was still unheard of in Poland. It was only thanks to her determination that the already ubiquitous sausages and soy sausages were developed and brought to market. She has been a vegetarian for over 23 years and a vegan for 4 years. Enthusiast of Asian culture and cuisine.

Paweł Głowacki

Technologist at Lubella

In the course of his professional and research career, he has implemented more than 100 different design solutions (process and product) in the plant with a focus on the production of a new range of extruded products and pasta.

As of 2019, he is a participant in the Doctoral School of Science and Life Sciences at the Maria Curie-Skłodowska University in Lublin. Discipline Agriculture and Horticulture. Dissertation title: Development of a technology to production of textured vegetable meat substitutes by extrusion with appropriate technological properties.

Since 2015, close cooperation with the Innovation Management Department at the Maspex Wadowice Group. Participation, as a member of project and research teams, in 4 EU-funded projects.

Jan Kisielewski

Head of Foresight, Żabka Group

He works as Head of Foresight at Żabka Group and is responsible for identifying key trends affecting food product and service categories and for creating innovations that address these trends. He has 19 years of experience in brand building, which he gained while working for brands in Poland and the CEE region. In his work he combines market and cultural analysis. Previously, for the last 5 years, he was Head of Brand Strategy and Consumer Research at Deloitte, implementing strategic and business projects for brands in Poland and Europe.

Aleksandra Lazar

Entrepreneur, start-up, founder of food accelerator FoodForward.vc

Entrepreneur, start-up, founder of the accelerator for the food industry FoodForward.vc. A keen observer of food and technology trends. She invented the largest Polish restaurant guide - Gastronauci.pl (now Zomato.com).

Emilia Mochort

Business Agility & Portfolio Management Officer at Hochland

Process and product designer. Enthusiast of design thinking and future studies. Trained as a commodity scientist and psychologist.
Works on projects in a large FMCG company on a daily basis.

Katarzyna Nietrzpiel

Senior Application Technologist at Givaudan, Taste & Wellbeing

Food Technologist working at Givaudan for over 7 years at Flavour Creation & Application Department. She specialises in the savoury segment and works on projects related to a wide range of food products, e.g.: sauces, soups, ready meals, processed meat, meat analogues and substitutes. She supports food producers in creating products with excellent taste and in creating food experiences that do good and feel good, for body, mind and planet.

Begüm Önal, PhD

Food Safety & Operations Manager, Gourmet International Ltd.

Dr. Begüm Önal is a Food Safety & Operations Manager at Gourmet International Ltd. Food Trade Company, where she plans the quality and food safety management system of the company in accordance with the 'BRCGS Agent & Brokers', creates the processes and creates the documentation systems. She is also responsible for the implementation of new product development research/work with food suppliers. She graduated from University of Ege with bachelor and master degrees in Food Engineering. She holds a doctoral degree in Chemical Engineering from the Department of Industrial Engineering at Università Degli Di Studi Salerno. She continued her research on 'Sustainable Food Systems', 'Circular Economy' and' Eco-efficient Production Process' &' Food Supply Chain Management'. She has gained her experiences on many international projects in Turkey, Italy, Portugal, Spain, and others.

Ivars Orlovs

Co-founder and CTO at Got Foods

He is a food technology enthusiast with 10 years of experience in the food production industry, where from good and bad experiences he has learned how to manage a business, how to manage a lab and how to create scalable, innovative products.

Wojtek Osiński

Independent fractional CMO. Business & Marketing Director with +20 years of FMCG food

Innovator with strong focus on consumer understanding. Successfully developed and launched to the market product concepts like: WINIARY Pomysł na... or dedicated solutions for Biedronka. Responsible for new business development at Givaudan. Working with emerging trends and scalable solutions for food business: sugar reduction, plant food or mindful drinking.

Managed local and regional brands at Nestle - just to mention a few... WINIARY, KIT KAT LION or PRINCESSA. Pragmatic & result driven team leader. Strategist with long-term thinking. Food traveller & blogger at www.tastepoland.pl (food-travel) and www.marketingnagodziny.pl (marketing). Ex-Polish Ambassador & Vice-Chairman of World Food Travel Association.

Michał "Misza" Piosik

foodtech.AC/VC general partner, serial entrepreneur, economist by trade, ex-restaurateur, father of 2, failed wakeboarder and a wannabe philosopher

He gave up a career in banking to make dumplings with tourists. His first company, Polish Your Cooking, grew to be the largest culinary event agency in Poland.

A few businesses later, together with his colleague from the Warsaw School of Economics, Piotr Grabowski, they founded the first start-up accelerator for the food industry in Poland: foodtech.ac. They scout out, train and help fund startups that will change the food industry to be more environmentally friendly. Their portfolio includes products such as meatless chicken, vertical farms and powdered food. They believe they can save the earth from environmental disaster by changing big industry.

Jakub Radzikowski

Innovation Marketing Consultant, consumer intelligence expert, startup advisor, growth mentor and Petopo founder

He is an experienced marketing manager focused on innovation and sustainability, who brings over 20 years of experience working with both startups, SME and international companies in the FMCG (packaged goods), IT and health sectors.

His expertise covers digital transformation, go to market strategy, sales support and consumer intelligence. As a startup mentor and advisor, he's helped launch dozens of startups where he created their growth strategies, connected them with investors and assisted with successful exits.

Recently, he founded Petopo, the fastest growing pet-care platform in Poland. As a Board Member of C-Gence, a consumer intelligence company, he's responsible for growth and expansion.

Professor Dubravka Skunca, PhD, DSc

Leading SME Support at GO Project, European Regional Development Fund and Region Skåne; European Commission Technical Advisory Board on Environmental Footprint

Dubravka is leading Support for Swedish SMEs in the area of green transition (circular economy principles, life cycle assessment, UN SDGs, ESG, sustainable development, carbon removal) at Project GO, financed by European Regional Development Fund and Region Skåne. She has gained the experience as a LCA Leader at GreenProtein Project, European Commission, Horizon 2020, BBI JU, expert at European Commission, Technical Advisory Board on Environmental Footprint and at EU ETV (Environmental Technology Verification), as well as an EIT Food RIS Council Representative. Dubravka was also a Researcher at Sorbonne University (postdoc), London School of Economics (PhD research) and at Columbia University, and she has published over 50 scientific publications with more than 200 citations.

Katarzyna Świąder, PhD

Food expert, international academic lecturer

Specialist in functional foods, sensory evaluation and food design. Author or co-author of implementations of new food products on the Polish and European market, as well as patents, publications, studies and projects. Assistant Professor at the Faculty of Human Nutrition of the Warsaw University of Life Sciences, member of the Polish Society of Nutritional Sciences and the Polish Association of People with Coeliac Disease and on a Gluten-free Diet. She was the Polish representative of the European Commission DG (SANCO) and CMDv working group at the European Medicines Agency and is currently an advisory expert to the Global Harmonization Initiative (GHI). Mentor and promoter of healthy lifestyles.

Marcin Tischner

Corporate Engagement & Sustainability Specialist, ProVeg Polska

He is looking for effective ways to create a more sustainable food future. At ProVeg, he holds the role of Corporate Engagement & Sustainability Specialist, where he works with food producers and retail chains, educating about the veggie trend, plant-based alternatives and cultivated meat, and raising awareness of the environmental impact of our food choices. He has gained his experience on numerous projects for Too Good To Go, Zero Waste Fairs, IKEA Retail, Ministry of Development or Lariche Community (in Kuala Lumpur), among others.

Attila Vörös

Managing director at Federation of Hungarian Food Industries

Starting his career in the Ministry of Agriculture during the Hungarian EU Presidency he moved to the industry and after experiencing both the lawmakers and manufacturers sides he joined the Hungarian national food manufacturers' association. Working at all sides of the food regulatory stakeholders he has a wide perspective and general experience of the food and beverage manufacturers typical challenges from a regulatory point of view.

Among others he is working on interpreting the upcoming European food chain framework changes to the association members, highlighting all the major changes driven by sustainability considerations, that will create new opportunities and challenges to all producers regardless of product type and company size.

Milica Vulicevic Basorovic

Innovation Strategy Director for Europe at The Coca-Cola Company

Creative and curious problem solver, highly collaborative and goals-driven global marketer with 15+ years of experience. Using extensive marketing and business acumen to spot diamonds in the rough and bring ideas successfully to life. Human, empathetic and inspirational leader, certified coach and mentor.
Owner of multiple Cannes Lions, Effies, world's 2019 top 20 ad and more. Global Best of the Best Effie Awards 2022 jury member.

Katarzyna Zgieb

Senior Nutrition and Quality Development Manager in the largest retail chain in Poland

Since 2010 responsible for quality development, reformulation and nutrition strategy of Biedronka. Especially involved in development and democratization of plant based products and retail's standard for vegan and vegetarian products. Master of science degree in human nutrition and food technology at the Warsaw University of Life Sciences and postgraduate studies in dietetics. Gained experience in Danone, among others. Participant and speaker at various food & business conferences.

Daniel Żarski, PhD

Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn

He is a graduate of the Faculty of Fisheries at the University of Warmia and Mazury in Olsztyn. He is currently working as an assistant professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, where he is involved in the analysis of factors determining reproduction in fish, with particular emphasis on the quality of fish gametes. The results of his research (related to the developed procedures for controlled fish reproduction) have been successfully implemented in many aquaculture companies throughout Europe. One of the most important aspects of his work is the constant contact with fish farms and fish farms, whose problems often become his scientific challenges. Through close contact with practice and extensive international cooperation, he has acquired extensive knowledge in the field of the entire aquaculture and inland fisheries sector, which he is happy to share through various popularisation activities and expert activities.

Alternative Proteins

Alternative Proteins

Meat without meat - is it possible?

