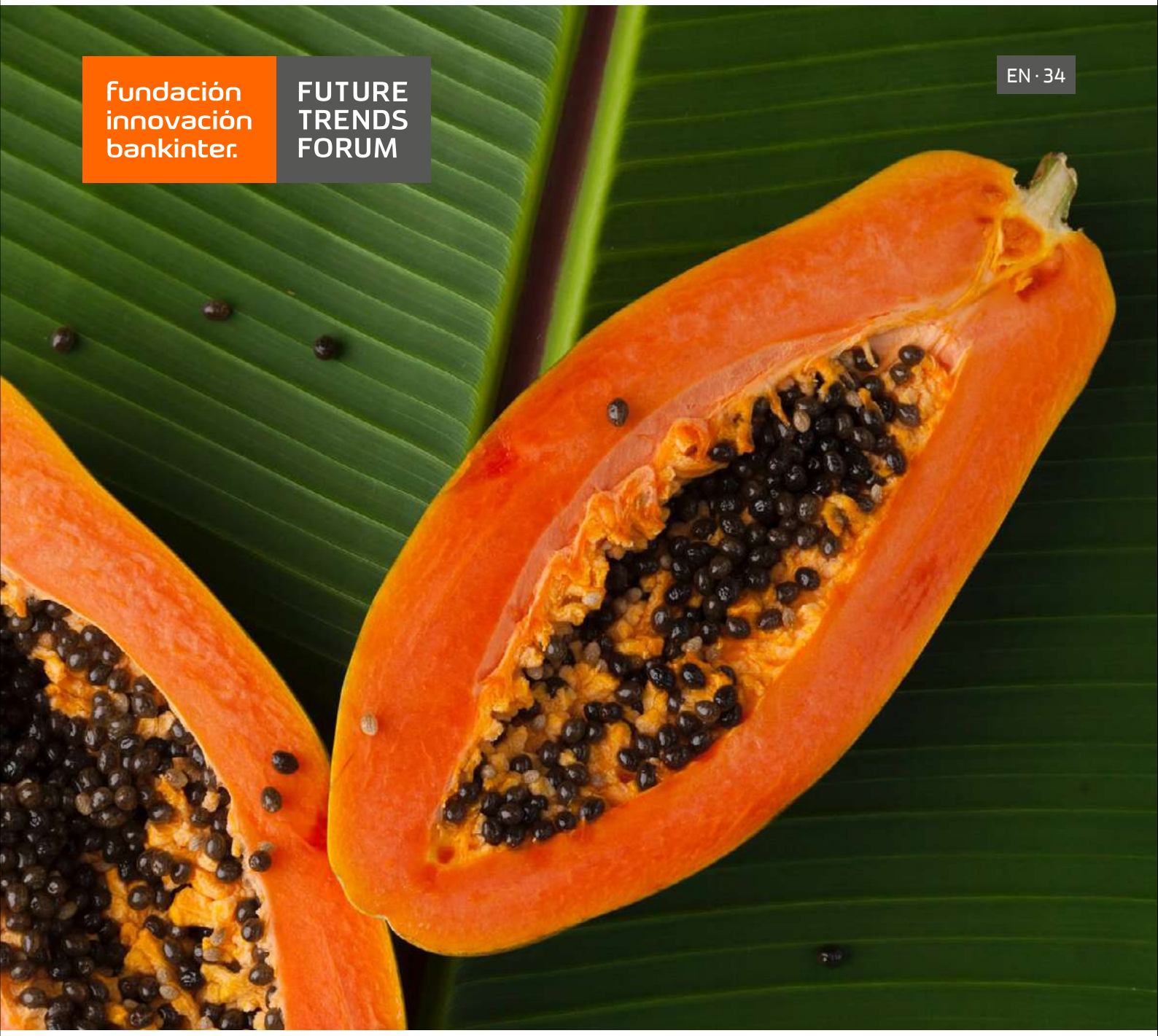
fundación innovación bankinter.

FUTURE TRENDS FORUM

EN · 34



Food of the Future

Index

00

Introduction

How will we feed ourselves in a few years, when there are 10 billion people on Earth? Will our food experience as radical a change as those experienced in healthcare, communications, the way we work or interact? Will we eat eggs without hens, drink milk with no cows, tomatoes without gardens?

Aided by worldwide experts in food, this report tries to address these questions, from how to achieve the UN **Sustainable Development Goals** to the role of **epigenetics** in food, and the most interesting *foodtech* innovations, such as **cell-based agriculture** and the very much needed **leadership** in the industry.

This is a watershed moment for humanity, when **science, technology and innovation can change the course of food systems** as we know them. Until recently, the **economic sustainability** of the system has been the top priority, meaning, maximizing production at the lowest possible cost. For a few years now, **environmental sustainability** and **social sustainability** have been gaining prominence. **Innovations in methods, processes, products and relations may speed up the sustainability balance.**

In the last 50 years, the food system has changed radically, increasing the efficiency of the entire supply chain, guaranteeing food and nutritional security around the world, and—thanks to technology—transforming the way we produce, trade and distribute food, even the connection to an increasingly better informed consumer who is very much aware of their nutritional decisions.

Our food system can now produce more food than ever before. However, there currently are **820 million people** who go hungry and close to **2 billion overweight**, which increases the incidence of food-related diseases. Paradoxically, in parallel to this reality, a third of all food produced around the world is wasted, according to **the latest data** from the United Nation's Food and Agriculture Organization (FAO).

The health of the world's population is at risk because of food: in some regions, people do not eat a sufficient amount of food, with the necessary nutrients, and the overeat food high in saturated fats or sugar.

Climate change is bringing along huge difficulties in food production, because of the volatility of weather conditions in some regions suffering droughts, floods or fire. Besides, food systems **account for 80% of losses of biodiversity, 80% of deforestation and 70% of the fresh water used,** as activities related to the food system (agriculture, use of the land, storage, transportation, packaging, processing, retail sale and consumption, including food waste and food loss) **account for 21% to 37% of** greenhouse gas emissions.

Our food systems are at a crossroads, and the COVID-19 pandemic has highlighted the critical and the weakest points, putting us at the brink of a global food emergency.

In this context, the Bankinter Innovation Foundation focused its think tank **Future Trends Forum** on the food of the future, gathering behind the screens for the first time more than thirty multidisciplinary experts interested in bettering our food system. They identified the **main trends** that will have impact on society and proposed an **action plan to make headway in human food sustainability.**

This report analyses the most important challenges the food system faces in 2020. It identifies all players involved and to-be-involved in this journey towards the food of the future. The report prioritizes the challenges as well as **potential solutions brought about by science, technology and innovation,** which may enable us to tackle significant challenges and lead initiatives to achieve them, shaping a **roadmap to make the food system sustainable worldwide by 2030.**

The Future Trends Forum experts anticipate **faster changes in the food system given the current health and economic crisis.** Therefore, we expect this report to become a seminal paper for the leaders meeting at the *Food Systems Summit* in 2021, as several FTF experts will attend the summit. That is where the global commitments and measures to transform the current food system will be taken.

01

Present and future of the food system

"We are all part of the food system and we can all take action to lead the change we need" was the message launched by António Guterres, Secretary General of the United Nations, regarding the **report on food security policies** launched in June 2020. This report is expected to set the grounds to activate the measures that will transform food systems in all industries.

In the next 15 years we will face food security, a complex challenge: **guaranteeing healthy and sustainable nutrition for a growing population of 10 billion people by 2050.**

That is the thinking that spurs this report, which identifies the most important challenges currently and critically affecting our food system, for which solutions are urgently needed.

These are the top priorities:

1. **Food security**
2. **Health and nutrition**
3. **Sustainability and resilience**
4. **Food technologies**
5. **Leadership**

1.1

Food systems

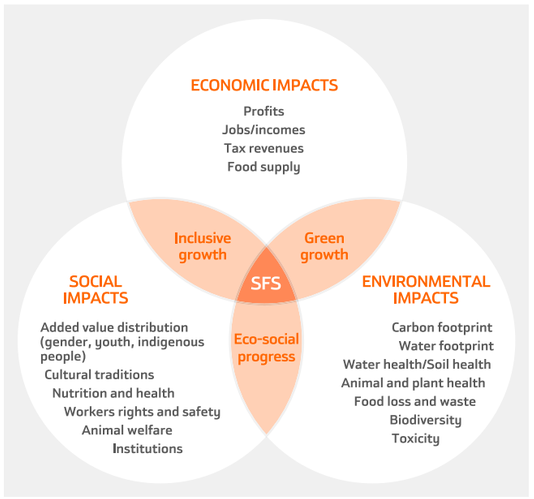
The global economic contraction could impact food security negatively, as the number of undernourished people would increase by 14.4 million to 80.3 million people by the end of 2020.

- The future of food is one and only one: sustainable food systems

For **Roberto Ridolfi**, Assistant Director General at the FAO, the future of food is necessarily linked to the **food system sustainability** and specifically aligned with the Sustainable Development Goals (SDGs); especially with **SDG 2** (Zero Hunger) and **SDG 12** (Ensure Sustainable Consumption and Production Patterns).

Food security, which is achieved when *"all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life"*, as per the FAO's definition, is the objective that must be achieved.

Moreover, if it is done sustainably, we would be taking a real step forward towards a Sustainable Food System, one that *"delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised"*, as per the FAO's definition.



Source: FAO "Sustainable food systems".

Sustainability indicators offer experts a broad framework of objectives to urgently transform the food systems of the world, which shall pivot on these axes:

- **Economic impact - Prosperity.**
- **Social impact - People.**
- **Environmental impact - Planet.**

Roberto Ridolfi
Assistant Director General at the UN Food and Agriculture Organization (FAO)

The SDGs and the Food System

Duration: 10:58 min

How to make headway towards the three-pronged sustainability?

First, there are some powerful **traditions and cultures,** as in the Mediterranean region, which will play a key role in the transformation of the food systems going forward.

Second, **consumers' behavior** around honesty, authenticity and food labeling, essential areas in which trust in the market is created.

Third, harnessing **digital technologies** to accelerate and scale high-impact potential, innovative ideas around food and agriculture, transforming digital solutions and services into global public goods. It is a matter of empowering rural homes through technological innovation and instilling an entrepreneurial spirit for food and agriculture in the youth.

Making headway towards **greater social sustainability** requires tackling and correcting the most critical shortcomings of food systems, which have become apparent during the pandemic, threatening the life and livelihood of people around the world, particularly the most vulnerable groups.

Ridolfi states that *"most food in this planet is produced by people whose calorie intake does not match the physical effort that producing the food requires"*. He further adds that leadership and coordination across continents is required to work together in a new direction.

Making headway towards **greater environmental sustainability** requires rethinking food systems to **protect biodiversity** and do our best to **slow down climate change.**

Who calculates the cost of biodiversity when producing food?

Biodiversity is essential for life: our planet and the economy depend on it and on ecosystems, which provide us with food, health, drugs, materials, leisure and wellbeing. Let us not forget that half of the world's Gross Domestic Product (GDP), that is, some €40 trillion, depend on Nature.

Unsustainable human activities are irreversibly deteriorating the planet's biodiversity: the global population of wild species has shrunken by 60% over the last 40 years, and close to 1 million species are endangered.

The loss of biodiversity and the climate crisis are interconnected and feed on each other. The European Union is already working on a strategy to mitigate the effects of climate change before 2030. Besides, the FAO, in its 2019 report *The State of the World's Biodiversity for Food and Agriculture* offers an assessment of biodiversity for food and agriculture around the world, based on information given by 90 countries. This evaluation describes the many **contributions of biodiversity to food health and nutrition, as well as the resilience** of production systems, and points at the **main drivers to reverse the trend:**

- **Public policies to protect biodiversity**
- **Advances in Science and Technology**

As mentioned earlier, if the value of biodiversity accounts for 60% of the world's GDP, destroying it should bear considerable social and economic cost. Ridolfi would like to define a new concept of **sustainability-based economy,** one that includes the **"natural capital"**, that is, the environmental cost of the food we eat.

