

Towards a Resilient and Sustainable Future: The Role of Protein Diversification in the EU Agri-Food Sector

2024



EIT FOOD PROTEIN DIVERSIFICATION THINK TANK

Knowledge & Innovation Center on Food, part of the
European Institute of Innovation and Technology (EIT).

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This paper was written by
the **EIT Food Protein Diversification Think Tank - EIT Food.**

The EIT Food Protein Diversification Think Tank convenes stakeholders and partners, combining the expertise of academics, research and technology organisations (RTOs), companies, and NGOs.

It fosters broad and inclusive participation and aims to create structured dialogue to overcome barriers to innovation in the field of protein diversification.

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About EIT Food

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

Supported by the EU, 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 agri-food 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 for Innovation & Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe.

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Why protein diversification?

In the last five years, Europeans faced a long list of unprecedented challenges: a pandemic, a major war on European soil, rising inflation, geopolitical turbulence, logistical crisis, and the increasing impact of climate change. The cumulative effect of all these external factors has redirected key European policy initiatives introduced in 2019, namely the European Green Deal and the Farm to Fork Strategy.

To mitigate these external factors, a new set of policy priorities has emerged, focusing on competitiveness, food security, and resilience, alongside sustainability. This integrated approach, aiming to balance all these priorities, has been both reflected in the post-election demands of the European Parliament's political groups and the ones set forth by the new Commission.

The alternative proteins sector encompasses both well-established categories, such as plant-based proteins and traditional fermentation, and emerging ones, like microorganism-based fermented proteins (including yeast, mycoproteins and precision fermentation products). Additionally, the sector includes novel and innovative products from cultivated animal and plant cells, like cultivated meats, seafoods, algae, plant cell culture ingredients or dairy alternatives.

For the entire European food system, these four policy priorities demand a fresh approach. Diversifying protein sources in both production and consumption is crucial: It diversifies nutrient sources and reduces import dependencies while also providing farmers with new income opportunities and enhancing Europe's internal and global competitiveness.

As the new European Commission prepares to set in motion its policy priorities for the next five years, the EIT Food Protein Diversification Think Tank wishes to emphasise the importance and contribution of diversifying Europe's protein sources. This diversification is crucial for addressing the new challenges Europe faces across four interconnected themes: **Food Affordability, Resilience, Competitiveness, and Sustainability.**

Food Security and Affordability: What's at Stake

The COVID-19 pandemic and the 2022 input cost explosion disrupted existing food supply chains and raised food security as a significant concern for consumers and policymakers for the first time in decades. However, in Europe, it is more opportune to speak of **food affordability**. According to its latest report, **Eurostat** indicated that in 2023, 8.3% of European citizens were unable to afford a meal containing meat, fish or a vegetarian equivalent every other day, although significant differences across country and income levels existed. The number of Europeans who are unable to afford protein-rich food every other day has increased in previous years due to rising food prices. This requires a response that brings prices down for consumers without negatively impacting farmers' incomes.

Policies that support protein diversification efforts can play a key role in supporting these efforts by increasing the availability of protein-rich foods that are grown and produced inside the EU, less reliant on imports and with a low environmental impact without imposing additional burdens on either farmers or consumers.

Import Dependency & Self-Sufficiency

Currently, the EU is **not autonomous** when it comes to plant protein sources. For instance, most soya beans stocks are imported. Likewise, in 2023/24, it is forecast that nearly 60% of all oilseed stocks in the EU are imported. As traditional import sources like Russia and Ukraine cannot export at previous levels, European consumers and processors are increasingly reliant on imports from South America. This shift negatively impacts sustainability and affordability, and it introduces inherent risks into the EU's food system, by making it overly reliant on a single, far-off source for a major source of protein for both food and animal feed.