Protein is one of the essential macronutrients we provide to our organism, and its main source are products of animal origin. Scientists sound the alarm that food production should double to be able to meet the nutritional needs of mankind in 2050 (1). Unfortunately, this is not without environmental significance (carbon footprint of livestock production), we do not have enough land to produce food for all people sustainably. Therefore, it is necessary to popularize alternative sources of nutrients, including proteins. According to the FAIRR report (Farm Animal Investment Risk & Return, an international association specializing in sustainable investments), the value of assets in the alternative proteins sector more than doubled in 2020 compared to the previous years. The trend is clearly growing. It is estimated that the total value of this market will increase to $17.9 billion by 2025 (2).

The interest in limiting meat consumption is growing year by year. Solutions helping to reduce the market share of traditional livestock farming include the following:

- **plant-based meat** - simply speaking, this is meat made of plants. It has been invested and manufactured to look and taste like conventional meat, but without using used ingredients of animal origin
- **cell-based meat** - produced using the technology of breeding animal cell cultures. Test tube meat, unlike traditional animal husbandry, is produced without any participation of alive animal. It is created thanks to the use of cell technology stem and tissue engineering.
- **insects** - the most commonly eaten insects are crickets, locusts and beetles (mainly in Thailand, Mexico, and China), however, it is assumed that about 2,000 species are edible. From a nutritional point of view, insects are an invaluable resource of highly valuable protein.

Trends and challenges

According to the experts, the biggest challenge in the alternative proteins market is the high price of products. There is huge price inequality as meat is cheaper than its substitutes. However, it is slowly changing, mostly due to the increase in the price of meat.

Paweł Głowacki, a technologist at Lubella says:

> The sudden increase in the popularity of alternative proteins in the world results in shortage of these raw materials, the prices are very high. Meat is expected to become more expensive - it is also a good sign because currently, it is relatively cheap compared to its substitutes. Only 18% of production is meat substitutes, so we must straighten it.

Marcin Tischner, Corporate Engagement & Sustainability Specialist at ProVeg Polska, also pays attention to price inequalities:

> Plant-based products are more expensive than animal-based products because they are not yet produced on a massive scale. The meat industry has very low margins, and low meat prices attract people to stores, for example, chicken meat is currently a basic necessity for many people. The cost of the plant--based product itself is often lower than that of the animal-based product but has a higher margin. The disproportion is artificially inflated. If plant-based products were at the same price level as animal-based products, we would have a different market situation. Price inequalities, large margins, and co-financing for the meat industry, which the plant-based industry does not have - these are the real problems.

Attila Vörös, Managing director at Federation of Hungarian Food Industries, mentions also unusual sources of proteins such as insects and cell meat:

> When it comes to this topic, one of the greatest problems is communication. The biggest challenge is how the two sides, traditional sources of protein like meat or dairy, and new emerging categories like plant-based products, play a fair game, if I may say so. The discussions around these catrogires and products often go to extremes. For example, insects as a source of protein can be really controversial. I think that real large-scale solutions (if you want to feed millions of people) cannot be achieved by offering insects to everyone. I think the hardest thing is to focus on a solution that can be mainstream and that can scale to larger populations. We just need to pay attention to the context and not go to the extremes. If you consider all new categories to be part of a larger solution, it's more realistic. Another question is whether and how can industry or governments and institutions change the general opinion? In Hungary, there is practically nothing without animal protein in an avarage office or factory canteen. Meat is such a big part of our daily diet that it is hard to implement and big changes or find a quick solution.

The trend researchers confirm the challenge. Plant-based options are currently priced at a significant premium across categories. Along with taste and accessibility, price is part of the key consumer drivers of interest in alternative proteins. In the current market landscape in which the price of alternative protein products is higher than those of conventional products, the cost can limit consumer adoption. According to a Mintel study, among adults who do not currently consume meat alternatives, 20% point to high prices as a barrier (3).

Another important factor questioned by the experts is the **good composition** of alternative protein products. There are opinions that meat substitutes have a lot of additives to enhance taste and are highly processed. We clearly need to find a balance between taste and nutritional value.

In fact, to emulate the taste, appearance and texture of meat, plant-based products are sometimes highly processed. Some plant-based burger products can contain as much as 20% more sodium and 25% more saturated fat than beef. Additives such as gums, stabilisers and agents are also often needed (4).

Katarzyna Gębala, a pioneer of the vegetarian and vegan food industry in Poland, CEO in Well Well noticed:

> Among the consumers for whom we prepare our products, there are two important, sometimes contradictory values - taste and composition of the product. The taste has to be familiar. They expect a simple composition and non-controversial ingredients - these are two things to reconcile. In my industry, we use soy-derived ingredients that have a relatively good taste and can be combined with a variety of spices. But the cultivation of soybean in the world also raises a lot of controversy about the destruction of hereditary forests. On the other hand, soybean grown in Europe is an absolutely safe crop both for people and the environment, but there is a stereotype that we should avoid soy. And making a good product is a huge challenge.

Milica Vulicevic Basorovic, Innovation Strategy Director for Europe at The Coca-Cola Company added:

> When it comes to nutritional value sometimes it's difficult to balance calories vs what you have inside the product. Of course, there are consumer challenges as well, which are taste expectations; food is also expected to be lighter and healthier. Our consumers are people with certain lifestyles, but we also want to attract more people who desire to find the balance between meeting their taste needs and trying different food as a challenge.

For our experts, it is extremely important to **educate the customer,** so they know how to choose well. Higher educated, as well as more ecologically oriented consumers, will be more likely to accept alternative proteins, as they would be more aware of the environmental and health benefits of such an alternative.

Wojtek Osiński, Food Marketer explains:

> The biggest challenge is how to reach the mass customer. Today, when you like a few „plant diet promoting profiles" profiles on Facebook or Instagram, you live in the certain „information bubble". You might have the impression that everyone is talking about alternative proteins etc. However, the reality is different, it is a rapidly growing but poorly penetrated market. Penetration of plant based meat reaches 20%, which means that just 20% of households have bought these products at least once. How to get deeper, how to make these products available to the mass consumer, especially since now when everyone is living in a crisis mode, where the willingness to risk investing money is low. How to narrow down the group of products we know and propose new solutions is one of the biggest challenges for me. In my opinion, quite basic knowledge about nutrition and nutritional value is also a big barrier. In younger generations, it begins to change, but an average Pole does not understand why reaching for higher-quality products, and protein alternatives. There is a big gap to fill in the nutritional education of society, no one has ever taught us that.

Katarzyna Świąder, PhD, food expert, and international academic lecturer says:

> Protein in our diet is essential. This can be plant-based protein from legumes, cereals, mushrooms or algae, as well as animal-based protein such as milk, eggs, meat and fish, as well as insects. We have many sources of protein that we can use. At the same time, many institutions are paying a lot of attention to limiting the intake of meat in the diet. On the other hand, education about limiting protein from meat should go in a slightly different direction. Many analogues of animal products are appearing on the market - plant-based chops, plant-based drinks, plant-based cheeses, etc. But it is also worth taking a closer look at these products and noting that they are very often highly processed, with synthetic additives and ingredients not recommended from a dietary point of view.
>
> It is worth paying attention to how these proteins are sourced and to enable consumers to use the least processed proteins, as has been used so far in vegan diets. It is about making the consumer aware. He needs to be educated and shown where he can find alternative proteins, but also given the opportunity to source them easily. Examples would be the widespread use of soya in the form of fresh legumes (edamame beans) or vertical farms where legumes or mushrooms are grown and thus there is year-round access to fresh legumes and mushrooms, not just those in dried form. If consumers actually had greater accessibility to unprocessed, plant-based protein sources, they would reach for them.

Our experts also mentioned that the **war in Ukraine** affects the industry of alternative proteins, mostly due to the lack of grain from Ukraine.

Marcin Tischner, Corporate Engagement & Sustainability Specialist at ProVeg Polska claims:

> In 2022, the war was the greatest issue for the food industry. The energy crisis, the collapse of supply chains and the difficulties in exporting and importing have led to a significant increase in food prices, especially regarding animal feed and therefore the final price of animal-based products. In the meantime, the prices of plant-based alternatives remained the same or grew by only a few percent, in some markets, thanks to the shorter supply chain. It turned out, that within 2022, the prices of some categories of plant-based alternatives reached price parity with their animal-based counterparts (eg. meat in the Netherlands, milk in Germany). Thanks to the bigger scale of production, better availability and higher consumer acceptance, the plant-based alternatives might be cheaper than the „conventional" products in all categories, and on all markets, within the next few years. We received a strong signal of the need to shorten the supply chain so that it would not be extensive. The current situations like Brexit, covid and the war supports more local and resource-effective food systems.

Ola Lazar, Entrepreneur, start-up, founder of food accelerator FoodForward.vc added:

> Regarding meat substitutes, there is information in the media that meat substitutes are not entirely healthy, that these are highly processed, expensive products. A lot of work on this topic has to be done to make it acceptable. Much of plant-based meat is produced from wheat and taking into account the volatility, and the interruption of supplies from Ukraine - they are also heavily influenced by what is happening. Both the meat and meat substitute production are affected by the war.

The war has disrupted global agricultural exports from Russia and Ukraine. These are two exporting powerhouses that accounted for 24% of global wheat exports by trade value, 57% of sunflower seed oil exports and 14% of corn between 2016 and 2020, according to data from UN Comtrade (5). The military conflict came at a bad time for global food markets because food prices were already high due to disruptions in the supply chain caused by the COVID-19 pandemic, strong global demand, and poor harvests in some countries.

Last but not least thing mentioned by our experts is a **taste of products**. Making them similar to meat products, building an appropriate sensory experience is crucial for customers and their shopping choices.

Ivars Orlovs, co-founder and CTO at Got Foods says:

> The biggest challenge is definitely the taste. It's hard to get good-tasting products because a lot of these alternatives are plant-based. You drink some almond milk and it's not like milk because it tastes like almonds. We still see it's very hard to get new consumers to these products because they are afraid due to their past experiences of a bad taste. So it is hard to get consumers to even try the products. It is also tough to start collaborations with distributors or retailers because they also do not yet understand the product.

Jan Kisielewski, Head of Foresight, Żabka Group confirms:

> The challenge in the area of alternative protein sources is certainly the question of the composition/ingredients. Attempts to mass production mean that there are a lot of ingredients that are supposed to imitate meat structure/colour and are not needed from a nutritional perspective so this can reduce consumer confidence in brands.