Along this line of thought, tools to meet the Sustainable Development Goals should be developed. The tools could include developing **environmental sustainability and biodiversity credits,** which should use a similar assessment system as the carbon footprint—rewarding, punishing or demanding economic compensation, depending on the impact produced.

1.2

The sustainable-while-healthy challenge

We are facing a dual challenge: we must achieve the food system sustainability and a sufficient, healthy food intake for everybody.

Undernourishment and unhealthy diets are two very relevant causes of death. Therefore, **food security and nutrition must become a priority** if we are to guarantee the wellbeing of the world's population. However, the input data are not positive:

- Food and agriculture account for some 21-37% greenhouse gas emitted globally.
- 1/3 of cropland and arable land is severely degraded and loses productivity.
- 820 million people still go hungry, while 2 billion lack micronutrients and 1.9 billion are overweight or obese.

1.2.1

Diet

Hippocrates said *"let food be thy medicine and medicine be thy food"* 25 centuries ago, thus evidencing the link between food and heath, as the right choice of food can prevent the development of some food-related diseases.

Are sustainable and healthy diets for 10 billion people in 2050 feasible?

Walter Willet, is the Epidemiology and Nutrition Professor at *Harvard T.H. Chan School of Public Health*. He has published over 1,500 papers about various aspects linking diet and disease. Supported by the report of the EAT-Lancet Commission he co-chairs, he states that a healthy and sustainable diet for 10 billion people is feasible in 2050. Healthy and sustainable diets already exist. It is a matter of making all stakeholders (public administrations, citizens, international organizations and agrobusiness alike) aware of the fact that this is the only possible option going forward.

The clearest indicator of the lack of general awareness is the increase in obesity recorded in basically all countries in the world.

Researchers in nutrition and health use the ***Healthy Eating Index*** to research the quality of diets and measure the compliance with dietary recommendations and guidelines. In 2002, **Walter Willet**'s research team designed the ***Alternate Healthy Eating Index*** to assess diet quality around the world, as it can **predict and reduce food-related mortality in chronic diseases.**

> "A rich and balanced diet could reduce the risk of premature death by 20%"

Walter Willet
Epidemiology and Nutrition Professor at Harvard T. H. Chan School of Public Health

Health and nutrition

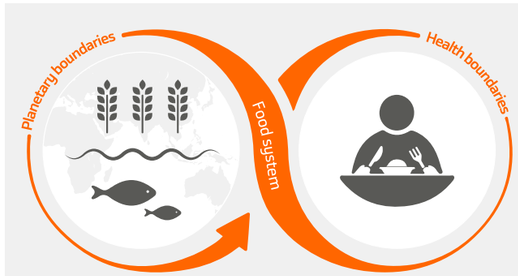
Duration: 08:45 min

Based on this Index, they established that **the Mediterranean region continues to offer a best practice in healthy diet** (although the quality of the products is deteriorating). It is followed by South East Asia and Japan, with 65 points out of 100. In Willet's words, there is no country with an optimal diet at present.

Regarding the environment and climate change, the trends are alarming. Based on the latest forecast by the NASA Earth Observatory, the average annual temperature will rise by at least 1 degree Celsius over the next five years, compared with pre-industrial levels (1850-1900). And 2020 is expected to be one of the warmest years of the XXI century.

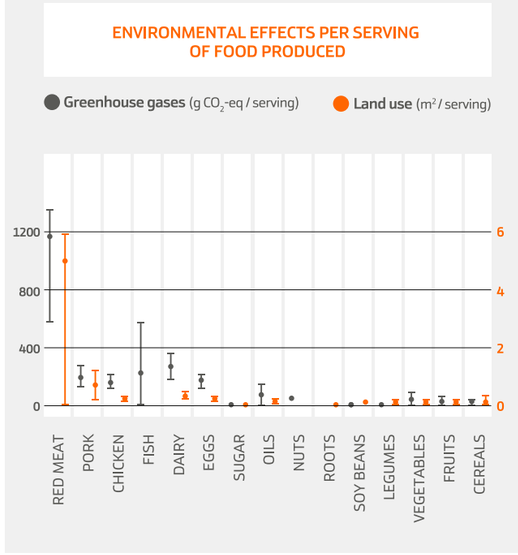
The path to tackle changes in the food system must take into account:

- **The fight against climate change and the ecological disaster** we are heading towards.
- **Health.**



Source: Summary Report of the EAT-Lancet Commission.

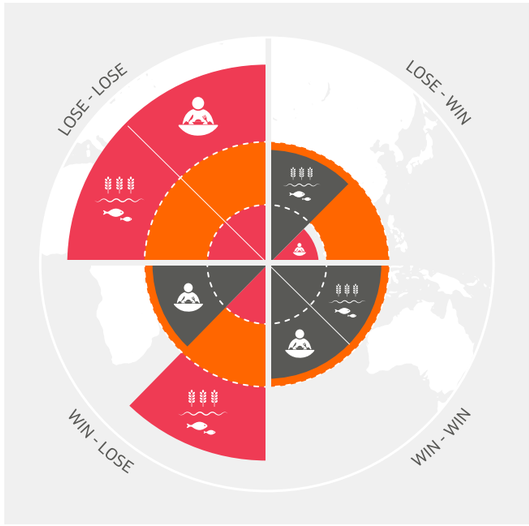
Both of these have a common enemy, which is the **overconsumption of red meat,** since its production generates huge amounts of greenhouse gases and requires the use of vast lands.



Source: Dr. Walter Willett: "Health and nutrition", at Future Trends Forum "Food of the future".

The shift to healthy and sustainable diets will require essential changes. The global consumption of fruits, vegetables, nuts, seeds, and legumes will have to double and the consumption of food like red meat and sugar will have to reduce by more than 50%. That is the conclusion of the report quoted.

The following graph shows what is the **safe space for food systems,** represented by the orange circle. The wedges represent **dietary patterns and food production patterns.** These dietary patterns can be "healthy and unsustainable" (win-lose), "unhealthy and sustainable" (lose-lose) or "healthy and sustainable" (win-win).



Source: Summary Report of the EAT-Lancet Commission.

The win-win dietary pattern is a diet rich in plant products with less animal-sourced food.

> A diet rich in plant products and with less animal products is healthy and beneficial for our Environment

1.2.2

Sustainability and resilience

Climate change threatens the current food production methods, and these production methods worsen climate change.

A vicious circle severely affecting the planet, one that prevents limiting the rise of global temperatures to safe levels unless we change the way we produce our food and manage the soil.

The FAO defines resilience as *"the ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover from them in a timely, efficient and sustainable manner. This includes protecting, restoring and improving livelihoods systems in the face of threats that impact agriculture, nutrition, food security and food safety."*

The foundation of a resilient and healthy diet is **sustainable agriculture,** which first requires maintaining **fertile, healthy land** that can produce healthy seeds to then produce nutritious food for people.

Sara Eckhouse, Executive Manager at FoodShot Global, proposes focusing on two essential areas, where significant change is required to transform the food system:

- **Optimizing the use of land,** in such a way that the global agricultural production shifts **from an extractive model to a restorative model.**
- **Obtaining better quality proteins** for human consumption while polluting the least possible.

Let's take a closer look into both areas:

Optimizing the use of land

The 2019 IPPC report on climate change and the Earth numbers the increasing threats arising from shortage of food and water, undernourishment and desertification.

Sara Eckhouse
Executive Manager at FoodShot Global

Resiliency & Sustainability

Duration: 08:16 min

The current trends are disquieting:

- **The growing world's population, urbanization and the rising middle class, the exponential increase in food demand,** particularly meat, whose production incurs in high environmental impact.
- **Soil degradation, deforestation and low levels of biodiversity, together with greenhouse gas effects** resulting from food production contribute to **climate change,** which in turn has impact on crop yields, reducing their nutritional value and increasing the pressure on agricultural economies and threatening food security worldwide.

- **Shortage of nutritious and safe food** around the world, particularly in low income communities, is stunting hundreds of millions of children. Besides, food produced in this context increases the risk of developing cancer, diabetes, infections and chronic diseases.

The FAO calculates that there are roughly 60 years of farming left at the current rates of soil degradation

The world has already lost 30% of arable soil due to excessively intensive and polluting agricultural practices.

Intensive farming practices generate an excessive dependence on chemical fertilizers, pesticides and unsustainable soil erosion rates. **Every year we lose 4 million hectares of agricultural land** due to this problem.

it is urgent for food production systems around the world to shift from extractive to restorative methodologies, where **soil is the basis for a healthier, more sustainable, and equitable food system**. This is how soil can become a vector to increase **nutrient bioavailability** and **farmer profitability.**

Soil is amongst the most vulnerable resources in the face of climate change, soil degradation and loss of biodiversity. It is also a great carbon reserve, as it contains more carbon than the atmosphere and the planet's plants put together. Preserving it can increase crop yields, making them more resilient while increasing the quality of the soil as well.

How can we transform the food system into a healthier, more sustainable and equitable food system?

There are several collective initiatives around the world working on this already. **Foodshot Global** is one of them. It is a collaborative capital investment platform that empowers innovators, entrepreneurs and researchers. The platform identifies the most critical obstacles to create a healthy, sustainable and equitable food system.

Foodshot global leads a global consortium of venture funds, banks, corporates, universities and foundations, deploying capital through awards to **channel innovative solutions with the potential to transform food and agricultural problems.**

Facing the challenge of optimizing the use of soil was addressed in the first Foodshot. The winning project, *Innovating Soil 3.0* kicked off in September 2018. It has analyzed how to close existing gaps in the market to optimize soil and **support high potential innovations in terms of scale and impact for a healthier, more sustainable and equitable production system.**

Then, *Innovating Soil 3.0 Deep Dive* was launched. It focuses on three key aspects of soil health: **carbon measurement, microbiome functionality** (there are microorganisms such as bacteria, algae and fungus that naturally exist in fertile soil and that are beneficial to the soil) and the quick adoption of **regenerative practices.**

This is the type of commitment we must take with soil in the long term to truly **develop from scratch the resilience and sustainability of the food system.**

The purpose of a successful and sustainable food system is to provide world-class nutrition

Obtaining better quality proteins

As the world is facing challenges—a growing world population, unsustainable consumption patterns, climate change and the recent pandemic—it becomes apparent that **democratizing nutrition is the next milestone in the food industry.**

Therefore, **innovations across all protein-based food producing sectors are urgent,** particularly in the most traditional sectors: livestock breeding, aquaculture and fishing. Technological innovation strategies have enabled researching and developing new sources of protein based on algae, fungi, bacteria and insects that will set the future trends in food, together with **cell-based agriculture,** which is discussed in chapter 2 of this report.

We must work together to **develop a protein system that leverages science, technology, investment and innovation to offer great benefits to human and planetary health and reduce the consumption of resources.**

Precision Protein is the outcome of a long-term commitment to nutrition. It seeks to develop a system to source proteins that is aligned to human and planetary health. It intends to connect global and regional supply and demand, increasing access to food and reducing food waste and environmental damage.

Resilience and sustainability in the context of investing in the food system

Sustainability means that farmers make a profit and a decent living; resilience means that biodiversity and supply chains can withstand the blows of climate change, pandemics and other global threats.

Public entities, multinational companies and governments must commit deeply and invest to change the global food system.

When corporations and their shareholders see sustainability as essential for their survival, there will be the necessary level of investment to undertake transformative change. This would become a profound, radical approach to produce better food.