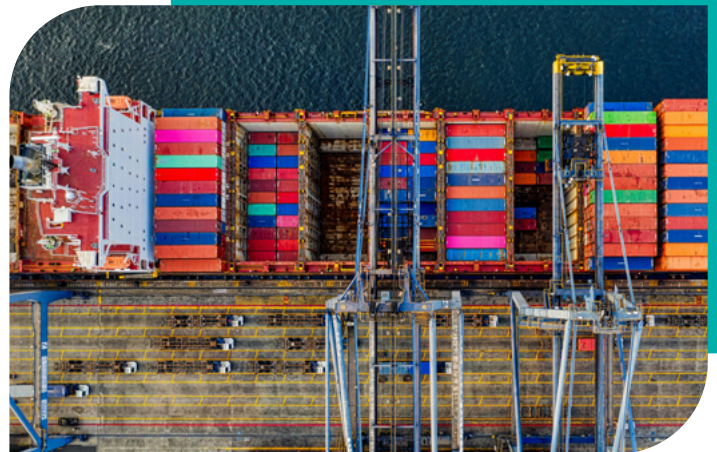
Food, and particularly **food sovereignty**, is a critical concern for the next five years, as highlighted by

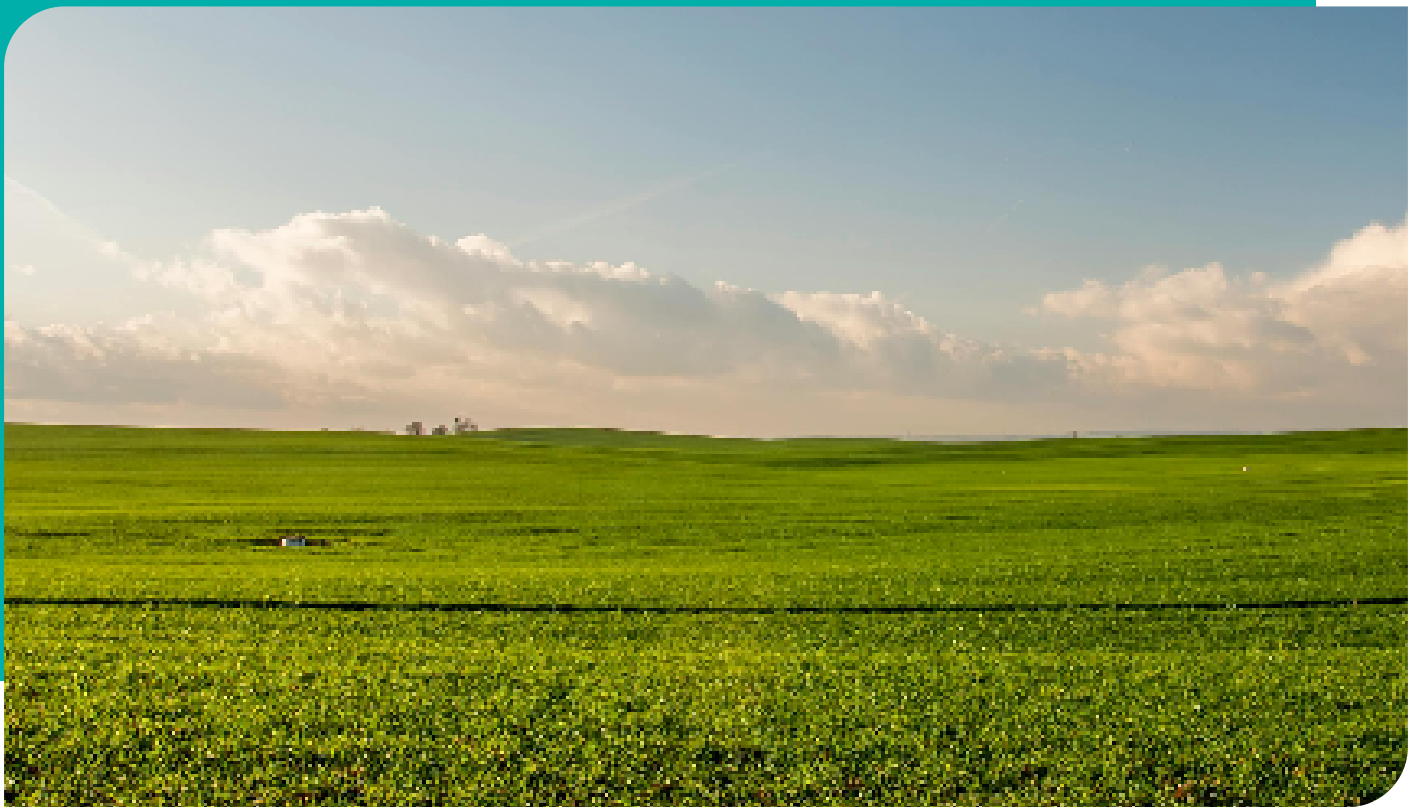
Commission President Ursula von der Leyen in her 18 July investiture speech and the accompanying Political Guidelines for the upcoming Commission. Supporting the development of plant- and fermentation-based protein sources in Europe, whether through harvesting new varieties or developing alternatives to meat and other animal-based proteins that reduce the dependency on feedstocks and, particularly, those imported from outside the EU, presents an opportunity to achieve **greater self-sufficiency** and food sovereignty.