Agree or not - taste is the key driver for consumers when trying alternative proteins and venturing into new segments. It can make or break a product. If it does not taste good, it is unlikely that the customer will purchase it again. According to DSM's research, 62% of US consumers would consume meat alternatives more if products had a 'better' taste (6). People expect an authentic and appealing taste, texture, and mouthfeel from start to finish.

Start-ups

In the area of challenges related to alternative proteins, it is worth paying attention to the following companies that are blazing trails in creating solutions for the industry.

NapiFeryn BioTech - https://napiferyn.com/ - Poland
Obtaining a protein isolate in the process of extraction of oilseeds, e.g. rapeseed.

Nasekomo - https://nasekomo.life/ - Bulgaria
Producing high-quality protein products from industrial rearing of insects.

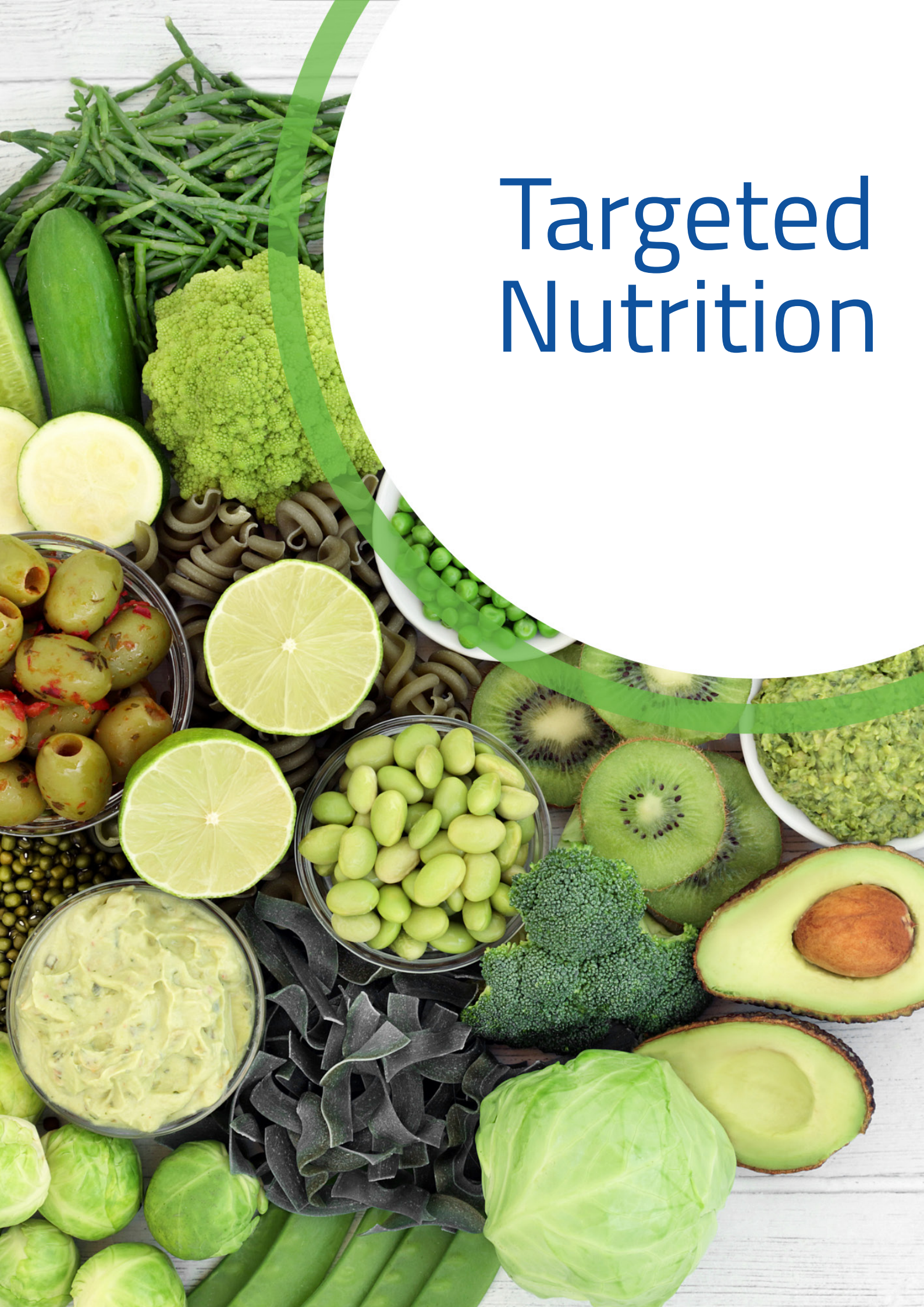
Mushlabs - https://www.mushlabs.com/ - Germany
Growing mushroom roots in fermenters in an efficient, sustainable process.

Essento - https://essento.ch/en/ - Switzerland
Delicious, protein-rich and ecologically worthwhile insect food products.

Protera - https://www.proterabio.com/ - France
Designing functional proteins using AI algorithms.

Boosque Foods - https://www.bosquefoods.com/ - Germany
Cultivation of pure mycelium and using it as an ingredient for meat alternatives

Cano-ela - https://cano-ela.com/ - the Netherlands
Removing refined ingredients from the food supply chain by processing oil-rich seeds.



Targeted Nutrition

Targeted Nutrition

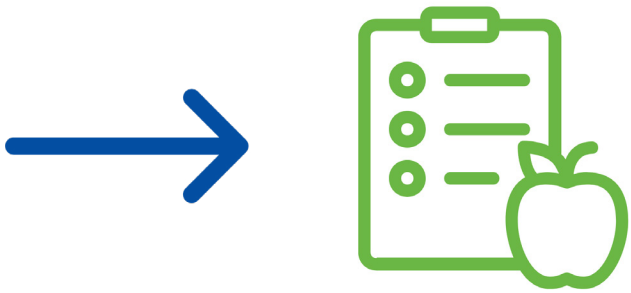
Personalized nutrition is at the top of the list of 10 upcoming trends in dietetics. The creators of the New Nutrition Business report found that consumers are paying more and more attention to what they buy and what they eat. People began to realize that diet is something personal that should be tailored to individual needs. Targeted nutrition should replace the existing dietary standards and recommendations created for the general population (1).

In the era of the growing problem of diet-related diseases, developing a diet tailored to individual needs became a challenge for nutrition science and food producers.

What is targeted nutrition?

Targeted nutrition is a personalised approach to products and nutritional counselling. It aims at making the diet healthier and adapted to individual needs. It is an optimisation for a given person. When creating targeted nutrition products for consumers' special medical or dietary needs, we should take into account their food preferences.

Every day, people all over the world realise that optimizing health and well-being through diet will not apply to the "one-size-fits-all" rule anymore. During their life cycle, people fall into different groups such as infants, children, elder people, specific patient groups, athletes, women, and men. The groups present their specific nutritional requirements. This principle creates many opportunities for food producers, whose products can respond to these particular needs.



A global trend

According to the data presented by the Functional Foods Global Market Report, the food value of the global functional food market (i.e. enriched with properties that take into account specific needs of selected consumer groups) in 2018 was estimated at USD 129 billion with a growing trend. It was projected then that by 2024, the sales of this product category will almost double to USD 253 billion.

The market research agency Mintel collected some interesting data in the report „Innovation vs. health. Opportunities for food brands". The consumers who took part in the research spoke about the functionality of food, and most frequently referred to losing weight (28%), bone health (12%), and improving immunity (12%). One of the most dynamically growing categories of targeted food is the one supporting weight control and weight gain, aimed primarily at people who practice sports. The authors of the report draw attention to an important issue - the people who choose products with such functionality also expect natural ingredients and taste-related attributes (2).

Personalization of food according to experts - trends and challenges

Health is the most important value for most people. Eaten food is supposed to support human health. These two are currently the most popular contemporary food trends. Hence, supporting the health of consumers by providing them with the right products is the best direction in companies' development strategy.

Research confirms this phenomenon. Tetra Pak Index 2021 report reveals how COVID-19 changed the way consumers think about their lifestyles and choices. The pandemic has made consumers appreciate the value of relationships more than before, including sharing experiences of eating and drinking together. Restriction of freedom and choice that consumers have experienced over the months, have led them to take steps to regain control of their life (and food). Now they are actively looking for ways to make changes that will positively affect their physical and mental health (including nutritional changes). For example, 62% of consumers pay more attention to the quality of consumed food and beverages (3).

Unfortunately, recent socio-political events, such as the war in Ukraine, high inflation, and the oncoming worldwide crisis made our experts quite pessimistic about the nearest future of targeted nutrition. The predicted trend is that **the interest in personalised nutrition will decrease** as fewer and fewer people can afford it. Targeted nutrition is called a "product for better times". Great concept, but seems to be useless for now, as feeding humanity is more important.

Ola Lazar, an entrepreneur, start-up, founder of food accelerator FoodForward.vc says:

> Targeted nutrition is a nice concept for better times. The interest in targeted food is continuously falling on a large scale and will fall on a narrower scale too, this is the first world's problem. Very few people can afford targeted nutrition, even fewer than before.

Daniel Żarski, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, confirms:

> Targeted food is a very niche option. It will stay in that niche regarding people who are looking for it, and there are very few of them. If we look at the biomass of the food sold, these are products for people who are looking for challenges for themselves as consumers. I am not convinced that it will be good, because when it comes to the agri-food sector, the most important challenge is to feed the population. In my opinion, it's a great concept, even sensational, but practically impossible to implement. Not for 9 billion people on our planet. The problem is somewhere else - how to produce sustainable food so that one man is not able to starve the whole world.