1.2.3

Leadership in agrobusiness

Tina Lawton, former Asia-Pacific Manager at Syngenta , (one of the leading biotechnology companies globally and global leader in the seed and pesticide market) considers that **leadership in agrobusiness can be achieved. Common goals and principles must be set. For this to happen, we need the commitment of governments and global coordination through specific development programs.**

Tina Lawton
Former Asia-Pacific Manager at Syngenta

Agribusiness Leadership

Duration: 10:05 min

Leadership in agribusiness is driven by SDG compliance

This collaborative effort must take shape in an approach that **empowers small farmers,** gives them training, weather forecasting tools, strong seeds, insurance against disasters and financing options. This scenario would improve their source of livelihood and generally, it would also have positive and immediate impact on achieving the Sustainable Development Goals.

The approach to tackle this may vary based on the country this effort is addressing:

Opportunities in developing countries

Let us illustrate the issue in developing markets with Lawton's story about a small farmer in northern India who grew hybrid corn (using two hectares simultaneously) as a strategy to guarantee production. If it did not rain during the sowing season, the farmer would lose his investment in seeds. This would in turn prevent him from feeding his family. A story that could be told from many farmers in the region.

At this point, Syngenta kicked off the **rain insurance program,** where farmers would buy a bag of seeds. Along with it, they received a card to join the rain insurance program. Via satellite, Syngenta obtained data on the level of rainfall in the region. When rain was scarce, farmers received a QR code on their phones that they could exchange for a new bag of seeds. This way, the farmer could quickly buy new seeds to increase the production sustainably by offering high quality corn.

How can we do this better and to the degree and scale required? And how can we increase social and economic benefit?

The key lies in empowering small farmers. Rather than offering them grants, they must receive technological tools to increase their productivity and the resilience of their crops:

*"We must work together to ask **governments to shift from subsidies to resources** that support education, investment in infrastructure (watering systems, roads, storage to back productivity and guarantee farmers' access to seeds)".*

NGOs also play a key role, as they build bridges between the public and the private sector, thereby enabling their beneficiaries to participate in this type of initiatives.

Governments, policymakers and other key institutions play a key role to **turn carbon management into an incentive** to farmers who prove they have adopted sustainable farming practices.

Opportunities in developed countries

In developed countries, such as the United States, farmers are in a wholly different position: many of them need aid, but they have far better access to financing, technology and much deeper knowledge of production techniques. As a result, their productivity is 3 to 4 times greater than that of small farmers in India.

The productivity of developed countries and carbon emissions are closely related, as there are opportunities to reward sustainable producers who reduce carbon. For this to happen, **financial incentives** are needed.

Finally, regarding leadership, we must not forget **that consumers will play a key role in the future of food,** by calling for certain products on supermarket shelves. This **requires raising social awareness around a healthier and more conscious consumption.** In the long term, this will foster sustainable changes across the food ecosystem.

1.2.4

Food security

Stefan Schmitz, Executive Director at Crop Trust, an NGO working to protect crop diversity, states that COVID-19 has revealed the depth of human vulnerability in terms of food security. It is a severe, exceptional event that has required quick, globally coordinated action. It is an opportunity to learn what are the critical points of the food system. We must respond to the challenge of securing food for the growing world population, while bearing in mind the hardly predictable environment and the potential global threats.

This challenge can be addressed with a three-pronged strategy:

- **Robust global institutions**
- **Committed political leaders**
- **Regulation that promotes R&D**

Based on this strategy, there are two axis on which to work:

Agrobiodiversity adapted to cultural and environmental peculiarities across regions and **optimizing the food supply chain.**

Stefan Schmitz
Executive Director at
Crop Trust

Agrobiodiversity

Having sufficient and healthy food for all is linked to a **productive, diversified agriculture.**

Crop diversity is at the core of agriculture. It enables it to **evolve and adapt** to curb the challenge of producing sufficient and nutritious food sustainably for a growing population. The solutions to challenges that threaten our food systems lie in the **incredibly rich biodiversity of our food crops.**

This is how we can face the problems that threaten food and nutritional security. Beyond what has already been mentioned, they include these health-related challenges:

1. The current food systems do not have the capacity to feed us correctly.
2. Most of the 500 million small farmers around the world live in poverty.
3. The current farming production methods threaten the environment.
4. Food waste and loss have impact on the sustainability of food systems.

5. The loss of agricultural biodiversity, including crop diversity, radically reduces the range of options for agriculture and food going forward.
6. Food systems are unstable and vulnerable to economic and ecological disruptions.

Optimizing the food supply chain

The current food systems will not be easily changed or made more resilient and sustainable. It will not be easy to increase food security either. *"The silver bullet does not exist; there is not one single solution that will be enough by itself. However, we must rethink globalization in agriculture and the food industry",* says Schmitz.

> It makes sense to focus less on global supply chains and more in the regionalization of food systems

The following aspects should be revised:

- **Readjusting the sector's globalization.** Globalization is unfavorable to Western Africa because of its impact on the economy, agriculture and nutrition of their population. Greater self-sufficiency would mean greater security against crises and greater rural development.
- **Self-sufficiency alone** is not the solution, although **it must be part of a comprehensive strategy,** developed in synch with the region and the country.
- **Strengthening ties between rural and urban areas,** reducing dependencies from global markets and increasing self-sufficiency. The majority of the demand must be met with domestic vendors, which is a great opportunity to **develop rural economies.**
- **Focusing on policymaking for rural areas.** Decision-making powers must be decentralized, from capital cities to regional hubs, transferring human and financial resources so that local people and economies are empowered. This would translate into **accountability and civil society engagement.**
- **Agricultural biodiversity should contribute to develop rural economies,** enhancing greater self-sufficiency through local crops, promoting the production of healthy and nutritious food and reducing food waste and loss.

The Doomsday Vault: a back-up for the food system

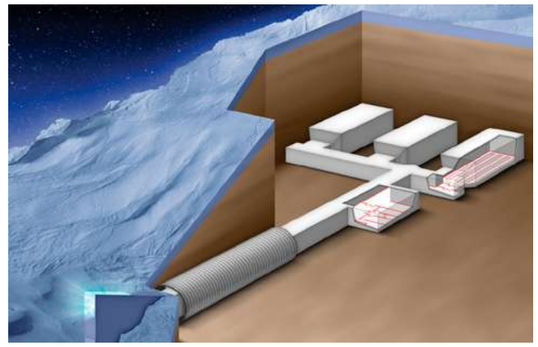
As climate change progresses and crop diversity lowers, our food systems become less resilient to environmental impacts. The more resilient our food systems are, the better prepared we will be to overcome a catastrophe in the shape of a pandemic or natural disaster.

A noteworthy initiative to increase the global food system resilience is the "Doomsday Vault" also known as *Svalbard Globale Frøhvelv*. It is a global seed bank where more than 1 million samples from 35 regional and international gene banks are stored.

The facility is dug 130 meters deep into solid rock, in a mountain mass of permafrost, with a stable temperature of between minus 3 and 4°C. The seed storage area has an additional cooling system, to bring the seed storing temperature to minus 18°C and ensure that it remains constant.

It is 130 meters above sea level and underneath 50 to 60 meters of rock, which protect it from potential natural disasters.

The Seed Vault's total storage capacity is 4.5 million seed accessions. Each variety includes 500 seed samples on average, which brings the total seed capacity to a maximum of 2.5 billion seeds.



Source: Crop Trust - "Conserving Crop Diversity Forever".

Urban agriculture to effectively meet the demand for food

Since the early 20th century, there is a growing interest to promote, create and encourage urban agriculture. The FAO highlights that this practice shows remarkable benefits in terms of food security, job creation, urban waste recycling and reinforcing the resilience of cities vis-à-vis climate change.

Lim Chuan Poh
Chairman of the Singapore Food Agency

Lim Chuan Poh, Chairman of the Singapore Food Agency, mentioned that Singapore has made strides in its urban agriculture model, which aims at producing 30% of Singapore's nutritional needs by 2030. An ambitious enterprise, taking into account that the surface of Singapore is barely 700 square kilometers and there are over 6 million people. Singapore's contribution to the world could be to export their model as a highly productive urban food solution.

This type of **vertical agriculture** model is being successfully implemented by tech entrepreneurs. Square Roots and AeroFarms are two examples. According to the latter, their productivity per square meter is 390 times higher than that of traditional agriculture, and they use 95% less water and 0 pesticides.

Their models use digital technologies intensively, from sensors to data science, artificial vision and artificial intelligence.

Tackling food waste

Food waste is another major issue humanity is facing. According to the FAO, approximately one third of all food produced globally is lost or wasted in the different stages of the production, distribution, or consumption chain, which amounts to 1.3 billion tons annually. This is more than the total food production of Sub-Saharan Africa and it would be enough to feed the more than 800 million people that suffer from hunger in the world.

The Future Trends Forum experts, both on this point as well as on sustainable quality production, highlight the fundamental role that end consumers must have, since, as Tina Lawton indicated, *"we produce what consumers demand."*

The report "*CITIES AND CIRCULAR ECONOMY FOR FOOD*" by the Ellen MacArthur Foundation highlights the essential role of cities in applying the circular economy principles to the food system.

This report will cover proposals and actions to end food waste.

1.3

Consumers will shape the trends of the future

Joxe Mari Aizega
General Manager at the Basque Culinary Center

Joxe Mari Aizega, general manager of the Basque Culinary Center, a first-class pioneering center on gastronomy, it is necessary to rethink the **education** of **consumers** as well as of **chefs** and **restaurateurs**, so that, *"food sustainability is perceived as a creative and positive challenge".*

> Food sustainability as a creative challenge for consumers

Pedro Álvarez, co-founder and general manager at Ivoro Food Innovation Hub and **Mimic Seafood,** says that if consumers made the right choices, many challenges in the system would be addressed. However, there is a lack of will to make those choices. It is urgent to review regulation applicable to companies that produce food unsustainably and unhealthily. One example could be the sugar product industry.

Pedro Álvarez
Co-founder and general manager at Ivoro Food Innovation Hub and Mimic Seafood

Likewise, **Beatriz Romanos**, a food technology and food innovation expert, founder of Techfood Magazine, invited experts to analyze the role that the food industry, restaurateurs included, can play. Leaders managing this type of services have high impact on consumers' opinion. There is a brand-new opportunity every day to connect with restaurant-goers with a menu in their hands. Influential chefs have an opportunity to tell a story (sustainability, nutrition, health, production, labelling) and have impact on the consumers' lifestyle and habits.

Beatriz Romanos
Founder of Techfood Magazine

Empathy and awareness

In the future of food, the consumer will be an agent of change. They will value having their aspirations and needs as human beings taken into account. This awareness will take them to support the companies and brands they see as honest, emphatic and generous.

One initiative to **empower consumers** to decide on what type of food they eat and at what price is called Who's the boss? The Consumers' Brand, led in Spain by **Annaïck Locqueneux**, who took on this initiative after several stints in mass consumer companies, NGOs and the hospitality industry.

The proposal is for us, consumers, to choose what we eat. Hence the name.

Consumers have a say throughout the product creation process, including selecting the farmer from whom they will be buying a certain product.

This is groundbreaking. Deciding where our money goes is new, we are no longer consumers, we are "consum-actors".

> Our actions as consumers can make a difference. There are lots of people in Spain, especially young people, who want to effect this change.

We take many food-related decisions on a daily basis that have impact on the planet and specifically, on the lives of the people around us. The term "consum-actor" shifts the paradigm of the present consumption model, empowering consumers and making them accountable for their decisions. Consumers decide the products they want to consume.

This platform enables consumers to find out about the origin of the product, the manufacture, packaging materials used, and even meeting who is producing the food we eat. There is a dialogue between producers, distributors and consumers that makes the latter part of the process.

The difficult balance between universal access to staples and a fair pay to producers requires policies and regulations that promote sustainable business models and aids or subsidies.

In Spain, people voted for staples such as milk, eggs, or oil. Now thanks to the supermarket chain Carrefour, the products picked by The Consumers' Brand are available on their shelves.