Expanding Choices through Complementarity

Embracing alternative protein sources enable farmers to explore and adopt more commercially and environmentally beneficial land uses, positively impacting both their profitability and their negotiating position in the value chain. New protein crops can offer market-driven solutions for farmers to ensure the stability and fairness of their incomes, for instance it can open the door to new income streams between seasons thanks to the planting of certain crops in fallow lands.

Alternative proteins should not be conceived as an enemy to livestock farming. Rather, alternative proteins can enable livestock farmers to shift to





higher added-value varieties, bolstering both the economic and environmental sustainability of their operations. Increasing the availability of alternative, more sustainably- produced and more nutrient-rich animal feed options (like insect-based feeds) and reducing the overall societal consumption of animal protein products. This offer livestock farmers new opportunities for diversifying their operations and business models, by, for instances, enabling them to move towards more less intensive but more extensive production methods for higher quality produce that can be paired with protein crop plantation or other sustainability-boosting practices, or to livestock accompanied with efficient feed conversion rate having thus improved environmental impact.

Together, this offers **a diverse set of instruments to improve returns on investment for livestock farmers** without significantly impacting the core of their economic activities.

The end-result would be to address the long-standing grievances of farmers by improving their bottom margins and their long-term economic viability and global competitiveness (as sustainable high added value products is an area where EU agri-food production has a competitive advantage) while also

improving their environmental impact.

In line with the evidence from **a recent report** on large European retailers, the greater availability of alternative protein products in Germany and the Netherlands resulted in growing consumer demand for these products, indicating that the relationship between supply and demand of alternative protein products is bidirectional. The implication is that a greater availability of these products for consumers opens the market for farmers to further diversify production. The growing demand for protein crops and legumes would be beneficial to those farmers who embrace it. This is particularly the case where certain protein crops (whether destined for food or feed production) can be grown off-season, reserving best growth periods for traditional crops. As a result, farmers can have access to additional and complementary income streams throughout the year, without compromising soil yields during the main growing and harvesting seasons.

This can be even further boosted where these crops can also be used as carbon sinks for carbon farming purposes, where those farmers who chose to be a part of these schemes can profit from carbon capture and storage (CCS) and carbon capture and utilisation (CCU) credits.

Value Chain Resilience: A Vision for the Future

Addressing the long-term European food value chain resilience and ensuring access to healthy, nutritious and affordable food for all Europeans requires a roadmap with clear initiatives on both the producer and consumer ends of the value chain. The final objective of this roadmap must be improving the food system's resilience. The diversification of protein sources has to play a central role in boosting the long-term resilience of the EU's agri-food system, addressing concerns of policymakers, consumers, and farmers alike.

Imports & Transition: A Vision for Producers

As President von der Leyen outlined on 18 July during the presentation of her priorities for the 2024-29 mandate, the Commission will present both a Climate Change Adaptation Plan and a Vision for the future for agriculture and food within a hundred days of taking office to outline ways in which to ensure the resilience, sustainability and competitiveness of European agriculture and its entire food system.

However, as important as setting out a long-term vision is, more immediate, pressing issues need to be tackled. The Commission's vision will require specific commitments and actions that signal Europe's commitment to enacting its vision for agriculture and food in a pragmatic, technology-neutral fashion that provides the kind of innovation support, regulatory predictability and stability that any sector needs to flourish.

In particular, we expect that the EU and national authorities support the uptake of protein crops and the development of novel foods with a twin goal: Reducing import dependencies and helping the sector's adaptation to the upcoming challenges of climate change and shifts in consumer demand towards more sustainable diets.