Katarzyna Gębala, a pioneer of the vegetarian and vegan food industry in Poland, Mentor, Entrepreneur, Chairman of the Board, Well Well Group, pays attention to extra costs:

> Developing our products, we focus on ensuring the nutritional value is balanced in terms of the daily diet of our consumers. It is difficult because, for example, liquid vegetable oils are now more expensive and less available than they used to be. Therefore, there is a greater temptation to reach for substitutes that have saturated acids, which I would try to avoid. The challenge is how to maintain the good nutritional quality of products at the costs we currently have. We must think about how to provide products with supplements for the body when they are very expensive and will continue to become more expensive. Will the consumer pay more? I believe that this is the right direction. But on the other hand, we should ask ourselves whether the right moment is now.

Iga Czubak, CEO at Planteris Sp. z o.o., mentioned logistics complexity:

> It seems to me that the more something is custom-made, the more resources it requires, and that's probably where the difficulty lies. Take, for example, the number of couriers that are already moving around the world – it seems to me that soon there will be simply too many of them. I guess we got into some kind of madness that everything would come to our house. Therefore, there may not be enough logistical resources for these projects. I am in constant contact with the environment of logistics and the environment of raw materials, so such challenges came to my mind first.

There was also some sub-trend in targeted nutrition mentioned by our experts. One is **microbiome health**, i.e. matching the diet to the intestinal microbiota. Not everybody knows that diet plays a fundamental role in shaping gut microbiota composition. Designing food towards a balanced feeding of the gut microbiota and their metabolites is a strategy to enhance human health.

Michał „Misza" Piosik, a startup entrepreneur and expert in the agri-food industry, explains:

> Microbiome health, i.e. analysis and customizing products according to our intestinal microbiota, is targeted food for specific social groups that are not taken care of now. Our society consumes too much protein and not enough fiber. All products that make this balance right will be desirable.

Ivars Orlovs, co-founder and CTO at Got Foods, points out:

> A lot of companies are not considering microbiome health while planning their products. They are not considering the use of real food fermentation and natural probiotics in their products, at least in alternative protein sections. Too much sugar in the products is also a problem. It's hard to systemise this because each country has a specific number of people, and these people have their needs. There is a need to find some common goals for bigger population groups.

Another trend in targeted nutrition is the use of **hyper-relevant products like personalised vitamins**, e.g. based on saliva tests. People no longer believe in the one-size-fits-all rule, and it applies equally to dietary sensibilities and food regimens. A recent report on this topic by The Hartman Group cites the growing interest in individualised and hyper-relevant products and food experiences (4).

Katarzyna Nietrzpiel, Senior Application Technologist (Savoury) at Givaudan says:

> Let us take meat substitutes as an example of targeted nutrition. When developing recipes, we can easily adjust the amount of macronutrients such as protein, carbohydrates and fat. A problem may arise when it comes to vitamins, which are sensitive to different agents such as light, heat, humidity, acids and alkalis. For example, vitamin B12, which is commonly used to fortify meat analogues, is sensitive to acids, alkalis, humidity and light. During production of food products, we can expect degradation of vitamins. Therefore standardization of vitamins in products with targeted nutrition, might be a challenge. Are producers able to prove the consumer will receive what they have assured him of? Another thing about targeted nutrition that can be challenging is scale. How to create such a range of products with targeted nutritional value and ensure such production would be profitable for the producer?

Katarzyna Zgieb, Senior Nutrition and Quality Development Manager at Jerónimo Martins, has also an interesting view on this topic and pays attention to food counselling:

> This area – targeted / personalised nutrition is the closest to me. Especially in the context of epidemiological data and an increasing amount of research on how food can affect our genes and how our body can react to various nutrients. It is about understanding and disseminating the fact that general recommendation should be complemented by our individual needs and preferences. These are the elements that will allow us to approach each person individually. Epidemiological data are very alarming, so the role of education in the field of proper nutrition tailored to our needs and the ability to choose valuable products is elementary. In some parts of the world, there may be a problem with access to good, safe food. Therefore, both systemic solutions, general dietary recommendations and an individual approach are very important - they should coexist. It is worth emphasising here that the challenge is, for example, the access to dietary counselling, which is not a standard for an average consumer. This is a big challenge especially in times when nutritional information, that often has nothing to do with evidence based nutrition, is so common. Access to dietary counselling should be available as a constant element of our health care. Such an approach and cooperation between nutritionists, industry and policy makers that will facilitate access to nutritional education and valuable products will be an effective way to support individuals.

Vesna Alič, Consultant, researcher, manager at Zavod ZRKP, zavod za razvoj kmetijstva in podjetništva (Zavod ZRKP, Institute for the Development of Agriculture and Entrepreneurship) StartUps and Digitalization in AgriFood, gives an example:

> The first challenge is obesity, and for people who are at the right weight, the problem is that the food is customised for them. We could develop software to help people make healthy choices. And as far as meat is concerned, how the issue is related to alternative proteins, so we're back to balancing foods again. We eat too few vegetables and need more protein, but the main source should not be meat. It is also necessary to introduce an interdisciplinary approach (doctors, productions, etc.) and digitization to make wise choices.

Start-ups

In the area of challenges related to targeted nutrition, it is worth paying attention to the following companies that are blazing trails in creating solutions for the industry.

- **fermentful** - http://www.fermentful.com/ - Latvia
  Fermented plant-based drinks for gut health.
- **magic broth** - https://www.linkedin.com/company/magic-broth/ - Lithuania
  A natural food product with collagen protein.
- **alberts** - https://www.alberts.be/ - Belgium
  The Alberts Smoothie Station combines robotics and AI, to prepare personalised, 100% natural smoothies on the spot.
- **Amai proteins** – https://amaiproteins.com/ - Israel
  Sweet designer proteins as a mainstream sugar substitute.
- **Be You** - https://www.beyouapp.com/ - Spain
  The AI-driven platform underpinning the latest health-tech and wellness digital products.
- **Completeorganics** - https://www.completeorganics.de/ - Germany
  Fermented spreads, drinks, powders, spices, etc.
- **Little Inca** - https://littleinca.com/ - UK
  Organic quinoa-based baby food.
- **Montinutra** - http://www.montinutra.com/ - Finland
  Scalable technology to convert forest industry side streams into high-value bioactive products for cosmetics, food & beverage, and chemical industries.

Digital Traceability

Digital Traceability

Product traceability is one of the most important challenges faced by the modern food industry. More and more entities, and private parties, i.e. consumers, require detailed information on the flow of products in the supply chain. Therefore, tools for fast and precise data recording became essential. There used to be barcodes or QR codes, especially in the case of a large variety of products. However, it seems they do not deliver all the information customers need.

What is product traceability?

Traceability is the monitoring of the production, processing, and distribution process from the procurement of raw materials to the delivery of a finished product to the customer.

Digital traceability is a product tracking process using digital systems, prepared to eliminate the risk of human error. The process is supposed to guarantee consumers that the producer is using good practices of sustainable development.

According to International Food Information Council, traceability is one of the top five trends (1). The article published in "Food Processing Magazine" states that in 2021 food traceability was an important element of every food safety system and becomes more digital and automated every year (2).

Why do we need traceability?

The 2020 EIT Food Trust report was based on a survey of nearly 20,000 consumers in 18 European countries. The respondents expressed their increased demand for issues such as farm-to-fork supply chain transparency, natural and better products, and more than just regular information labels (3).

The report suggests two things. The first one is that agri-food enterprises should improve their transparency efforts. The second proposes they should implement digital traceability technologies. Both steps would suit directly the needs of consumers and probably gain the consumers' trust.

In the aftermath of the Covid-19 pandemic, consumers all over the world are using an increasing number of digital and online services. It is estimated that they do as much as 45% more food purchases on the Internet than before (4). Is it a good time to start investing in digital agricultural technologies? Absolutely! As many as 67% of consumers want to know where their food comes from (5), and 69% of consumers under 40 would pay more for sustainably sourced products (6).

Digitization is expected to be one of the main drivers of enhancing the competitiveness of the food economy in the future. Consumers living in the 4.0 era industry are increasingly using digital tools, and they expect shopping processes are as fast and pleasant as possible.

Trends and challenges

According to our experts, currently, the greatest challenge regarding digital traceability is a communication problem – products labels are unclear to consumers. Few people know where to look for and how to read information about the origin of a particular product. The information such as where the manufacturer gets the individual components of the product from, where the product is made, whether it is bio, organic, natural, etc. Consequently, **people do not read labels** and experts wonder how to simplify and make them more attractive.

Daniel Żarski, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, claims:

> As for the consumer – I think the consumer market would like to introduce digital traceability but is afraid of it. Products have labels, but few people read them. Therefore, the question arises: is it reasonable to introduce these changes at the consumer level? Producers, especially those in agricultural production, will strongly resist it. It is important to note how the food sector is subjected to the influence of a giant lobby of its competition.

Prof. dr. sc. Đurđica Ačkar, professor in the Faculty of Food Technology, Osijek, puts attention to industry challenges:

> Traceability is always an issue, I think – especially on paper. But when it comes to practical application, you always have that human factor and laziness. Maybe digitalization will become a need in traceability. Anyway, we have to think about its cost because we need to digitalize everything in the process from basic materials to ready products. How to establish the process and not burden the industry and producers with lots of financial input in the production? How to make all these user-friendly, so everybody can use them? Even a worker on a production line with not much knowledge about the technology etc. So, how to make everything convenient and cost-effective? Can we do it on a farm level? How do convince producers it is a tool which will help them? Whenever you want to do something new, you must have partners who can see the benefits, not only for consumers.

In fact, food labels can help consumers select products with attributes they value. Otherwise, it would be difficult or impossible to verify things such as whether a chicken at the grocery store was raised without antibiotics. However, to make informed product choices, consumers must be able to interpret food labels properly. Only about a third of the study sample used labels frequently when buying a food product for the first time, so, definitely, there is room for improvement (7).

Despite these clear benefits, there are often concerns about implementing digital traceability technologies. For food supply chains to become truly traceable, using these technologies must become universal. Therefore, our experts point out the **cost and complexity of the process.**

Emilia Mochort, Business Agility & Portfolio Management Officer at Hochland, asks questions regarding this issue:

> I know that there are solutions where companies have products with QR codes, and you can see what field the ingredients come from. What would have to happen to make it standard? What steps would we need to take for this to happen? And another question is, would it be attractive? Of course, there are also the costs of implementing such a solution. So, what would have to happen for me, as a producer, to feel the need to do this and not be forced to it? And who could help me so that, as a producer, I could get some benefits from it?