> "An informed and motivated consumer is much better than an ignorant, passive consumer"

Annäick says that guaranteeing a sustainable production and distribution requires a **well-informed consumer who can choose responsibly.** *"If you know what you are eating because you know the story behind that product... then you are deciding where to put your money, you are making a choice. It is all about being aware of the impact of your purchases".*

Annaïck Locqueneux
Headed in Spain initiative Who is the boss? The brand of consumers

Consumers in the news supply system

Duration: 31:25 min / Interview in spanish

02

Foodtech revolution and precision nutrition

Science, technology and innovation have partnered in today's nutrition. *Foodtech* is consolidating as a powerful industry, being as it is an interesting line of business both for companies with significant experience in the world of nutrition and for new startups.

The term *foodtech* encompasses **new technologies and innovative solutions that are radically changing the food, agriculture and livestock industries around the world.** It includes applying the Industry 4.0 to this particular sector, and the specific technologies and solutions that enable creating new food from new nutrients or combinations of existing nutrients.

In sum, *foodtech* encompasses the **ecosystem of innovative entrepreneurs and start-ups that are applying the latest technology to improve all the links in the food chain, from the production to the distribution, and ultimately, the consumption.** Ultimately, this industry seeks to tackle the upcoming global challenges, such as climate change and the increasing population, and guide the agri-food industry towards a more sustainable and efficient future.

Broadly speaking, *foodtech* start-ups seek to resolve some of these challenges:

- Food waste
- CO2 emissions
- Solid and liquid waste
- Drought
- Scarce labor force
- Health
- Opaque supply chains
- Inefficient distribution
- Food security and traceability
- Efficiency and profitability of farms
- Unsustainable meat production

Alessio D'Antino
Founder and CEO
of Forward Fooding

We have classified *foodtech* applications and services based on the goal they serve, following our own Future Trends Forum expert **Alessio D'Antino**Alessio D'Antino's taxonomy. He is the founder and CEO of Forward Fooding, the first collaborative platform in the world for the food and beverage industry:

In this chapter we will focus on the **new food and beverage** category, particularly, cell-based agriculture (laboratory meat and fish), as it is expected to stir a revolution in the industry. Just to get a rough idea of its potential, the agrifoodtech venture capital firm **AgFunder** has indicated in its report *Agrifood tech Mid-Year Investment Review* how start-ups developing innovative food and ingredients, including alternative protein, raised more funds in the first six months of 2020 than in all of 2019, hitting the $1.1 billion mark.

The search for **protein-rich alternatives to meat and fish** (plant-based meat, insects, **3D printed food** and cell-based agriculture) is a rising trend that attracts both investors and start-ups in a market that grows exponentially and globally. As a result, a **novel culinary offering** is available.

Precision nutrition is also on the rise. It offers **personalized diets based on your genetics** and linked to each person's genome and microbiota. Our organism offers key information on our health, which is key to develop personalized diets and offer specific food for each person or group affected by a certain disease or ailing.

In short, the scientific and technological communities share a goal: **bettering everybody's wellbeing and quality of life,** an essential pillar of health, particularly as it pertains the most common diseases in industrialized countries.

2.1

Technology that is defining the future

2.1.1

Foodtech landscape

We will now peruse the *foodtech* categories, technologies and solutions required, as well as some examples, following the taxonomy presented above:

Agrotechnologies

Services and technologies that seek to increase agricultural efficiency and sustainability, including the use of field sensors, drones, management and admin software for agriculture, automated equipment and water and fertilizer management solutions. This category includes novel cultivation techniques, such as vertical agriculture, aquaculture and insect breeding.

AeroFarms: As explained in chapter 1, AeroFarms is a worldwide leader in **vertical agriculture,** it produces 390 times more crops than traditional agriculture with 95% less water and 0 pesticides, enabled by ***an intensive use of technologies*** (sensors and IoT actuators, data science, artificial vision tools and artificial intelligence). This Company ranks first in *THE FOOD TECH 500*.

Consumer services and apps

Applications and services that facilitate access to food and information about it. For example, nutrition and recipe apps, **specialized digital platforms,** applications that help users find restaurants based on their dietary needs, and services to hire professional chefs to cook at home.

HireAChef is a North American collaborative platform enabling users to hire a specific chef online, based on the type of food preferred. In the future, this type of tool may also include cooking lessons for users.

Food delivery at home

On demand food delivery services directly to consumers. This category includes food delivery and ready-to-eat food from restaurants. It also includes dark kitchens, delivery of food kits and food and beverage delivery from specific local producers.

CloudKitchens, a start-up created by the co-founder and former Uber CEO, *Travis Kalanick*, is a prime example in this category. It is a bundle of businesses: food service franchise, real estate business to lease space and supply kitchen equipment, digital platforms and food distribution. Deliveroo was among the big groups to pioneer in dark kitchens, creating this service in 2017.

Food processing

Products or services that leverage on innovative techniques to process food or improve the functionality of ingredients. For example, **3D printing** solutions specific for food, packaging technology for specific ingredients or robotic solutions at an industrial scale.

eggXYt, a *startup* we have discovered via **Pedro Álvarez,** a Future Trends Forum expert, has come to solve an industry-wide issue in poultry farming. There are basically two different breeds of chicken: broilers optimized to produce the highest amount of meat possible, and laying hens, optimized to lay as many eggs as possible. In modern poultry farming, the males of laying breeds are useless, since they cannot lay eggs and they do not grow quickly enough to be sold as poultry meat. Therefore, **laying hen farms discard 8 billion newborn male chicks yearly.** In order to tackle this issue, eggXYt has developed a technology to detect the gender of embryos as soon as the egg is laid and before the 21-day incubation period starts. Farms will save on the incubation cost for the eventually slaughtered chicken and the costs incurred to determine the gender as they hatch. Moreover, 8 billion eggs could be added yearly to the global food supply. A brilliant solution to a complicated problem.

Food security and traceability

Technological solutions to disinfect machinery and other food processing equipment, assess product freshness and extend their useful life. This category includes as well **products or services to detect undesired ingredients, pathogens and allergens,** as well as ***blockchain*** **traceability applications** to trace the full supply chain and show the product source.

As consumers are increasingly conscious and seek nutritious, organic or locally produced food, offering transparency is a top priority at present. Food traceability is a key component in the food supply chain. In order to verify the quality and health of a product, large companies such as Carrefour, **Nestlé**, and most recently Starbucks have already implemented the blockchain technology. By using this technology, tamper-proof data can be shared securely among players in the food value chain, enabling consumers to trace the food to its source. IBM Food Trust is the most powerful initiative by a tech company in this field.

Catering and kitchen technologies

Smart appliances for consumers, as well as smart equipment or technologies to help restaurants manage their business more efficiently. This category includes solutions to make professional kitchens smarter via Artificial Intelligence, Machine Learning and IoT.

Plant Jammer, a Danish *startup*, offers AI-based kitchen help. Launched in 2018 and backed by Miele Group, this company promotes a 0 food waste economy: users tell the app what ingredients they have in their fridges and kitchen cabinets and the app comes up with a recipe.

PicoBrew is a promising start-up, whose future is uncertain as of today. The company owns several very interesting patents about automated home-made beverages, from coffee to beer and spirits, so some other player will probably take on the baton. The idea was to create a universal Nespresso, a machine that **could produce any prepared beverage.**

Next-generation food and beverage

Solutions and processes that leverage science and technology to **create new types of food and beverages.** This category includes **cell-based meat, alternative proteins** such as plant-based meat, insect and fungi-based products, functional food and beverages. It also includes **meal replacements.**

Further on in this report you will read about two initiatives in this category: **BlueNalu** and **MosaMeat**. In addition, note that plant-based proteins are mainstream now, thanks to the latest moves by giants such as Burger King, Findus or McDonald's. There are signature burgers too for the most exquisite foodies.

Managing waste and surplus

Products and solutions that help reduce food waste. For example, consumer apps that redistribute food surplus from restaurants and supermarkets, and creation of products or subproducts from waste. This category includes as well sustainable **bio-based** packaging solutions beyond plastic and polymers.

Tipa creates compostable packaging; no toxic waste, microplastics or other pollutants are produced. This biodegradable packaging is a source of compost.

A key technological requirement was to ensure that the flexible biomaterial is as good as conventional plastic in terms of:

- Shelf life and durability
- Transparency
- Sealing strength
- Printability
- Flexibility

Apeel, following the latest $250 million financing round could become the **first unicorn in the food waste category.** The edible packaging they have developed multiplies the useful life of products times three, avoiding the waste of tons of fruit, vegetables and greens.

The *foodtech* market

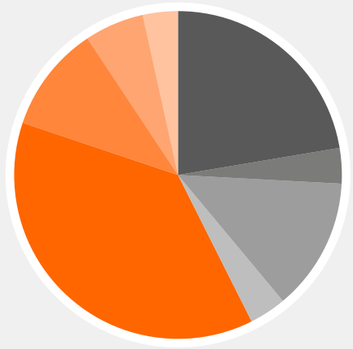
As presented in the report *Europe Food Tech Trends H1 2020* put together by ForwardFooding, the market is booming. Some examples cited by the report are:

- Amazon's recent commitment to invest $2 billion in clean tech companies, including the *foodtech* industry.
- In Europe, EIT Food just granted €6 million to food innovations that support COVID-19 related problems. For example, COVICOAT, an antiviral edible coating for food.

According to PitchBook, the global *foodtech* ecosystem, including ag-tech, has raised $7 billion in financing rounds in the first half of 2020. In all of 2019 it raised $10 billion.

SHARE OF GLOBAL VC DEAL VALUE (%) BY SUBSECTOR FOR 2020

· *FOODTECH* ·

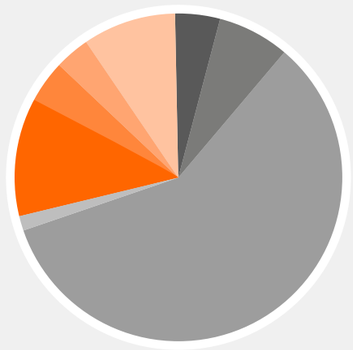


- 22,6% · Alt protein
- 3,7% · Consumer health
- 13% · E-commerce
- 3,6% · Hardware-enabled
- 37,1% · Meal kits & delivery
- 10,7% · Novel Ingredients
- 6,1% · Processing & packaging
- 3,1% · Supply chain

Source: Agrifood investment trends in the COVID-19 era

SHARE OF GLOBAL VC DEAL VALUE (%) BY SUBSECTOR FOR 2020

· *AGTECH* ·



- 10% · Ag marketplace & fintech
- 8,9% · Animal tech
- 34,1% · Crop protection & Input management
- 6,8% · Imagery
- 20% · Indoor Ag
- 7,7% · Plant science
- 4,3% · Precision Ag
- 8,2% · Sensors & farm equipment

Source: Agrifood investment trends in the COVID-19 era

Foodtech & agritech markets at a glance

$35.4 billion
Aggregate value of global agrifood tech VC raised over the past decade, representing $10.4 billion in combined venture investment in *agtech* while foodtech generated $25.4 billion.

3,058
Sum of combined funding VC rounds raised across the global agrifood tech space since the start of 2010, with *foodtech* companies securing 1,429 investments while *agtech* companies completed 1,629 transactions.

44,2%
Compound annual rate at which *agtech* venture investment has expanded over the past decade, with funding levels jumping 4x since 2015 and fueling dramatic changes across the ecosystem.

$18,6 million
Global *foodtech* VC median deal size at the late stage in 2019, while the median early-stage deal size was $8.8 million and the angel & seed median deal size was $2.7 million.