To reduce import dependencies and meet the expected increase in global protein demand, it will be necessary to scale up protein production. However, in order not to expand land use for agricultural purposes, greater efficiency will be required. Adapting regenerative agricultural practices by farmers, disseminating information on the latest techniques, mapping the most suitable areas per crop variety are all important aspects to increase land efficiency. The Protein Diversification Think Tank has published

various papers outlining several different approaches that can help policymakers to reduce import dependencies.

The transition to a more sustainable agricultural model will require time and efforts by policymakers and operators, which will not come without additional costs. As a result, introducing additional income streams and product diversification can boost farmers' economic viability in the transition, while offering long-term resilience through the adoption of a more diversified set of crops that can help farmers to adapt or mitigate the impact of climate change.



Addressing Concerns: A Vision for Consumers



European consumers have mixed perceptions of alternative proteins, partly as some are in the spotlight more than others. EIT Food's Consumer Observatory has produced **a consumer report** looking into the different consumer profiles' perceptions of insect-based, plant-based, and microorganism-based products, like fermented derivatives from mycoproteins and yeast-based proteins. The findings showed that further work is needed to address consumer concerns, particularly over the convenience, taste and feeling of satiation of consumers when eating alternative protein-based products.

Working to meet consumer expectations and address their concerns over alternative protein-based foods all contribute to the long-term vision of ensuring the resilience and sustainability of Europe's agri-food sector.

A United Nations 2023 report assessing novel alternative proteins recommended the launch of public information campaigns to improve consumer awareness and understanding of protein alternatives. The think tank can play a key supporting role, by offering easily accessible, free materials, developed by our members based on the latest scientific evidence and input from the sector, offering a much-needed, easy and efficient way to use public funding to address consumer concerns.

To support policymakers to make informed choices based on objective, evidence-based and up-to-date data, the EIT Food Protein Diversification Think Tank conducts extensive and regular consumer research exercises to understand the nuance of consumer concerns regarding agricultural innovation, including the more innovative protein sources like cellular agriculture-derived products, and help dispel misinformation.

Another policy option, as highlighted by the UN in a 2023 report, recommends changes to existing public procurement policies to offer more alternative protein products to boost the healthiness and sustainability of the food choices offered in public canteens.

Competitiveness: Europe as a Global Leader

Boosting the European economy's competitiveness is another of the Commission's key priorities for the next five years. The European Commission has promised to mainstream competitiveness into every policy field and introduce competitiveness checks in future impact assessment of its legislative proposals. Europe's agri-food sector will play an important role in the Commission's efforts to bolster European competitiveness by harnessing the opportunities offered by biotech and ensuring a more level-playing field domestically.

Regarding new proteins sources and food processes, in 2023, total global retail sales for plant-based alternatives added up to €26.3 billion (\$29 billion), 34% higher than in 2019, as consolidated food companies and restaurant chains increase their efforts to offer a broader menu of non-traditional protein food options and new start-ups emerge. In 2023, alternative protein start-ups raised approximately €1.45 billion (\$1.6 billion¹), with a 22% year-on-year increase for

cultivated meat start-ups alone. In total, in the last 5 years, these start-ups have raised 4.1 billion dollars, or 95% of the total private investment in this period, showing the growth and attractiveness of a new and innovative sector.

European start-ups are playing an important role. Currently, out of 174 companies involved in cultivated meat, 47 are European, while 61 out of 158 companies involved in traditional, biomass-based and precision fermentation are also European. European start-ups in cultivated meat are leading the way, with French start-up Gourmey, being the first company to apply for marketing authorisation in every continent.

In spite of the leading global role that European entities are playing in protein diversification, they face a difficult landscape concerning both public and private investment. Private investment, which already paled in comparison (under 15% of global investment in spite of representing 30-40% of all start-ups) has seen a drop in private investment that is expected to continue in the near-term.