Jakub Radzikowski, Innovation Marketing Consultant, consumer intelligence expert, start-up advisor, growth mentor, and Petopo founder, says:

> For me, digital traceability is the digital identification and transparency of the products we consume. Firstly, I think technology has to be available to everyone. The way consumers would use technology must be easy and clear. There can't be many steps to go through the app. It shouldn't be the case that the consumer turns on something in the application so that something else appears, and only then the right screen is displayed. We will lose these people despite the beauty of the technology and this prototype working great. It has to be a simple solution that will be readily available. Now, this is the thinking of start-ups that notice a strong trend in the development of some technology and are sure that in 2 years everyone will be using it. This is a correct way of thinking because then they can tailor this technological solution and have an impact on whether someone uses it or not. The point is not to enter niche technologies despite their beauty because this way we delete accessibility to a large group of people. The second thing is to prepare such solutions that are easily integrated with other manufacturers, suppliers, or trade.

Daniel Żarski, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, notices:

> I can see the problems – the technology is everywhere. The question is if manufacturers will want to use it, as my experience with digital traceability is that as long as nothing bad happens, it's fine. To implement digital traceability, we should consider everything, not just the origin of raw materials. We must take into consideration the entire production cycle. Will I be able to assure my consumers about the origin of the products, or will I want to inform them that I took the feed from here and made the product there? For now, I see a difficulty with the producers' resistance. Because, sooner or later, it will be a problem for them.

Global food traceability is a prime requirement of the food industry business around the globe because of the safety and quality assurance of food products. A real-time traceability mechanism can keep a check on unsafe food, which leads to a decrease in foodborne illness. This is why our experts emphasise the **importance of digital traceability for safety reasons**, i.e. for complaints.

Katarzyna Zgieb, Senior Nutrition and Quality Development Manager at Jerónimo Martins, says:

> Consumers want to get closer and closer to the products they consume - traceability is important from their perspective - increase their trust but also from the safety reasons. As a person who has audited many production plants, I know how important traceability is. We all live fast and have little time to familiarise ourselves with labels. I would like to draw your particular attention to the labelling of products and the issue of providing effective and legible information to consumers through labels. Information that would help consumers to use products in a more sustainable way.

Michał „Misza" Piosik, startup entrepreneur and expert in the agri-food industry, concludes:

> In Poland, digital traceability does not exist – this is probably the biggest challenge. Now we don't know where the products come from, how they are produced, etc. It creates room for malpractice. Such transparency would be an issue for producers, distributors and retailers. Implementing a tool which allows us to examine the origin and composition of products would be beneficial to end customers, however would be a large scale enterprise. A startup embarking on such a mission would benefit greatly from backing by state or large industry player.

Start-ups

In the area of challenges related to digital traceability, it is worth paying attention to the following companies that are blazing a trail in creating solutions for the industry.

Agrimp - https://agrimp.com/ - Portugal
A B2B digital marketplace where fair food trade is made easy, fast and transparent.

Altalentum - https://www.aitalentum.com/ - Spain
The innovative company specialises in artificial intelligence, machine learning and high-performance computing.

Alanytics Engines - https://analyticsengines.com/ - Ireland
Create innovative, data-driven software solutions that drive value from data.

Connecting Food - https://connecting-food.com/ - France
The platform where a type of food follows a fully traceable journey through the supply chain.

Delicious Data - https://en.delicious-data.com/ - Germany
Forecast solution using machine learning to combine historical data of catering businesses with additional external factors to calculate future sales figures.

Nemis technologist - https://www.nemistech.com/ - Switzerland
Simple, safe, and reliable on-site pathogen detection for food factories.

aotech - https://aotech.es/ - Spain
Using photonics to measure quality.

Biocode - https://biocode.io/ - Finlad
Online solutions for climate smart food.

Sustainable Agriculture

Sustainable Agriculture

Agriculture is the heart of our food system. Along with population growth, demand for agricultural products increases. It is estimated that to meet the growing demand for products, agriculture will need to produce 60% more food by 2050 (1). Agriculture and other types of ground usage are currently responsible for nearly a quarter of global greenhouse gas emissions (2). Would it be possible to reconcile these two prospects?

Sustainable agriculture means all measures taken to limit the impact of the farming economy on the environment. It enables more efficient and environmentally friendly use of resources (e.g. soil, water, crop protection products, or fertilisers) while maintaining the profitability of agricultural production and social acceptance for it.

Why is it worth promoting sustainable agriculture?

With climate change already threatening our planet, the transition to sustainable agriculture is crucial for humanity (3). By 2050, the food sector will have to face the challenge of feeding approximately 10 billion people worldwide, without increasing the land used for agricultural production while reducing greenhouse gas emissions by several dozen percent.

It is worth considering, by food producers, that in the years to come we will face a transformation of the entire food system. The transformation will be driven among others by consumer expectations and legal requirements.

Companies in the food industry are starting to perceive being ecological as something cost-effective. Green innovations increase opportunities to reduce costs due to improvements in the rate of production. It leads to a reduction in raw materials and energy consumption. In addition, research shows that customers are willing to pay more for products or services produced in a more environmentally friendly way (4). By introducing eco-innovations, companies have an opportunity to adapt to consumer trends and thus offer a greater variety of products.

Trends and challenges

One of the key aspects raised by experts is **climate change.** Agriculture needs to adapt production to the conditions of a climate catastrophe, this is an increasingly serious situation. Food production is threatened by climate change. Our farming system is heavily reliant on the physical environment and, while farmers are used to climatic variability, many of them are already reporting difficulties due to unpredictable weather and seasonal patterns.

Jan Kisielewski, Head of Foresight, Żabka Group, says:

> When it comes to the issue of costs and changing weather conditions, you continuously have to adapt. We have two levels: the first which inhibits and the second which is an adaptation (or in other words, adapting changes in agriculture). There is also a need for great flexibility between types of agricultural production. New species of plants tend to appear. Let's look at the varieties of potatoes, they are changing all the time. The shifts arise from changes in climatic conditions.

Attila Vörös, Managing director at Federation of Hungarian Food Industries, claims:

> First, the environment is changing, and nature itself is changing too, so I think the biggest problem starts with realising that we need to change. The current practice is simply unsustainable. So challenge number one is to recognise the need for changes, and then to become familiar with the elements we should change. The second challenge is to think together about what we need to change to make agriculture and food systems sustainable and how we can start implementing the changes. All players, starting with the farmers should have a vision of where they need to go and what is the sustainable way ahead of us. If you look at the the next generations (for instance people aged 18-19) who are starting to be consumers the you'll see there is a huge gap between the old generations' and current needs. Future consumers will only look for sustainably sourced and produced food products whereas classic production is not there yet. There is a huge gap between the current mainstream practice and the upcoming more sustainable way of producing food, and that gap needs to be filled as soon as possible.

Emilia Mochort, Business Agility & Portfolio Management Officer at Hochland, mentioned the expenses required:

> The costs are probably the biggest barrier when it comes to awareness and willingness to deal with sustainable agriculture. Now it is a farmer's task to think about the sustainability of agriculture and the importance of the planet issues. And this is a matter of priorities and the importance of values.

Without adaptation, climate change could reduce global crop yields by as much as 5-30% by 2050. On the other hand, farmers who adapt by changing planting times, crop varieties, and managing water supplies, could increase yields by 7-15% compared to present production rates (6).

Experts urge a need for **reduction of environmental impact.** Modern farmers need to focus on the optimization of crops so that they are efficient, but also interfere with the environment as little as possible. Commonly discussed agricultural adaptation strategies include planting different crops, breeding new lines, genetically modifying crops to make more drought- and heat-tolerant varieties, and shifting growing seasons to accommodate shifts in rainy seasons and temperatures.

Paweł Głowacki, Technologist at Lubella, says:

> We should aim at the optimisation of crops so that they are efficient and do not interfere with the environment. Fertilisation should be as simple as possible. But of course, it's hard to adapt it to a large-scale industry. What could be used instead of artificial fertilizers? This is a difficult topic and I would rather not formulate any theses or make assumptions.

Dr. Dubravka Skunca, Leading SMEs Support at GO Project, European Region Development Fund & Region Skåne; European Commission Board on Environmental Footprint, mentioned the recent changes in the agri-food industry:

> Changes are related to stronger government regulations regarding environmental targets - global warming and climate change are being incorporated into government measures. Another trend is related to the implementation of IT and Artificial Intelligence solutions in agrifood, for example for the use of nitrogen in the fields. We need to find out the exact amount of nitrogen required in the fields, and Artificial Intelligence and advanced IT solutions can help.

Daniel Żarski, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, lists:

> The challenge is to integrate different production systems and different agricultural products. The second challenge is reducing the impact of agriculture on the environment because we are in a bad situation. It's mainly about water food print, carbon footprint, etc., and definitely should deal with reducing the impact on the environment. The third challenge, one of the biggest, is the appropriately qualified staff, and human resources with appropriate knowledge and theoretical background. We lack people who are able to bring agriculture into the 22nd century.

Prof. dr. sc. Đurđica Ačkar, Professor Ordinary at the Faculty of Food Technology, Osijek, claims:

> We have different types of plants that are currently not edible, and most often they are used as compost or as animal food. Can they be used more effectively? Can they be used for energy production or fuel production? Or can we make them edible in some way? There are different ways and directions we can take.

The experts emphasize the aspect of l**imiting the use of fertilizers,** pesticides, and use of biological plant protection products instead.

Prof. dr. sc. Đurđica Ačkar continues:

> Organic production is very challenging because there are plenty of issues connected with pests dealing and here you cannot use chemistry to maximize the production. So, I think crop maximisation without overusing pesticides is a very fascinating area. How to choose fertilisers that would make the crops abundant but not change the soil too much.

Milica Vulicevic Basorovic, Innovation Strategy Director for Europe at The Coca-Cola Company, adds:

> Another thing to apply is using more plants growing next to the main crops without using chemicals that affect the environment.