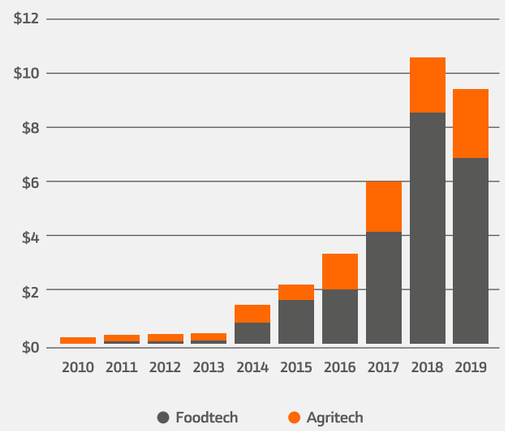
$11 million
Global *agtech* VC median deal size at the late stage in 2019, while the median early-stage deal size was $3.2 million and the angel & seed median deal size $1.3 million.

2,2X
Increase in global median pre-money valuation for later-stage *foodtech* companies compared to *agtech* in 2019, an exception to the trend toward convergence around valuations registered at the early and angel & seed stages.

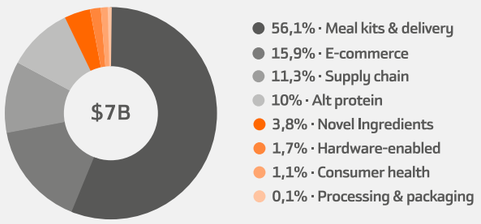
"The flow of capital is shifting as the market matures. While more investment dollars pour into advanced crop protection technologies, indoor farming, alternative proteins, ingredient refinement, and supply chain advances, investment in mainstays like digital ag is beginning to dry up as leaders start to emerge. Likewise, those investment booms will help drive a healthier, more sustainable food and ag ecosystem."

Arama Kukutai, co-founder and partner at Finistere Ventures.

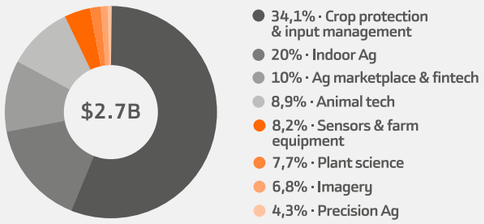
AGRIFOOD TECH VC DEAL ACTIVITY



SHARE OF GLOBAL VC DEAL VALUE IN FOODTECH BY SUBVERTICAL (%)



SHARE OF GLOBAL VC DEAL VALUE IN AGTECH BY SUBVERTICAL (%)



Source: 2019 AgriFood Tech Investment Review by Finisterre Ventures LLC

The European market

During the first half of 2020, close to **€900 million** were invested in Europe, which is **32% less** than the year before (this number excludes two big deals: **Delivery Hero,** which raised €2.3 billion to finance the acquisition of the Korean company **Woowa** and **Just Eat**'s acquisition of **GrubHub** for €6.4 billion).

Interestingly, despite the lower figures of total investment and number of deals, the average investment volume of the 2020 deals is 83% larger than last year, with an average of €13.5 million.

Some interesting data, per country

- Most *foodtech* startups are located in the United Kingdom (479), followed by Israel (417) and France (218).
- London is the number 1 *foodtech* location (250 startups) for food-related consumer apps and services, as well as next generation food and beverages.
- Paris has the largest concentration in next-generation food and beverage and food processing.
- Tel-Aviv is home to the largest number of *foodtech* companies, second to London and Milan. It has experienced fast growth in food delivery to home.

Business models

The activities most handsomely financed are ag-tech, next-generation food and beverages and consumer apps and services.

975 financing deals involved **B2C** (*business to consumer*) business models, and 971 deals involved **B2B** (*business to business*) models. **B2G** (*business to government*) business models and **B2B2C** (*business to business to consumer*) are far less frequent.

The ***agrifoodtech*** sector concentrates **B2B** companies, while next-generation food and beverage companies, consumer apps and food delivery services tend to apply B2C models.

Type of financing

The category **food delivery** received the largest amount of funding (**€502 million**), followed by **agrotechnology (€121 million)** and **consumer apps and services (€105 million).**

Activity

France (17.2%), Estonia (17.1%) and the United Kingdom (16%) received the largest amounts of funds, followed closely by **Israel (15.1%).**

Estonia's case is noteworthy. It has received ¼ of the total European funding thanks to the **€150 million** round raised by Bolt, an urban mobility company rivaling Uber.

Despite the tremendous global economic impact caused by the COVID-19 and the obvious frailness of our food system, as explained in chapter 1, the ***foodtech* industry will come out of this process ever stronger,** as technology is the tool to offer potential solutions to the challenges we currently face across the supply chain.

2.1.2

What is cell-based agriculture?

> Cell-based agriculture is poised to become the next food revolution

Eggs without chickens, milk without cows, tomatoes without vegetable gardens? As our world makes technological advances, the science-fiction scenes that we watched in movies decades ago—or most recently on our favorite streaming platforms—are becoming real. Cellular agriculture is considered the next food revolution.

In our search for sustainable food systems, finding new ways to generate food has fostered technological innovation in the field of food biotechnology. The goal is to improve food's nutritional attributes while reducing the cost and environmental impact of what we produce, and to make sure it is compatible with the exponential growth of the world's population.

New Harvest is a prime example in this field. It conducts **open, public, collaborative research to reinvent the way we manufacture animal products with no animals involved.**

Their vision rests upon accessible, public cellular agriculture research to build a **post-animal bioeconomy** where animal products are "harvested" from cellular crops rather than animals, in order to feed the growing population of the world in a sustainable, affordable way.

They are now focused on designing new types of super productive crops that are more nutritious and require an ever-decreasing amount of water, fertilizer and pesticides. Beyond that, they offer alternative plant-based food as a source of protein to replace meat, since the current meat producing methods have a deep ecological footprint.

Every year, experts reunite for their annual conference at the Massachusetts Institute of Technology's (MIT) Media Lab in Boston. They address the challenges and opportunities arising from current research in the emerging field of cellular agriculture and its commercial and technological applications, as well as the way in which this innovative technology could be explained to consumers.

Lou Cooperhouse, president and CEO of the cellular agriculture pioneer BlueNalu and **Mark Post**, CSO ofMosa Meat, who developed the first lab-made burger with his team at the **University of Maastricht** in 2013, were among the participants from past editions of this conference. At the Bankinter Innovation Foundation's FTF, these top-level experts shared success stories of meat and sea food products that show the real opportunities provided by technology in the field of food production.

Cellular agriculture is the generation of food products, particularly animal tissue, based on cell development. These products feed humans but do not require animals to be raised or slaughtered. They leverage the same lab techniques we use with stem cells to create artificial organs for transplants.

This new, controversial technique opens a significant debate over whether this lab-food is healthy or ethical. Every advance made in the food industry poses the problem of how innovation will be controlled and what regulations it will be subject to.

Scientist assert that **products are not genetically modified,** but rather obtained in a lab after undergoing complex technological processes involving cells that come from the original animals. On top of a **reduction in financial and environmental costs,** the flavor, appearance and even the nutritional value of these products are improved. However, they always remain **faithful to the qualities of the original product.**

> Through cellular agriculture, we can design personalized food products that will improve health and offer greater, laboratory enhanced nutritional value

A few visionaries predicted that in 2021 this type of cellular agriculture-based products would already be on supermarket shelves. It is true that over the last few years a growing number of companies have been spending their capital, time and effort on the replacement of meat products in the livestock industry with more sustainable products that do not involve slaughtering animals.

Bill Gates and **Richard Branson** are both visionary magnates. They have decided to invest in this new industry through Memphis Meats, which has already produced the first chicken and duck meatballs from animal cells.

Let's take a look at the innovations by **BlueNalu** and **Mosa Meat** and their developing of new food products (also known as 'novel foods') based on cell agriculture.

BlueNalu is a startup from San Diego that develops technology to produce 'clean fish', as they call it, from marine animal cells. It was founded by **Chris Somogyi, Chris Dammann** and **Lou Cooperhouse,** who put together a team of experts in cellular biology, tissue engineering,

intellectual property, food innovation, technology commercialization and consumer marketing.

In Lou's own words, they have a clear goal: becoming world leaders in the field of **'cellular aquaculture'.** The idea is to provide consumers with flavorful sea products that are:

- Healthy for people
- Respectful of marine life
- Sustainable for the planet

Lou Cooperhouse
President and CEO of the cellular agriculture pioneer

Advances in *foodtech*

Duration: 08:10 min

"We are creating sea products directly from fish cells. They will be flavorful, reliable, safe, mercury-free and with no environmental pollutants", Cooperhouse states.

Mercury is a relevant issue for pregnant or breastfeeding women, as well as for their children; mercury consumption is limited to certain portions to prevent harm. These new products are healthy alternatives for these consumers.

BlueNalu's challenge, at a scientific level, involves taking **myosatellite cells** (which generate new muscle tissue) from the animal's muscle (a fish in this case) in order to 'cultivate' them in a lab and use them to develop new products.

In December 2019, BlueNalu successfully conducted the Premier Culinary Demonstration of a fish's entire muscle; they were able to prove that the resulting yellowtail amberjack product is just like a traditional fish fillet you can cook in any recipe. Acidification techniques can also be applied to make poke, kimchi or ceviche. Both consumers and chefs widely accepted the product, which is the starting point for projects developed in 2020.

Arrival on the market?

BlueNalu has set a 2021 deadline for the launch of their products in a test market; they are currently developing a pilot. They are working on creating the best sea food products to later distribute to retail and services markets all over the globe.

The company is conducting exclusive research in collaboration with renowned universities and research centers in order to achieve their long-term goals. Cooperhouse states that they are committed to developing the entire production process without resorting to genetic modification.

Developing this technology, which has the potential to distribute 'clean fish' all over the world, could prevent billions of animals from suffering immensely. Cooperhouse assures that **fish do not die in a quick, painless way.**

The Mosa Meat case

> Will lab meat meet the growing global demand for protein?

According to the United Nations Food and Agriculture Organization **(FAO), traditional meat is the least efficient food product for humans.** 40% of the food grown on the planet is used to feed livestock, and according to estimates that figure could reach 60% in the next two decades if the demand for meat keeps increasing. Additionally, its production generates a large amount of greenhouse gases; between 16 and 20% of the total amount of greenhouse gases come from livestock breeding.

In 2019, the consulting firm **AT Kearny** conducted the study *"How will cultured meat and meat alternatives disrupt the agricultural and food industry?"*, which offered very relevant data for the future. In 2040, **35% of all meat will be produced in labs, and 25% will be vegan replacements.**

Many consumers are already reducing their traditional meat consumption because they are becoming more aware of its impact on the environment and the well-being of animals.

If we turn our attention towards beef production, we might remember press headlines from 2013 like "the first lab-made burger" [link in Spanish], telling the story of **Mark Post** and his meat culture team from the University of Maastricht, who spent five years researching and developing the first famous non-bred burger.

In Post's own words, this large project is not an experiment. *"We do not do this for fun, but for ethical, financial and nutritional reasons. According to the FAO's estimates, the demand for meat will increase by two thirds in the next 40 years."*

> For every 100 grams of meat, an extra plant-based kilogram worth of calories is needed to feed the cow; the system is highly inefficient. There is a lot of waste

How does the meat manufacturing process work in a lab?

Each muscle of each animal has stem cells that regenerate tissue. When a muscle is damaged, these cells multiply and start creating new tissue. This cell regeneration process can happen endogenously (inside the animal's body) or exogenously (outside of it).

To manufacture meat in a lab, small samples of the cow's muscle cells are needed. Stem cells are obtained from the muscle and left to proliferate in the lab for up to three weeks. In this period, they generate 10,000 muscle fibers that will allow us to produce thousands of kilograms of meat. From a single **half-gram** tissue sample, **we can obtain around 80,000 burgers.**

Regarding **food security,** this complex and expensive technology could be the solution to the challenge of feeding 10 billion people with a major need for animal-based proteins. There is a clear indicator regarding this critical issue: **As people become richer and increase their revenues, the amount of animal meat they consume increases as well.**

Meat consumption will increase disproportionately compared to the growth of the global population. The solution to meet the demand cannot be breeding and subsequently slaughtering more animals.

What is the reality of the market?