¹ State of the Industry report_Fermentation_2023 (gfi.org)

In light of the diminution of private investment opportunities, it will be crucial for public funding to fill the gap, particularly for the newest protein alternative options that are only now entering a commercial phase. However, up until now, EU investment has been widely insufficient, with investment into novel foods and food processes being less than 1% of the total funding in the myriad of public funding streams that support agriculture or innovation. For instance, one of the noteworthy EU initiatives to improve awareness of alternative proteins under Horizon Europe devoted 7 million euros.

By contrast, the UK has allocated nearly 20 million euros for cultivated meat research projects in 2023, and another 2.5 million in business grants for cultivated meat start-ups, while allocating 45 million pounds of public investment (paired with private financing) on 3 new novel foods' innovation hubs². At the same time, Australia, Canada or the US, major agri-food competitors, have pointed to novel foods and the use of biotech for food as major policy priorities, with Canada, for instance, investing significant public capital (ca. €135 million) into the sector to fill in the gap of private investment.

The European novel food and alternative protein start-up scene, struggling with shrinking private funding and insufficient public support compared to its competitors runs the risk of missing out on a new sector in spite of its relevance. **This will have very negative impact on innovation, as it can prompt many innovative firms to leave the EU to benefit from what they see as a more favourable regulatory regime** (where, like in the US or Israel, the commercialisation of cultivated meats is already allowed) or to obtain better access to public or private investment.

These are some of the intertwined priority areas for the future: Facilitating the growth and retention of innovators is a key policy priority for the new Commission. Food innovators, like innovators in other sectors of the European economy need a more predictable and friendly regulatory framework combined with improved access to public and private capital to flourish.

A Favourable Environment for Growth

SMEs, innovative farmers and food and agriculture innovative start-ups will play a key role in boosting the competitiveness of the European Union at the global level, and of economic operators at the individual level. To be able to do so, it is crucial that policies are in place to help them innovate. The early adoption of novel foods and alternative proteins can offer European economic operators an edge over non-EU competitors, establishing the EU as a leader in its adoption and development.

The announcement that the EU will adopt a comprehensive approach to supporting biotechnological innovation through a **Strategy for European Life Sciences and a new European Biotech Act due in 2025** all offer an opportunity to create a more predictable and favourable framework for innovators to scale up, and to obtain better access to capital to fund the growth of small innovators.

However, there is further action needed on the regulatory side to favour the growth and dynamism of innovative agri-food start-ups and SMEs. The Novel Foods regulatory process is often cited by entities in the microbial-based protein sector, for instance, as a significant hurdle by significantly delaying the commercialisation of these new alternative protein products. As a result, despite the financing by the EU of these initiatives, microbe-based proteins like Solein (developed by a Finnish startup) were commercialised in Singapore in October 2022 while they are still awaiting approval in the EU. Similarly, European start-ups like Meatable, Bluu Seafood or Vital Meat have prioritised approval in jurisdictions like the UK and Singapore over the EU precisely due to the envisaged regulatory difficulties.

Considering the amount of public investment already devoted to supporting food innovation through biotech R&D financing and the resulting flourishing start-up scene and IP development, forfeiting the head advantage and the potential for competitiveness due to insufficient access to funding or an ill-suited regulatory regime would be both detrimental to European welfare and a waste of public resources.

² The Centre for Process Innovation's Novel Food Innovation Centre, the University of Bath's Cellular Agriculture Manufacturing (CARMA) hub, and the START Healthy, Stay Healthy (STAR) hub of the University of Surrey partnered with the British Nutrition Foundation and funded by Defra.

A Healthy Environment and Consumption

Sustainability – in all its dimensions – is central to the future of the European food system and an important element in achieving a greater degree of resilience and competitiveness as well as ensuring the viability of farmers' long-term income.

However, policies improving the sustainability of agriculture and food production need to be undertaken pragmatically to limit any negative impact on economic operators. Protein diversification offers that pathway. A shift to alternative protein foods can reduce import dependencies, lessening the exposure to risks and increasing the resilience and food security for producers and consumers alike.

Similarly, embracing the planting of certain varieties of protein and cover crops, like legumes, radish, oats or barley, offers farmers another way to benefit from sustainability-boosting policies, like carbon farming and initiatives aimed at improving soil health and soil biological diversity (which are also beneficial for future yields). These policies offer avenues to both accomplish the decarbonisation goals set out by the European institutions and national governments, but also to introduce new income sources through carbon credits and opportunities for agri-food entrepreneurs and innovators.