Agricultural practices like crop rotation and the use of resistant crop varieties can reduce the need for pesticides. These are some basic strategies of integrated pest management (IPM), a philosophical approach to reducing pesticide use. The objective is to reduce crop damage while still protecting the environment—including beneficial insects like bees. (6).

Another crucial thing for agriculture is **reducing water consumption.** Water use and waste are increasingly becoming a priority, farmers are starting to incorporate ideas to use our water supply in the best possible way. Sustainable water management aims to match water availability and water needs in quantity and quality at a reasonable cost and with acceptable environmental impact.

Prof. dr. sc. Đurđica Ačkar concludes:

> Water resources will be less and less available in the future, so the question is how shall we use water?

Katarzyna Świąder, PhD, food expert, and international academic lecturer says:

> Sustainable development goals can be quite difficult to achieve in the context of the war in Ukraine but also the economic crisis. There will soon be further legislation forcing better resource management. When we talk about resources, we must keep in mind all natural resources, starting with food, timber, biodiversity, water, energy, soil, metals and mineral resources, and ending with land and air.
> It will no longer be a question of voluntariness, but of binding legislation. There is also a lack of concrete solutions for consumers. A major problem will be the availability of raw materials and finished products and their quality. Access to high quality food and water will be a luxury.

Last but not least challenge in sustainable agriculture is **soil erosion**, regenerative tillage is necessary.

Katarzyna Gębala, a pioneer of the vegetarian and vegan food industry in Poland, Mentor, Entrepreneur, and Chairman of the Board, Well Well Group, states:

> I dream that agriculture in Europe will change to less intensive cultivation of the land. But it requires courage, and support from institutions so that farmers dare to experiment and come to terms with the initially lower crop. The challenge for today is not to let go.

Michał 'Misza' Piosik, startup entrepreneur and expert in the agri-food industry, sums up:

> The problems for sustainable agriculture are intensive water consumption and fertilisation. We are searching for products and services in the field of regenerative farming, i.e. service technologies that help the farmland regenerate itself.

Given the damage already inflicted on the natural environment, 'sustaining' our ecosystems may not be enough to offset climate change and ensure the long-term productivity of farmland. With this in mind, regenerative farmers actively work to change the way they farm by increasing biodiversity, enriching soils, improving watersheds, and enhancing the health of livestock and wildlife.

Start-ups

In the area of challenges related to sustainable agriculture, it is worth paying attention to the following companies that are a blazing trail in creating solutions for the industry.

Pollenity - https://adopt.pollenity.com/ - Bulgaria
Innovative technologies to protect bees and create a thriving future for our ecosystem.

CLSTRLobe - https://clstrlobe.com/solutions/agriculture/ - Croatia
Data-driven crop farming.

Ullmanna - https://www.ullmanna.eu/ - Czech Republic
Smart non-chemical in-row farming.

Microbe - http://www.microbe-plus.com/en/ - Poland
Microbiological technology that reduces the use of chemical pesticides and fertilisers.

Nangatech - http://nangatech.com/ - Poland
Biotech solutions for farmers to become more eco-friendly & cost-efficient.

Carbominer - https://carbominer.com/ - Ukraine
Innovative technology to capture climate-friendly and cost-efficient CO_2 for indoor agriculture.

AgriColus - https://www.agricolus.com/ - Italy
The complete platform to manage farms efficiently with innovative technologies.

Computomics - https://computomics.com/ - Germany
Unique machine learning technologies that allow companies to optimise traits and provide the ability to improve crops.

Circular Food Systems

Circular Food Systems

The closed circular economy is a concept in which products and raw materials should remain in circulation as long as possible, and waste generation is reduced to a minimum.

It is about moving away from a linear economy based on the principle of 'take-make-consume-dispose' in which waste is often treated as the last stage of a product's life. In the closed circular economy, it is important that waste, if generated, is treated as recyclable materials.

Why is close the loop?

The planet we live on is a closed ecosystem that has limited ability to renew its resources. According to Global Footprint Network (1) right now the Earth needs 1.75 years to renew the resources humanity uses in one year, and this rate is still increasing. Limited deposits and climatic issues require moving from the take-make-dispose society to a carbon-neutral, environmentally sustainable, toxin-free completely closed circular economy by 2050.

The circular economy, or in other words, the closed circular economy, is an answer to the challenges mentioned above. It transforms the linear cycle of material circulation into a closed cycle in which the end of a product's life is also the beginning of a new product or services. All materials are used, and the waste is eliminated. There is no need to mine new resources.

The closed circular economy is a constant interaction of the whole chain of subjects - from farmers, food producers, suppliers, and sales networks to consumers. It is also taking conscious action for the environment. A good example of these actions is the food industry trend called from nose to tail, which means eating the whole animal so that nothing is wasted, not only the tastiest parts of it.

Trends and challenges - experts' statements

According to experts, currently, the most urgent issue in the case of a closed circular economy are **legislative challenges.** Better use-by-date legislation is needed, e.g. the possibility of distributing products after this date.

Marcin Tischner, Corporate Engagement & Sustainability Specialist, ProVeg Polska, raises the issue of sensible legislation:

> In case of food waste, good legislation fixes some things. Marking expiration dates on packages that are inadequate. In Poland, products after „best before" dates (BBD) cannot be delivered to consumers, while abroad, in some countries, they can. There are some differences regarding the legality of selling such products between countries. For example, in Poland and Spain you cannot sell products after BBD at all; in Germany, Sweden, and France you can sell products after BBD, but there are some restrictions (e.g. only up to 3 months after the BBD expires or there are additional guidelines); in Canada, the UK and Australia you can sell products after BBD if the seller takes responsibility for the quality of the food sold. We need better, smarter rules.

In fact, the EU Parliament briefing states that the best before date (recommended last consumption date) is often confused with the use-by date, intended for foods that are highly perishable (such as fresh meat or dairy products). The consumer market surveys in the EU show that only a third of consumers can correctly interpret the meaning of the best-before-date concept. While knowledge of labelling seems to be better in some countries, consumers throughout the EU have difficulties understanding the labelling scheme (2).

Now, as a part of the „From Farm to Fork" strategy, the European Commission proposes to revise the rules on date marking - 'use by' and 'best before' – to avoid food waste (3).

Marcin Tischner, following his speech, also mentioned using **leftovers from one to the next production process**, e.g. beer from bread leftovers. He continues:

> The second issue is the use of leftovers from one production process for the next production process. It could work great in the brewing business. Some startups are already doing this. For example, beer is made of bread leftovers or using rainwater. Another example is a Hungarian start-up that produces fats from grape seeds. It is possible to use leftovers from the production of nuts. The ProBioVege project uses the residues of oilseed pressing, and press cakes, and turns them into powder to make substitutes for animal products. That is why I imagine a win-win solution.

In fact, while the spent grain is mostly used for agricultural purposes, such as compost or animal feed, there are lots of new revolutionary uses, such as powering a brewery, upcycling it to use in food, cutlery, and more. Utilising spent grains in innovative ways underscores the craft beer community's commitment to creating a sustainable product that lives in our sensory memories instead of our landfills.

Coming back to legislative issues, our expert **Daniel Żarski**, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, says:

> Among other things, integration at the political/legislative level is important because the most difficult challenge is to convince legislators to use waste for other things. There are various concerns, e.g. sanitary, but still, producers, especially those working in the animal industry, have problems with the legislation. The law prohibits them from doing many things, so they can do it illegally or not do it at all. When it comes to fish – what they excrete or leave uneaten accumulates in the form of sediment. The only thing you can make from this sediment is fertilizer for houseplants. It is dried and can be sold to households and then people can, in theory, use it. Unfortunately, it is impractical because it requires the opening of a bag factory. On the other hand, the law prohibits the use of such fertilizers in agricultural production. Therefore, waste from various productions is problematic. Another thing to consider is the use of waste to feed other animals. And of course technology – there are ideas, but it is still a problem with technology and the problem of how to use this waste. Still, a lot of research is needed to make it commercial and to make it pay off, and then there is another thing - to convince people to choose products that are an important element in a closed circuit. We also need staff, people who have the knowledge or competence to listen to others and listen to solutions.

Begüm Önal, Food Safety & Operations Manager I Food Engineer, Dr., mentioned the challenges in the production process and urge for education:

> The increasing importance of the circular economy impacts the product development issue. Raw material specialists need to work with sustainable experts. Industries need to understand that so far all food wires are more focused on the traditional systems, and on what they produce. They don't know in which part of their chain they can use raw materials. Lack of regulations in government and lack of financing doesn't help to improve.

Our experts often mentioned **manufacturing from production waste** as a new trend in circular food systems. This urges a need to create and better implement relevant laws.
EU waste laws have driven major improvements in waste management since the 1970s, supported by EU funds. However, they need to be modernised on an ongoing basis to make them fit for the circular economy and the digital age (4).

Paweł Głowacki, a Technologist at Lubella, gives an example of a recycle-made product:

> We have energy losses, waste is generated, and it would be good to manage everything. In the manufacture of cereal products, the cereal is ground, and bran is formed. Apart from the fact that bran can be sold for fodder, we can use it to make various things, e.g. packaging or cutlery. We need to find a good use for this waste. When manufacturing our products, we often have incorrect products and these products are reused in production – we pride ourselves on the fact that we have no losses or do not produce waste.

Katarzyna Gębala, a pioneer of the vegetarian and vegan food industry in Poland, Mentor, Entrepreneur, Chairman of the Board, of Well Well Group, adds:

> We have a product that generates a lot of waste. It is fully plant-based. This waste is managed in a biogas plant. We are considering implementing a technology that allows this waste to be used for other products prepared for people. It requires significant effort to process it to achieve a tasty product. For now, we are at the stage of calculating what investment we would need. This requires energy, and the situation happening now strongly verifies our ideas.

Currently, the circular economy framework does not provide specific criteria to support the selection of actions nor specific guidelines on how to implement the concept. As the implementation of the circular economy varies significantly for different products and markets, the need for individualised or sectoral approaches makes it difficult to provide general guidelines.