Cellular agriculture entails highly complex technology, but developments are quick paced. We are only a couple of years away from commercializing this type of food products that, according to Mark Post, **generate 96% fewer greenhouse emissions and use 99% less land and 96% less water than livestock meat, therefore protecting our planet from climate change, deforestation and the loss of biodiversity.**

Its progress will also depend on our capacity to overcome some challenges:

- **Economies of scale, which increase production and optimize the benefit-cost ratio** of manufacturing cultured burgers. Currently, lab production costs about 8 euros. The goal is to bring it down to ½ euro to make it cost-effective.
- **Large investments for the development of production plants.** The highly sophisticated technology needed in order to produce this type of foods requires deep-pocketed investors to build factories and make projects come to life.
- **An updated regulatory framework** that ensures that this type of products is safe, given that they are **new foods** both in Europe the United States.

Currently, there are some 50 companies all over the world working with this technology. They are based in Silicon Valley, Israel and Europe for the most part.

> By 2040, most meat production will not come from traditional livestock

2.2

Nutrition and genetics

The international scientific community agrees that **nutrition is key to health,** particularly regarding the most common diseases in industrialized countries.

Being nutrition essential for genes to work, **precision nutrition** (also referred to as **personalized nutrition**) studies how genetic variability has impact on each person's response to the various components of nutrition.

Not only our genes (some 30,000) interact with our food, the million genes in our microbiota (group of microorganisms that inhabit our bodies) do as well.

We have known since the time of the ancient Greeks that we do not all respond to what we eat in the same way. As the Greek poet and philosopher Titus Lucrecius Carus said, ***"What is food to one, is to others bitter poison".***

This notion has been simplified in the 21st century and is known as precision nutrition or personalized nutrition. According to experts, it is defined as nutrition that adapts its strategy to an individual's specific needs, including nutrigenetic and nutrigenomic needs. These two concepts seem quite technical, but they are increasingly relevant in the public debate over the impact of precision nutrition on the health of a given population.

Nutrigenetics is a field within nutritional genomics whose goal is to **research how different genetic variables affect nutrient metabolism,** diet and related diseases. Nutrigenetics aims to provide personalized advice on disease prevention based on personal genomics.

Through modifying the expression and/or structures of individuals' genetic makeup, **nutrigenomics** (a subfield of nutritional genomics) aims to provide molecular and genetic insights on dietary components that contribute to health. Nutrigenomics is, in essence, the **study of interactions between genomes and nutrients.**

Precision nutrition as a public health tool

Personalized nutrition should be considered, now more than ever, a public health issue that countries need to be responsible for in order to face potential new pandemic scenarios. **It has been scientifically proven that immunity and nutrition are related.**

Jose Mª Ordovás is a professor of Nutrition and is considered to be one of the fathers of nutrigenomics and nutrigenetics. He is currently the director of the Nutrition and Genomics Research Lab at Tufts University (Boston) and a Senior Scientist at the IMDEA Alimentación institute (Madrid). According to Ordovás, the future of research in precision nutrition is to predict who will benefit from a dietary recommendation and who will not, **in order to avoid blanket dietary recommendations.**

In this scientific field, there is still a long way to go and much to explore, not just leveraging biochemical and genetic factors, but also all the information on our lifestyle that is compiled by our smartphone apps or activity bracelets (wearables).

Jose Mª Ordovás
Professor of Nutrition considered to be one of the fathers of nutrigenomics and nutrigenetics

Personalized nutrition and future technlogy

Duration: 29:55 min

According to this expert, integrating precision nutrition into the future of food will be a slow process, mainly due to the fact that we still need to process part of the knowledge stemming from research. This knowledge will not be mainstream initially, since it will target those who truly believe in **nutrition as preventive medicine.**

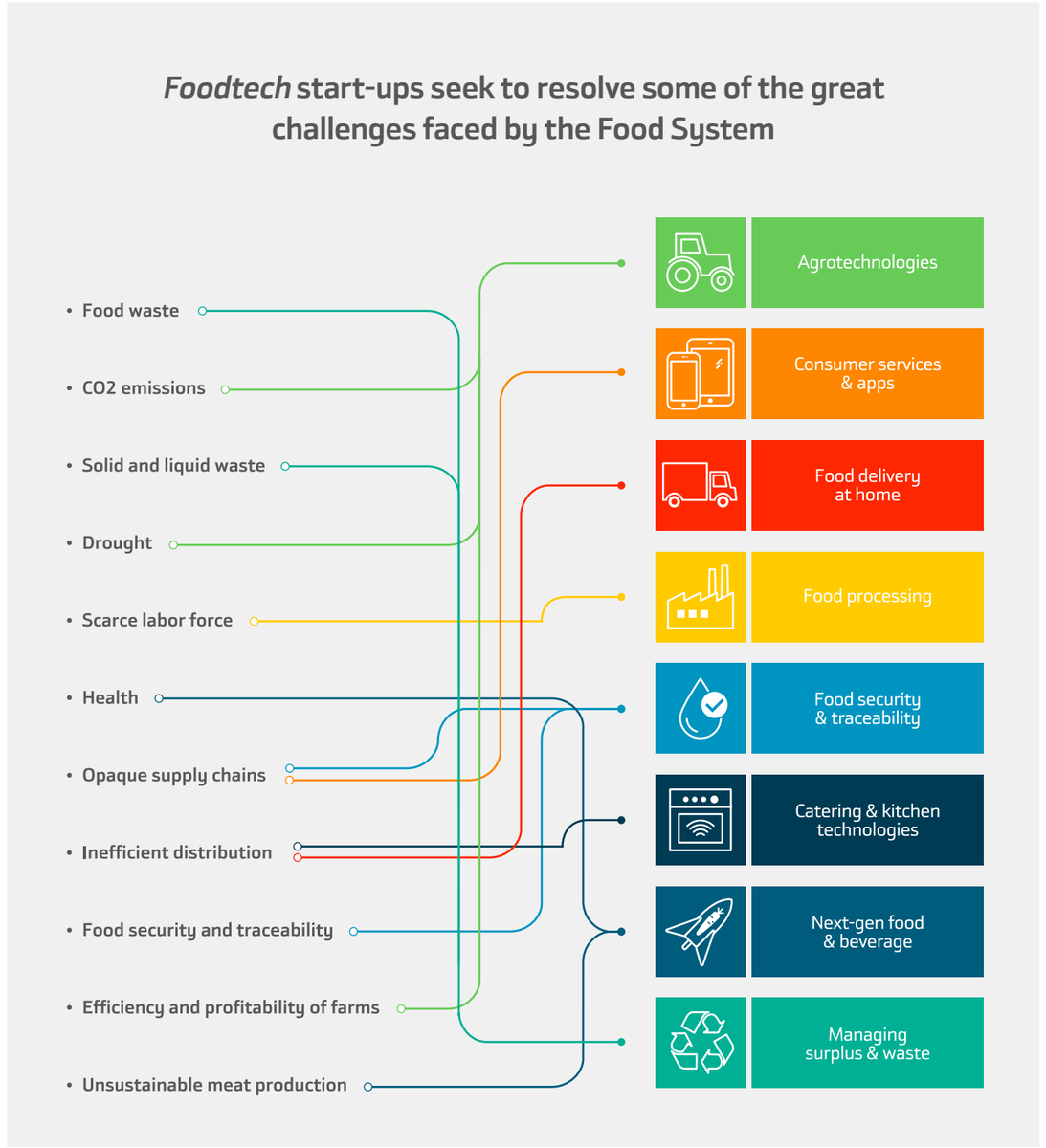
> We need to educate the educators such as doctors, nutritionists or dietitians, so that they adopt precision nutrition as a strategic tool

A **synergetic relationship between a sustainable food system and a sustainable healthcare system** is needed. This could be precision nutrition's great contribution: driving both systems together.

Nutrition is key to prevent diseases in industrialized countries—obesity, hypertension, diabetes, cancer. COVID-19 patients with poorer prognosis or who have, regrettably, died, lived with this type of diseases.

Poor nutrition prior to the pandemic has heightened the risk of large populations, particularly in developed countries. Not only is nutrition important for non-communicable diseases, it is also very important to prevent communicable diseases.

According to Ordovás, research in this field is not a cost, but an investment. Without research there is no knowledge. And *"that is the message we must convey to governments, because **well fed research means healthy research**".*



03

Roadmap towards a sustainable food system

Science, technology and innovation are already cooking the menu of the future for our planet: lab burgers and seafood, insect and algae based protein, vertical gardens in your own kitchen, 3D printers to use the “loose ends” of your fridge, an app that will validate your meal in a snapshot and verify the dietary requirements of your personalized nutrition, in order to feed your genes correctly and fight or prevent disease.

> “The best way to predict your future is to create it”
>
> **Peter F. Drucker**

The future of food is in each of our hands, in the decisions we are currently making as consumers, distributors, producers, investors and governments, which will determine what is to come in the following decades.

This report shows that both the trends and the challenges identified are a source of concern, but also hope for the change agents whose mission and responsibility is to provide **healthy and sustainable food to the 10 billion inhabitants** of planet Earth in 2050.

The journey towards that horizon must be based on urgent decisions and actions, led and coordinated globally by organizations and entrepreneurs committed with the Sustainable Development Goals (SDGs), **pursuing global food security by 2030.**

This chapter stands on the shoulders of the ideas and findings described above, it feeds on the thoughts and conclusions of the Bankinter Innovation Foundation’s FTF experts to make recommendations and propose a roadmap with potential solutions for a **secure and sustainable new food system.**

3.1

Players involved and challenges to address

■ What are the most pressing challenges that the food system will have to face in the 21st century in order to become sustainable?

To answer this broad question, challenges have been divided based on how they affect each of the five groups of stakeholders engaged in the food system. Each of them is called to become a player and change agent in the coming years:

- Agribusiness (economic activity resulting from or related to agricultural products).
- Governments and regulatory bodies.
- Technology entrepreneurs and innovators.
- Consumer rights organizations and NGOs.
- Investors.

The challenges faced by these groups, as identified by our experts, are:

Agribusiness

The term 'agribusiness' is frequently used to refer to **economic activities involving agriculture and livestock products,** and it is considered a key player within the transformation process. However, agribusiness needs to face some challenges:

- **Innovation of the business model:** *'think globally, act locally'*. Glocalization and Corporate Social Responsibility (CSR) must become the axis around which the global supply chain transforms. The term *'glocalization'* is an acronym resulting from the combination of the words 'globalization' and 'localization' in an effort to join global and local aspects in a business strategy, as an alternative for the development of our society. Glocalization is an adaptation of global patterns to local conditions; at a business level, this strategy is based on adapting a standard business concept to the specifications of its location.
- **Education**: we need to **change how we communicate with consumers,** empower them in their decision-making processes, raise awareness about the type of food they eat and whether these products are healthy and sustainable as part of the production chain. In order to do that, we need greater transparency. How much do farmers get paid for a certain product? How does it impact our health? This is the type of question asked in this new flow of communication.
- **Real cost allocation:** We need a process to review and **modify the global accounting system** to guarantee that environmental problems are represented within macroeconomic frameworks. We also need to take into account the system's economic impact on sustainability and biodiversity.
- **Vested interests:** Currently, certain stakeholders have a dominant position in the industry and too many financial incentives not to change the production method. FTF experts have pointed out how **developing a new economic framework** is paramount to promote all aforementioned changes.

Vincent Rosso, co-founder and CEO of Consentio, pointed out that getting rid of hierarchies and making the **model much more horizontal** could result in less food **waste.**

Vincent Rosso
Co-founder and CEO
at Consentio

Governments and regulatory bodies

The challenges faced by this group are:

- **Urgent regulatory framework:** nationally and internationally, it must encourage cooperation so that all players engage in the production of sustainable, healthy food. Those that do not comply with legislation must be penalized. This regulatory framework **must guarantee that food with positive impact on health and the environment does not come at a greater cost.**
- **Leadership and coordination:** they are essential at all governance levels, particularly internationally. There is no agenda with priorities for the future, since many governmental agents do not coordinate with other players involved. Global cooperation to invest in *foodtech* that can be applied all over the world (for instance, alternative proteins) is one example. Additionally, governments could push to achieve the SDGs.