National dietary guidelines across the EU stress the importance of a nutritionally balanced diet with a more varied array of nutritional sources and a reduction in the consumption of certain animal proteins while ensuring that citizens can continue to have access to a fresh, diverse, healthy and nutritionally varied diet. Alternative proteins can play a pivotal role in meeting these twin objectives by ensuring a comprehensive and diverse nutritional balance (including proteins) and reducing the consumption of meat and other animal protein products to the recommended intake amounts and frequency.

Greater consumption of alternative protein products would lower the existing pressure on farmers to maximise yields and increase production and allow them to embrace more premium agricultural products (like organics, free-range, etc.), reconciled with the demands for a shift towards a more environmentally-friendly farming and enabling, in some instances, the reduction in the total land area used for agricultural purposes, with a positive effect on biodiversity and landscape diversity.



Looking Ahead to 2050

According to the FAO, protein consumption is expected to continue to rise in the coming decades by 2050, primarily driven by increases in the least developed and developing countries. Compared to the 2005 figure, global increase in protein production could be 119%, while consumption of animal proteins may increase by 79%, without changes to our current dietary patterns and preferences. However, various environmental issues and the risks posed by climate change may jeopardise the global ability to meet this expected rise in demand for proteins.

Conversely, in Europe, current consumer trends point towards a decrease in meat consumption, driven by an increase in the number of 'flexitarian' consumers (consumers who continue to eat meat and dairy products but often eat plant-based alternatives and aim to reduce consumption) over time, with a shift towards legumes and other alternative protein products as the most common protein source in their diets.

To meet the future demand for a more protein-rich diet worldwide paired with the expected decrease in meat consumption, the European food system will need to adjust to be able to produce sufficiently and to adapt to the expected alternative protein consumption increase in both food and animal feed, particularly in Europe and North America.

This offers opportunities for European biotech entities and farmers alike. Despite regulatory and financing issues, European start-ups and companies are at the forefront of alternative protein research and innovation. This, in turn, can enable European agriculture to capitalise on the growing global demand for protein and maintain its status as the world's leading net agri-food exporter. By producing and exporting alternative protein products and shifting conventional protein production towards higher quality products, European agriculture can provide greater added value to producers without increasing environmental pressure.

Protein diversification offers a path forward to a new business model for European agriculture and its food system, focused on ensuring the economic, social

and environmental sustainability of the food system and the rural milieu. This model goes beyond an emphasis on ever-increasing yields and production, a model that is already showing numerous signs of fatigue, as soil quality has degraded significantly while climate change threatens existing traditional farming practices, ultimately jeopardising the medium- and long-term sustainability of the food system and rural livelihoods.

Protein diversification offers an effective and promising solution to the quandary of how to ensure the current food availability and affordability levels and the sustainability of the rural milieu while accelerating the restoration of the European environment and driving the food system towards greater sustainability.

At EIT Food's Protein Diversification Think Tank, we wish to offer our support and cooperation to open a pathway looking ahead to 2050 to prepare for changes in global protein production and consumption and to find new ways to drive innovation, create business opportunities, and foster a world where the food we consume is not only delicious but also good for our health and the planet.



Meet the Think Tank



The **EIT Food Protein Diversification Think Tank** brings together a broad network of leading academics, research institutions, innovative start-ups, NGOs, SMEs, and larger companies.

Our goal is to support the adoption of alternatives to traditional animal-based proteins through evidence-based, technology-neutral approaches and models of protein diversification. We aim to foster innovation in the EU agri-food sector, overcoming technological barriers to position the EU at the forefront of a new era in food production.

Our unique approach, combining a broad array of members with different perspectives, allows us to have a systemic and proactive approach to support the development of pragmatic, informative and objective policy recommendations, and to conduct our own research and projects to provide insightful and objective information feeding into public debates around polarised issues concerning the future of the European food system.

We would be delighted to present our work in more detail and provide additional insights to policy makers. To set up a meeting or organise a briefing on the state of play of protein diversification in Europe, please feel free to contact our Public Affairs team at EIT Food at Stacey.Aquilina@eitfood.eu

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