Start-ups

In the area of challenges related to circular food systems, it is worth paying attention to the following companies that are blazing a trail in creating solutions for the industry.

biorefic - https://biorefic.com/ - Latvia
Zero-waste biorefinery manufacturing prebiotics, alternative lipids, and proteins for animal feed and aquaculture without using food inputs.

ecobean - https://ecobean.pl/ - Poland
Reducing coffee waste by extending the coffee value chain and turning waste into raw materials.

Elea - http://www.montinutra.com/ - Germany
Pulsed Electric Field food processing systems.

Energy Plus System - http://energypulsesystems.pt/ - Portugal
Pulsed power modulators designed to add value to several industrial sectors.

Kern Tec - https://www.kern-tec.com/en/ - Austria
Enabling upcycled ingredients for the food & beverage industry.

Mimica - https://www.kern-tec.com/en/ - UK
Reducing food waste with accurate caps or labels to indicate food freshness.

Orbisk- https://orbisk.com/ - Netherlands
Fully automated food waste monitor.

Ypsicon - http://www.ypsicon.com/ - Spain
Ultra-high pressure sterilisation/homogenisation, Ultraviolet-Thermal pasteurisation, and UV-C bottle sterilisation.

Sustainable Aquaculture

Sustainable Aquaculture

Aquaculture is currently the fastest-growing sector of global food production. It was developed to meet the growing nutritional needs of people and as an ecological alternative to large-scale fishing.

Aquaculture is the cultivation of aquatic organisms in captivity. It is divided into freshwater or saltwater (so-called mariculture). Global aquaculture production is successively growing at a rate of over 6% per year (1). In 2018, it reached a record 114.5 million tonnes of live weight, with a total sales revenue of USD 263.6 billion (2). To support the demands of the future, aquaculture must meet the conditions of sustainable development and be economically, environmentally, and socially friendly.

As we can read in the Greenpeace report entitled Challenging the Aquaculture Industry on Sustainability, mass fish farming harms the environment in many ways: fish waste and feed residues lead to overfertilisation of water and a decline in biodiversity. The use of antibiotics and industrial chemicals additionally pollutes the waters and favours the emergence of drug-resistant strains of bacteria, also posing a threat to humans (3).

As large fish enterprises are much more profitable, the development of intensive aquaculture becomes a global trend. Therefore, we should promote more sustainable solutions because the current, intensive economy has negative consequences for the environment.

Environmentally friendly aquaculture – challenges and directions of development

According to our experts, currently, the greatest challenge for aquaculture is **high fish prices**. Strict rules are essential to protect fish species as soaring prices add to the pressure on overfishing, which damages the environment. The price of fish increased by 25% in the first four months of 2022. Then, the FAO estimated that about 3 billion people cannot afford a healthy meal (4).

Daniel Żarski, Assistant Professor at the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn, says:

> The food sector is heavily subsidised excluding aquaculture. It is difficult to develop it with high inputs but without the state support that all other agricultural sectors receive. It applies not only to Poland but to other countries too. Aquaculture is wrongly treated as a sector producing luxury food, but when comparing food prices, there would be no differences. What we need is legislation and support for the aquaculture sector.

Jan Kisielewski, the Head of Foresight, Żabka Group, alarms:

> If nothing changes, by 2050 fish will be excluded from consumption because of microplastics. Fish farming in fully controlled conditions involves increased costs and higher prices, this will redefine premium seafood – not wild but from a premium aquaculture.

In fact, overfishing depletes available seafood resources, altering the composition of the fish population. Depletion of several fish species resulted in cataclysmic changes in many other types of oceanic life. Experts agree that the most important thing today is to convince producers that it is worth investing time, energy, and money in sustainable production.

Another challenge for sustainable aquaculture is that, so far, there are **no vegetable substitutes for seafood** and there is a need for the production of substitutes with Omega acids. Meat alternatives, scaling, imitating the texture, and recreating whole cuts of seafood are the most recurrent challenges every company in the sector comes across.

Iga Czubak, CEO at Planteris Sp. z o.o., claims:

> Fish is an alternative protein. It will be a great challenge to increase the awareness of society when it comes to plant-based products to replace seafood or fish. It seems to me that fish substitutes are still a step behind us.

Katarzyna Nietrzpiel, Senior Application Technologist (Savoury) at Givaudan, remarks:

> It is worth thinking about the increasingly common substitutes for fish or seafood. The problem of overfishing still exists and may continue to worsen. Moreover, consumers are concerned about health issues related to pollution, microplastic contamination and mercury levels in fish. Due to different concerns, consumers reduce consumption of fish and seafood. On the other hand it is recommended to eat fish twice a week, especially fatty sea fish, which are a source of omega-3 fatty acids. It is an important ingredient for our health, which protects against atherosclerosis, heart attack and stroke. Producers can convince consumers to fish and seafood alternatives by creating delicious and authentic products that ensure Omega-3 intake. As consumers, by making informed consumer decisions, we have an influence on our health, climate change and overfishing problems.

Michał 'Misza' Piosik, a startup entrepreneur and expert in the agri-food industry, mentioned another source of proteins from the sea:

> Fish should not be caught at the rate at which it is being done at present. Let us focus on something positive – vegetable proteins from the sea, i.e. all kinds of algae. This is a giant field to show off because algae are the source of everything valuable to us – from protein to some supplements or spices like monosodium glutamate. The protein obtained in this way differs from wheat protein, which has no taste and must be seasoned.

Assuming current production techniques and expected technological development, this sector has the potential to reduce its environmental impacts compared to existing fisheries and aquaculture sectors.

Experts are continuously alert to **overexploit the sea**, which makes the ecosystem imbalanced.

Prof. dr. sc. Đurđica Ačkar, Ordinary Professor at the Faculty of Food Technology Osijek, reflects:

> In Europe, we have problems with exploiting of marine resources – we overuse fish, shells, and crabs. Even in Croatia, I see that some species that were not problematic some time ago, are in danger now because there is a big difficulty to find them. We overexploited the sea. How shall we restore those species? I know that there is some research, both in the food and cosmetics industries. Will we have the same issue with algae used in both types of industries? First, we need to preserve the species we have. Then we must consider maximising the use of the whole animal – how to use heads, bones etc. and thereby maximise the efficiency of production. If you do have to get rid of it, how do you do it with as little environmental impact as possible?
> We have introduced some new species of fish into our European waters, rivers and seas, and now there are too many of them, and they are killing other species. How to remove that problem? The ecosystem is imbalanced now.

One of the practical solutions is funding a **water recirculation** installation.

Milica Vulicevic Basorovic, the Innovation Strategy Director for Europe at The Coca-Cola Company, reveals:

> We use water platforms. In Europe, they (platforms) have already met their target, they rank very high in terms of the sustainability index, and basically, they reach their target to return to nature the same amount of water as they used to produce beverages. I think this is the right way to go. Of course, they don't return the same water, but they purify it. We've been doing this for a while, but the importance of clean drinking water is going to increase in the future, so I think it's a perfect example of how companies should behave. There are always areas where there is water, so we make sure that we don't affect the local population's agriculture. There are countless efforts to help, just like in Africa – we sponsor some efforts to get access to water, and new technologies. We are very active when it comes to dealing with water pollution, we know that ocean cleaning is a big thing and Europe is engaged in it.

Start-ups

In the area of challenges related to circular food systems, it is worth paying attention to the following companies that are blazing a trail in creating solutions for the industry.

MonitorFish - https://monitorfish.com/en/ - Germany
Digital aquaculture assistant empowering best practice fish farming.

LISAqua - https://www.lisaqua.com/ - France
Sustainable land-based prawn farm.

SuSea - https://www.sustainableseafood.co/ - The Netherlands
Development of innovative seafood preservation technologies to ensure healthy and high-quality products, improve seafood safety and reduce waste by extending shelf life.

SafetyNet Technologies - https://sntech.co.uk/ - UK
Technologically advanced solutions enabling precise catching of fish and their specific species.

Ace Aquatec - https://aceaquatec.com/ - United Kingdom
Technology that accelerates the adoption of responsible marine practices.

Seavolution - https://www.seavolutionfoods.com/ - Spain
Cost-effective, easy to scale, naturally cooked plant-based fish.

Upstream foods - https://www.linkedin.com/company/upstream-foods/ - The Netherlands
Cultivation of fat ingredient that delivers an authentic seafood taste and texture feel to plant-based products.

Ideas and solutions developed during Challenge Labs workshops

Ideas and solutions developed during Challenge Labs workshops

Design process

The Challenge Labs CEE innovation design workshop was conducted using the methods of the Design thinking and service design process. More than 60 workshop participants, coming from 12 CEE countries, were divided into 11 interdisciplinary teams. During the 24-hour workshop, they designed solutions to meet the needs of end users.

The entire design process was spread over two and a half weeks. We met online for the first time on the 29th of September 2022, starting by deepening our understanding of the problems we want to solve, and defining the challenges we were taking to the workshop. The following sessions were devoted to idea generation, selection of our ideas, clarification of concepts, and preparing presentations for investors. Throughout the process, the participants' activities were supported by **more than 20 mentors** – prominent experts in the agri-food industry from various European countries.

What's more, we also invited consumers to our online meetings to share their ideas, experiences, and feelings about the solutions designed by the participants. This perspective allowed our participants to design products that meet market and business needs as well as those of end users. Certainly, the **facilitators** also played an important role, each looking after one team of participants and ensuring that the design process proceeded correctly according to the methodology used.