- **Consumer education:** in order to support consumers' food choices, governments must provide them with **true, complete information** on the authenticity of food products and the raw materials, as well as the production and distribution processes.
- **Promoting biodiversity:** poor practices must be penalized, and sustainable, environmentally friendly ones must be rewarded. We need to look for new mechanisms to incentivize the players involved.
- **Promoting innovation** in the industry by reducing entry barriers and adding incentives for the **immediate implementation of *foodtech* solutions;** by doing this, governments can also influence private investors and, ultimately, spread these new resources far and wide, and supporting international collaboration.

Emily Broad, director of the Food Law and Policy Clinic at Harvard Law School believes that it is **a priority to increase coordination among governments and regulatory bodies** in order to achieve the goals.

Emily Broad
Director of the Food Law
and Policy Clinic at Harvard
Law School

Technology entrepreneurs and innovators

At present, one main problem lies in the high level of investment despite the few success cases; therefore, we need investors and government funding in order to implement a **national plan for entrepreneurship and innovation.** The COVID-19 crisis has highlighted the need to focus on local production to prevent a shortage of supply, as well as the need to develop collaborative proposals with the agriculture and livestock industry. These are the needs detected:

- Support local farms to produce enough food for the local community.
- Establish local farmers' markets to purchase local food.
- Teach educational workshops: use these local markets to teach citizens, particularly young generations, about nutrition and healthy, sustainable practices.
- Establish a direct relationship between local food producers and distributors, with no intermediaries.

Why is investing in a *foodtech* startup appealing? According to **Jon Etxeberria**, founder of BAIBA, it is essential to **create innovative products and services to impact the entire value chain.**

Jon Etxeberria
Founder of BAIBA

■ A startup is more appealing when you build trust with clients, partners and providers

Consumer rights organizations and NGOs

These are the challenges and solutions identified for this group:

- **Global alliance between consumers and NGOs** to achieve a more nutritious, environmentally-friendly agriculture that is also more profitable for farmers all over the world.

- **Triple bottom line:** companies drive progress and change. They reduce poverty by increasing productivity and, at the same time, they create jobs and produce goods and services that are essential to people. In the case of the food industry, we must ensure that both investors and corporate management boards include **sustainability in their profit and loss account** as one more KPI of their business performance.
- **Launching public awareness campaigns** on healthy, sustainable nutrition to educate consumers; they could start in schools and engage with students, their families and teachers. They need to learn how to analyze food production, labeling, certification, etc... eventually becoming empowered to make decisions.
- **Promoting KPIs** (key performance indicator) that measure the environmental impact of the food chain.

How can we make sure that the origin, production and distribution of food are environmentally neutral or friendly?

According to **Simon Winter**, Executive Director of the Syngenta Foundation for Sustainable Agriculture, the solution could lie with Blockchain [link in Spanish].

Simon Winter
Executive Director of the Syngenta Foundation for Sustainable Agriculture

Investors

Some of the hurdles along the way include the lack of maturity of the *foodtech* market and the need for consolidated companies to emerge, particularly in the field of cellular agriculture.

But this new food technology has plenty of potential and offers great advantages to global food security. On top of studying the return of an investment (naturally), these are some of the questions an investor should ask themselves about a *foodtech* opportunity. They are similar to questions asked in other emerging industries:

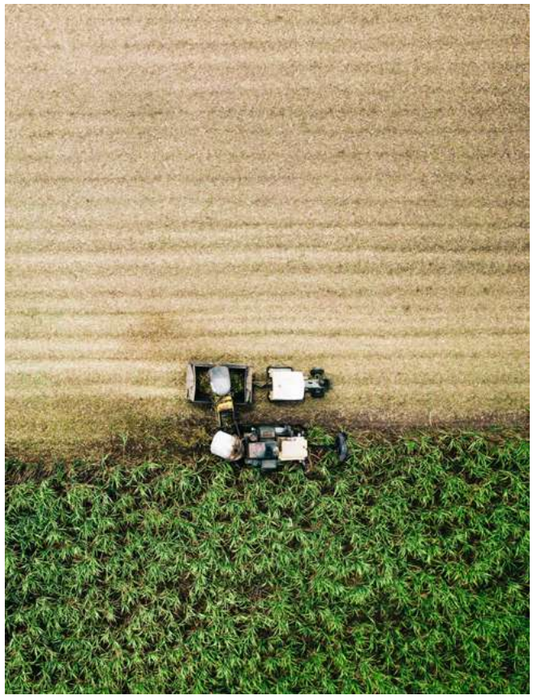
- Is it technologically possible?
- How can it scale?
- How can we avoid copies?
- What are the legal barriers?
- Who will develop it?

Sejal Ravji, Director of Open Innovation at Calidad Pascual stated that investors must perceive their money serves a 'greater purpose'; they must be social investors.

Sejal Ravji
Director of Open Innovation at Calidad Pascual

According to this expert, **food waste can be a great line of business in the future,** we need to research alternatives and technologies that shift the current paradigm.

It is necessary to **promote specific incubators and accelerators for the industry.**



In general, **leadership, coordination and cooperation will be essential tools** for all stakeholders **to achieve our global goals.** Only by addressing and resolving most of the previously mentioned challenges will we be able to achieve a sustainable food system.

3.2

Major changes and the initiatives behind them

3.2.1

Major changes foreseen

The greatest changes in the food system in the next ten years will be, ranked by impact factor, the following:

1. **Climate change pressure**
   - It will determine what can be grown and where.
   - t will accelerate the need to reduce food waste or to reuse it with other nutritional properties.
   - Food quality will be affected, and we will try to be more energy-efficient across the supply chain.
2. **Automation of the food production chain**

   Robots are here to stay. They are in processing and packaging plants and will affect workers at factories and at production centers; therefore, they will highly impact the labor market.
3. **Exponential use of cutting-edge technologies**

   New technologies such as Cloud Computing, IoT, Blockchain and Artificial intelligence will become widespread thanks to digitalization. These technologies will offer more transparency, therefore allowing us to optimize production, reduce food waste and redesign business models.
4. **Food will be the preventive medicine of the future**

   We will observe an increase in demand for healthy food, and **personalized nutrition** will be a driving force. Consumers will look for food with high nutritional value that match their living status in order to **live more years or to prevent and treat chronic diseases.**
5. **Food quality linked to consumers' socioeconomic status**

   High-income earners will have personalized nutrition and diets based on their genetics; low-income earners will consume non-personalized food of worse nutritional value. In some regions of the world, we expect to see a reduction in animal meat consumption, while in others the demand for it is expected to increase.

6. **Cultivated animal proteins and affordable, accessible 3D-printed food**

   This alternative must be democratized by offering consumers new proteins at prices that they can afford; also, by giving another chance to underused food through 3D-printed recipes, for instance.
7. **Millennials that engage in change**

   We will observe a global change in the way in which different generations think about food. By 2030, people over the age of 50 will be the largest consumer demographic and will have the highest purchasing power. FTF experts believe that these generations might not follow the foodie movement boosted by millennials. Millennials are concerned with their personal health and the planet's well-being and therefore **are conscious consumers of organic, gluten-free, cruelty-free products.**
8. **From the field to your table, directly to the consumer**

   Will people keep cooking? Technologies such as robotics or IoT will revolutionize the food industry and will facilitate food's distribution and storage processes. They will change the way in which food reaches the end consumer. Additionally, **digital platforms will favor direct interaction between small producers and consumers.**

3.2.2

The proper initiatives to face changes

Once the major changes that will take place in the next few years were classified:

What initiatives could get the best out of these changes in the next ten years?

The main initiatives that could be implemented can be classified in four large groups:

1. Proper nutrition at a global level.
2. Impact of the food system on health.
3. Food sustainability.
4. *Foodtech* solutions.

1. **Proper nutrition at a global level**

Climate change will have great impact on food supply, as well as on the increasingly unequal access to it. We have less arable land; therefore, the food supply is more unstable.

In order to address these issues, we need investment in the following areas:

- **Food technologies** (*foodtech*): they can be more efficient because they do not depend on land so much.
- **More resilient crops:** use of new species that can withstand weather conditions determined by climate change.
- **Smart or 4.0 agriculture:** it aims to reduce and enhance the use of natural resources by applying information technologies in a practical way.

Additionally, experts recommend passing regulation and legislation that help mitigate climate change and ensure food supply for the more vulnerable populations. This could be achieved by combining **incentives, taxes and fines.** Here are some examples:

- **Labeling** that helps people make more efficient decisions.
- **Taxes** on production methods that are not environmentally-friendly.
- Creation of a **quick-response redistribution system** to reduce the supply problems that climate change generates in some countries.

Global cooperation between non-governmental players and private investors will be key to **improve the resilience** of local markets.

Another essential initiative will be to **educate consumers and prepare them for different sources of nutrients.** According to experts, we can achieve this by boosting consumers' demand for **bio-sustainable alternative proteins.**

Additionally, we need to **promote local initiatives that address self-supply and culinary education** so that people are less dependent on the food chain

2. **Impact of the food system on health**

The food system's impact will vary depending on the population's socioeconomic status. It can be worse in developed countries, because the emerging middle class consumes some types of food that can lead to nutrition-related diseases (obesity, diabetes and other chronic diseases, for instance).

On the contrary, people with low socioeconomic status in developing countries are more vulnerable to food insecurity due to scarcity.

We need to **foster public policies that promote heathy food** consumption and discourage processed food high in saturated fat and sugar; it causes obesity, diabetes, cancer and cardiovascular diseases.

We also need to implement educational initiatives on nutrition at all levels in society (schools' cafeterias, companies, restaurants) in order to improve food quality and our diet and to ensure food security.

Spain and the Mediterranean diet: a global benchmark

Another recommendation is to launch awareness-raising campaigns, portraying those countries that have been identified as the healthiest on the planet. Our country is a good example: the Mediterranean diet has been identified as a protective factor in the development of cardiovascular diseases, according to the Predimed study [link in Spanish].

In the 2019 Bloomberg Healthiest Country index, Spain was at the top of the list (having moved up five ranks since 2017). Our country received a score of 92.7 over 100.

The Bloomberg index rates each country based on variables such as life expectancy, medical assistance or drinking water availability.

Finally, we urge governments to promote incentives and economic policies that improve food quality by developing national and local action plans that allow all industries to interact and achieve their goals.

3. **Food sustainability**

Consumers play a key role because they influence the type of food that is produced; however, it is essential to educate them and inform them properly, so that they become discerning consumers who can **tell information from advertising.**

Additionally, the power of large multinationals should be decentralized through technology (drones, robotics, smart irrigation, big data, etc.) and R+D. The idea is to provide greater opportunities for small agricultural, livestock, fishing and aquaculture producers with **digital tools** that allow them to mitigate the impact of climate change and create jobs in emerging markets.

Regarding Public Administrations and international organizations, we need policies, regulations and legislations that change the paradigm for farmers: from a *yield per hectare to a profit per hectare* approach.

We need **to reduce our carbon footprint as much as possible and protect biodiversity.**

Experts also highlight the need to boost and promote agroforestry and fintech [link in Spanish] in order to develop **innovative business models that allow us to grow alternative, more sustainable crops.**

Tina Lawton is one of our experts. She recommends linking the initiatives proposed at this Future Trends Forum with the work carried out by the World Business Council for Sustainable Development, also known by its acronym WBCSD, in their program "The True Value of Food".

4. ***Foodtech* solutions**

We must promote and encourage *foodtech* solutions across all processes in the food supply chain, as long as they ensure:

- Greater transparency.
- Production that is optimized to meet demand.
- Information shared among all players involved.
- Food that fosters biodiversity and reduces the carbon footprint.
- Healthier food.
- Greater resilience of those people handling raw materials (vegetable and livestock farmers, etc.).

Some *foodtech* solutions are already in place and described in chapter 2:

- Plant-based proteins and cultivated proteins.
- Precision agriculture and vertical farms.

- 3D-printed food to reuse wasted food.
- Use of artificial intelligence and big data with predictive and preventive analysis purposes.
- Use of blockchain to monitor food, from the field to your table.

3.2.3

Broad recommendations

Reviewing the global food security strategy and goal implementation: The United Nations must coordinate with government agencies and enable contributions from other stakeholders, establishing the strategic goals for the food system.

Launching a United Nations Framework Convention on Climate Change type of agreement with a focus on Food would be a great start. Or at least, the next Climate Change Convention, the COP26, could put food systems in the spotlight, come November 2021.

All agents involved in the value chain collaborate in order to reduce waste and ensure the diversification of agriculture and more nutritious, affordable diets for everyone.

Develop a true accounting system of environmental costs globally for all publicly listed companies.

All packaged products include smart labels that consumers can scan to access detailed information about the source, ingredients, nutritional facts, etc.

The **'total cost of food'** idea is implemented; this means that food prices should include environmental and health costs, together with the necessary support to guarantee that all agents can afford a sustainable and healthy system.

Telco companies can and must offer **digital transformation processes to local producers.**

Promote innovation in all areas and for everyone involved in food systems, so that they can respond to the opportunities brought about by the great challenges, leveraged on technology.

Create an **intergovernmental international *foodtech* fund** to develop innovative food technologies that will impact food security.

National governments could ban organic waste to stop food waste in landfills. A **transformational policy to reduce food waste** in the last stages of the supply chain; it enacts regulation that forces companies to make changes in order to reduce waste.

Support small farmers to make improvements with **digital tools,** enabling them as **agro-innovators.**

3.3

Main milestones in the roadmap to 2030

After analyzing the challenges and opportunities, as well as the changes foreseen, the initiatives that could be kicked off and some broad recommendations, it is time to forecast.

What can be accomplished in the coming decade?

2023

- Public access to a precision agriculture tool.
- Local and national governments promote actions to connect consumers and producers directly.
- Powder food becomes a healthy and sustainable supplement for people.
- An investment fund is raised for disaster-protection agricultural insurance.
- An innovative technology digitalizes the supply chain.

2024

- Countries approve national action plans for food in the framework of the Paris agreement. Countries are encouraged to develop the plans resulting from the UN Food Systems Summit in 2021.
- Reduction of obesity and diabetes through governmental initiatives that promote a healthy diet.
- International agreement about the food emergency fund.
- Adoption of an international framework to use soil carbon as an incentive for farmers to use and conserve the land.
- Governments acknowledge that healthcare costs would lower with a healthy food system at work.
- Insurance companies launch food insurance products to guarantee food in case of emergency.

2025

- Internet of Things (ioT) solutions for cattle welfare are the norm, and they add value to the final product.
- Massive and high speed transport of goods, enabling access to food.
- Massive adoption of food labeling sensors.
- Lab cultivated meat and seafood are a staple in supermarket shelves.

2026

- *Smart farming* solutions for farms that increase crop yield, enabling expansion to new markets.
- The UN votes for a global Food Traceability System.
- Urban agriculture changes the rooftop landscape in big cities.
- Farmers are empowered with incentives through regulatory changes so that they can grow food with profitability targets.

2027

- Vertical agriculture is a consolidated sector in big cities.
- Hybridation, *foodtech* and *fintech* supported by blockchain solutions: retail investors pick sustainable food solutions.

2028

- Vegetable-based meat accounts for 20% of protein consumption.
- Compostable packaging becomes mainstream.

2029

- The price of energy drops significantly, which alters the global food system, taking the different actors to reassess strategies and adapt production to alternative energies.
- DNA analysis are used to make personalized dietary recommendations.

2030

- Dark kitchens consolidate as a powerful line of catering. Many amateur chefs turn into celebrities.
- 3D food printers make an entrance into the house appliance mass market.

3.4

Conclusions - *"Writing the story of Future Food"*

Bankinter Innovation Foundation's Future Trends Forum experts show optimism regarding the changes that will take place in the food industry in the next decade, and how to tackle them from the triple sustainability (economic, social and environmental) perspective, as detailed in the recommendations and roadmap thru 2030.

Many recommendations and initiatives will be backed by the **Food Systems Summit,** which the United Nations Secretary General will convene in 2021. According to experts, it will be the turning point to achieve the 2030 agenda and the Sustainable Development Goals (SDGs).

This report tries to reflect what is currently happening in the global food system and what are **the transformations we must undertake.** We need to make sure that progress in the food system puts us on track to achieve the SDGs speedily and ensure global food security and the protection of biodiversity.

The main five groups of change agents included in this report (agribusiness, governments and regulatory bodies, technology entrepreneurs and innovators, consumer rights organizations and NGOs, and investors) must be in charge of leading change in a coordinated manner and at all governance levels in order to attain the SDGs.

Regarding **agribusiness,** innovations to the model will be based on glocalization and **Corporate Social Responsibility** (CSR), while factoring the economic impact of sustainability and biodiversity into the real costs.

Guaranteeing food security and adequate nutrition for the entire world's population will be **supported by technology and innovation** to a great extent, in order to reduce and improve the use of our planet Earth's natural resources, generate **more resilient crops** and preserve their biodiversity.

Governments and regulatory bodies must urgently define a global regulatory framework to guarantee sustainable productions, encouraging **biodiversity and carbon bonds,** which will drive producers to produce sustainable and will benefit the production.

Regarding **entrepreneurs and innovators,** it is necessary to execute national entrepreneurship and innovation plans to encourage local production and avoid food shortages, promoting producers' markets that connect directly with end consumers.

Promoting innovation is key to boost the immediate implementation of new, high-tech driven solutions, such as:

- **Artificial Intelligence, *Data Science*, IoT and Cloud Computing, which will guarantee food sustainability.** They are well established in other sectors. In the food industry they will bring greater opportunities to small farmers all over the world. Farmers will have a wide portfolio of digital tools to optimize their crops in the face of climate change.
- ***Foodtech* solutions will appear on supermarket shelves,** particularly **cellular agriculture** solutions and algae-based and insect-based **alternative proteins.** It is critical to define a regulatory framework that guarantees to both consumers and producers that this type of lab-food undergoes quality controls and complies with ethical rules.

The union of **consumers** and **NGOs** will achieve a healthier and more sustainable food production, promoting sustainability among investors and companies as one more KPI of their P&L account.

- **Launching public awareness campaigns on healthy, sustainable consumption** should start in schools and engage with students, their families and teachers. They must become **conscious consumers, accountable** for their health and the planetary health.
- **Exporting the Mediterranean diet as a strategy to prevent** highly prevalent chronic diseases. Spain could become a global reference since it is the healthiest country in the world, according to the Bloomberg index.

Investors suggest the need to develop specific incubators and accelerators that support innovative, high-potential projects in *foodtech* that may transform the entire food system.

- **Avoiding food waste can be a great line of business for companies** that could weave sustainability into their food production, through 3D recipe printing. This technology will transform food to-be-wasted, printing nutritious food that is much more appealing to consumers.

Another transformative factor will be enabling interaction across all regional, national and international sectors to solve the many challenges that will truly give way to a global and sustainable food system.

This report, **Food of the Future,** is a **roadmap to reflect and act,** so that we can accelerate our **collective journey towards 0 hunger, healthier and more inclusive food systems and protect planetary health.**

Acknowledgements

We would like to express our gratitude to the journalist Lorena Carrillo, who wrote this report that captures the trend analysis and recommendations made by the experts who attended the Future Trends Forum (FTF).

We would like to thank the members of the Future Trends Forum, the attendees of the 34th conference and our collaborators for organizing and defining the methodology of the FTF conference:

Christopher Meyer

The LUDIC Group

Garrick Jones
Clemens Hackl
Keisha Ferrell

Lastly, we would like to express our gratitude to the Bankinter Innovation Foundation for their commitment to our mission of promoting innovation in our society:

Bankinter Innovation Foundation
Juan Moreno Bau
Marce Cancho
María Teresa Jiménez
Raquel Puente
Carmen Mojón Nestares
Nerea Igoa
Jose Carlos Huerta
Javier Megias

Speakers and Assistants

Charles Bolden
Former NASA Administrator. President of The Bolden Consulting Group LLC and Trustee of Bankinter Innovation Foundation.

Joxe Mari Aizega
General Manager of the Basque Culinary Center.

Pedro Alvarez
Co-Founder and CEO at Ivoro Food Innovation Hub and at Mimic Seafood.

Sanah Baig
Chief Of Staff at The Good Food Institute.

David Bennell
North America Manager for the Food and Nature Program at the World Business Council for Sustainable Development (WBCSD).

Emily Broad Leib
Director of the Harvard Law School Food Law and Policy Clinic, and Deputy Director of the Harvard Law School Center for Health Law and Policy Innovation.

Angel Cabrera
President at Georgia Institute of Technology and Trustee of Bankinter Innovation Foundation.

Mr. Lim Chuan Poh
Chairman of the Singapore Food Agency.

Lou Cooperhouse
President & CEO at BlueNalu.

Alessio D'Antino
Founder and CEO at Forward Fooding.

John de Zulueta
Chairman of Círculo de Empresarios (Business Roundtable) and Vice-Chairman of the Bankinter Innovation Foundation.

Sara Eckhouse
Executive Director at Food Shot Global.

Jon Etxeberria
Founder at BAIBA.

Richard Kivel
Managing Director GrayBella Capital, Trustee of Bankinter Innovation Foundation.

Philip Lader
Senior Advisor of Morgan Stanley and Trustee of Bankinter Innovation Foundation.

Tina Lawton
Ex-Regional Director APAC at Syngenta.

Emilio Méndez
Professor of Physics at the State University of New York at Stony Brook and Director of the Energy Sciences Department at Brookhaven National Laboratory (BNL) in the US Department of Energy. Trustee of Bankinter Innovation Foundation.

Carolina Najar
Co-Founder at BAIBA.

Mark Post
CSO at Mosa Meat and professor at Maastritch University.

Sejal Ravji
Open Innovation Director at Calidad Pascual.

Roberto Ridolfi
Assistant-Director-General for Programme Support and Technical Cooperation at the United Nations Food and Agriculture Organization (FAO).

Beatriz Romanos
Food Tech and Food Innovation specialist and Founder of Techfood Magazine.

Vincent Rosso
Co-founder and Managing Director at Consentio.

Stefan Schmitz
Executive Director at Crop Trust.

Jens Schulte-Bockum
Chief Operating Officer at MTN Group, Trustee of Bankinter Innovation Foundation.

Eden Shochat
Partner at Aleph and Trustee of Bankinter Innovation Foundation.

Tan Chin Nam
Former Permanent Secretary, Singapore Public Service and Senior Corporate Adviser. Trustee of Bankinter Innovation Foundation.

Stephen Trachtenberg
President and University Professor Emeritus, The George Washington University. Trustee of Bankinter Innovation Foundation.

Wilfried Vanhonacker
Co-founder and Ex-Dean, CEIBS (Shanghai) and MSM Skolkovo (Moscow). Trustee, BankInter Innovation Foundation.

Renée Vassilos
Agriculture Innovation Director at The Nature Conservancy.

Walter Willett
Professor of Epidemiology and Nutrition at Harvard School of Public Health.

Simon Winter
Executive Director at Syngenta Foundation for Sustainable Agriculture.

fundación innovación bankinter.

FUTURE TRENDS FORUM

Fundación Innovación Bankinter
Paseo de la Castellana 29
28046 Madrid

FundacionBKT
Fundación Innovación Bankinter
Fundación Innovación Bankinter
Fundación Innovación Bankinter
fibankinter