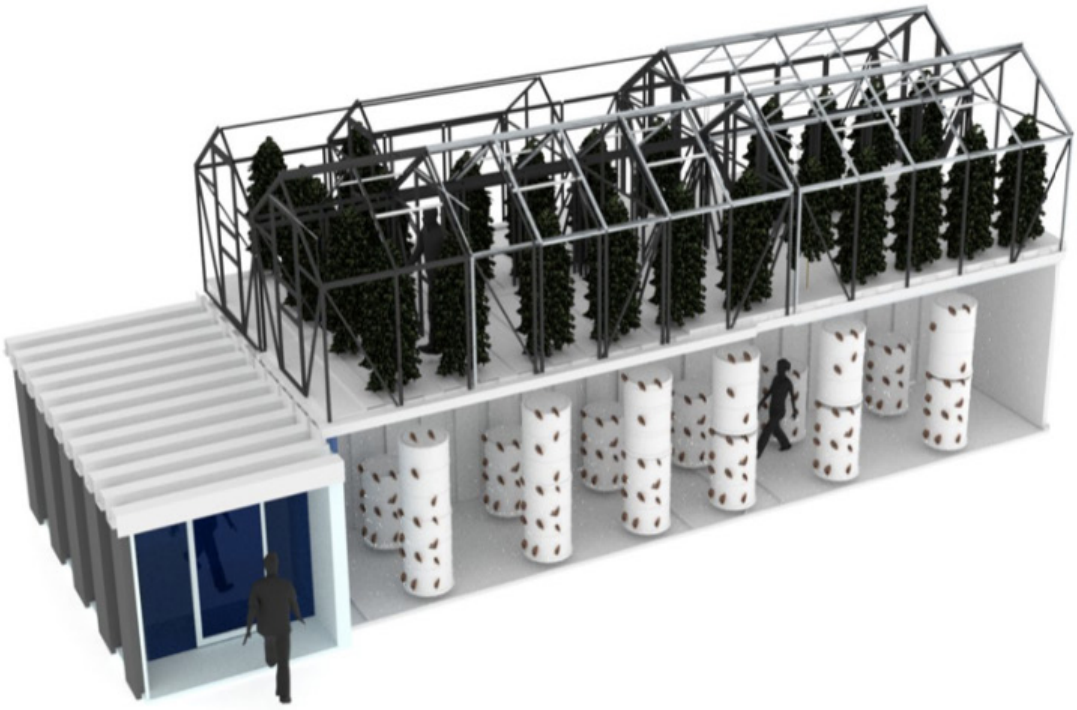
Solutions developed

The Challenge Labs CEE workshop also included a competition in which competent judges selected three winning teams that had developed the most business-profitable and responsive concepts.

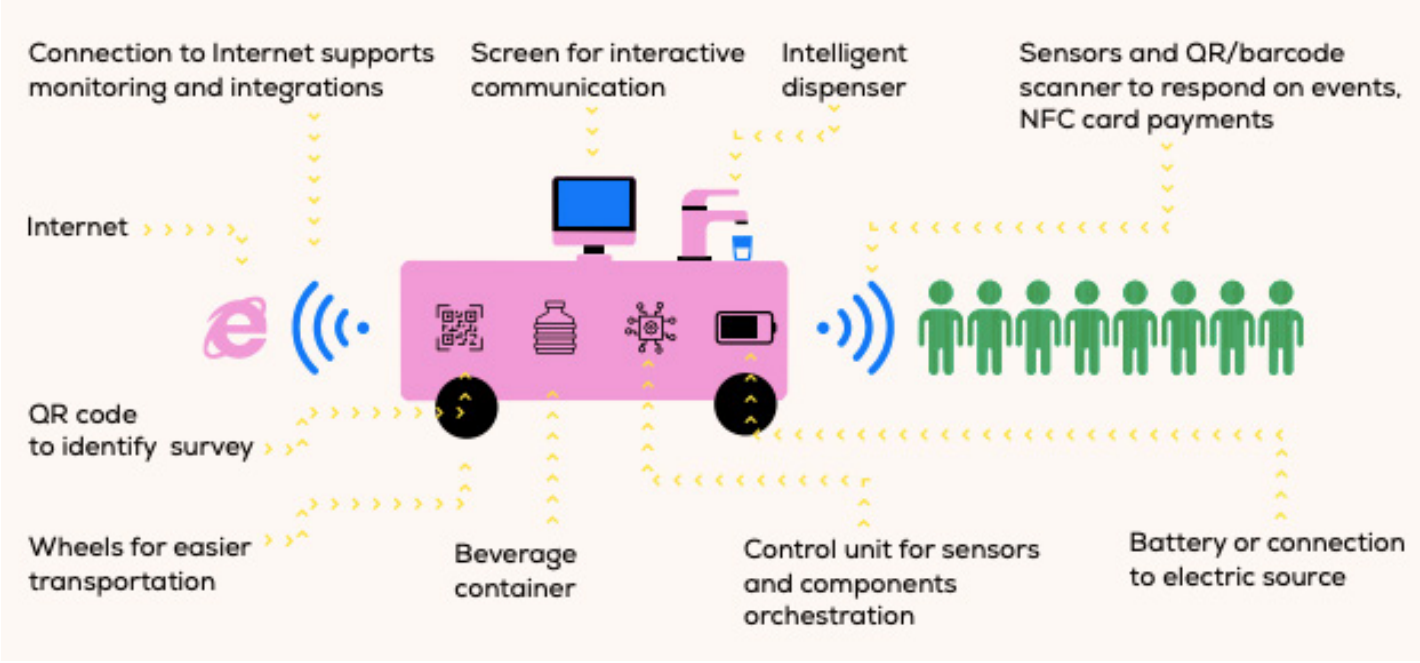
First place among the participants from Central and Eastern Europe went to **a team called ProBio**, **with their developed product 'PlumPro'**, a powder created from plum seeds, a natural source of nutrients. Their product can be used as an ingredient in many dishes, as the team proved during their presentation by offering an online resource with recipes for dishes using PlumPro'.

Second place was awarded to a **team called Shroomies. This team developed a concept for a comprehensive vertical farm in the city**, where mushrooms are grown alongside legumes. What is important is the fact that food and production waste are used for their cultivation. The result is a wide range of fresh alternative protein products.

Picture of the farm



Third place was won by a team called **TASTE ME DON'T WASTE ME, proposing a solution in line with the philosophy reflected in their name.** The idea is that the vehicle distributing drinks during festivals simultaneously collects waste generated by the consumption of previously served drinks. This idea also includes digitalisation and automation of the device operation, ordering, data collection, or payments.



The potential of the developed concepts

The solutions highlighted and described above are just a few ideas created during the Challenge Labs CEE workshop. After the innovation design marathon, some teams received a proposal to develop their concept in cooperation with business partners. The winning teams started working on the development of their business concepts during coaching sessions conducted by Dr. Eng. Agnieszka Klucznik-Törő. The purpose of the meetings was to prepare the teams for the European final of the Challenge Labs competition, which was held on November 24, 2022. A total of 6 teams took part in the grand final: 3 from CEE countries and 3 from Southern Europe.

The solution proposed by the ProBio team (the product called 'PlumPro') won first place in the international European final of the project. In second place was the TASTE ME DON'T WASTE ME team and their innovative vehicle that eliminates waste generation during festivals. The Shroomies team took fourth pace, which is also a great result.

Congratulations to the winning teams!

Report summary

Report summary

The goal of EIT Food is to support innovation in the agri-food sector by creating an environment where various industry stakeholders can meet: representatives of commercial and non-governmental organizations, academics, industry experts and representatives of startups.

For the purposes of this report, we interviewed 20 experts from the agri-food industry. We have described the trends and challenges in detail in 6 substantive chapters. You can see some of our experts in this promotional video (film 1). The following picture of the industry is drawn from their statements.

According to the experts, the greatest challenge in the agri-food market is the **high price of products**, mostly in alternative proteins and sustainable aquaculture. The costs are boosted due to protecting environmental requirements; the war in Ukraine and worldwide inflation have a great negative influence.

One of the key aspects raised by experts is **climate change**. Agriculture needs to adapt production to the conditions of a climate catastrophe, this is an increasingly serious situation. Experts urge a necessity for the **reduction of environmental impact.** Modern farmers must focus on the optimization of crops so that they are efficient, but also interfere with the environment as little as possible. Our experts highlighted **manufacturing from production waste** as a new trend for circular food systems.

For our experts, it is crucial to **educate the customer**, so they know how to choose well. Higher educated, as well as more ecologically oriented consumers, will be more likely to accept new eco-friendly products, as they would be more aware of the environmental and health benefits of such an alternative.

Unfortunately, recent socio-political events made our experts quite pessimistic about the nearest future of the most advanced solutions, like targeted nutrition. The predicted trend is that t**he interest in personalised nutrition will decrease** as fewer and fewer people can afford it. Targeted nutrition is called a „product for better times".

Despite these clear benefits, there are also often concerns about implementing digital traceability technologies. For food supply chains to become truly traceable, using these technologies must become universal. Therefore, our experts point out the **cost and complexity of the process.**

We hope that reading this report has inspired you to reflect on new ideas and search for modern solutions for the agri-food industry. We encourage you to see the short video summarizing Challenge Labs CEE (film 2) and visit the EIT Food website for information on the following editions of this event.

About the organisers

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About EIT Food

Co-funded by the European Union

EIT Food is the world's largest and most dynamic food innovation community. We accelerate innovation to build a future-fit food system that produces healthy and sustainable food for all.

Supported by the European Institute of Innovation and Technology (EIT), a body of the European Union, we invest in projects, organisations and individuals that share our goals for a healthy and sustainable food system. We unlock innovation potential in businesses and universities, and create and scale agrifood startups to bring new technologies and products to market. We equip entrepreneurs and professionals with the skills needed to transform the food system and put consumers at the heart of our work, helping build trust by reconnecting them to the origins of their food.

We are one of nine innovation communities established by the European Institute of Innovation and Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe.

Find out more at www.eitfood.eu or follow us via social media: Twitter, Facebook, LinkedIn, YouTube and Instagram.

About Generator Pomysłów

Generator Pomysłów

Generator Pomysłów has been a business creativity centre for 10 years. The scope of our activity starts with the development of the skills of creative thinking and creative problem solving of employees, through the development and support of entire teams in achieving the best results, to the implementation of systemic solutions for the productivity of employees and building a culture supporting the innovativeness of the entire organisation. If you want to find out more about the unique projects we carry out for our clients, please visit our website – www.generatorpomyslow.pl.

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