THE EUROPEAN AGRIFOOD SECTOR CHALLENGES AND OPPORTUNITIES

Elvira Domingo
RIS programme Manager

Co-funded by the European Union

The challenges of the food system

% of the food produced in the world that gets lost or wasted every year

30%

Source: FAO

eit Food

Co-funded by the European Union

What % of fresh water global consumption is currently used for food processing?

70%

Source: FAO

eit Food

Co-funded by the European Union

What is the $ value of yearly global food waste?

$1.2 Trillion

eit Food

Co-funded by the European Union

Source: Boston Consulting Group

Amount of overweigth people across the world?

2 Billion

800 million undernourished

Source: FAO

Ratio of Successful Startups?

9 out of 10 Fail

Source: Munich Business Schowafol

EU AGRIFOOD SECTOR OUTLOOK

GLOBAL AGRI-FOOD SECTOR OUTLOOK

The agri-food market is under rising pressure

⊙ **Food prices have increased** due to distinct **causes**:

- Decrease in **grain reserves**.
- High demand in **China** (voracity).
- High impact of **COVID-19 crisis on maritime transport**:
  - global **shipping container shortage**, specially in USA and Europe.
  - **cargo costs: +150%** Q4 2020.
- **Shortages on ingredients** (oil, cereals)

⊙ This situation could have an **impact** on:

- **Food security and affordability**
- **Healthy and nutritional habits**
- **Food convenience and circular economy**

Photo by Cameron Venti on Unsplash

eit Food

Co-funded by the European Union

Sources: SHIP TECHNOLOGY; FREIGHTWAVES; FMI

COVID-19 has changed consumer behaviors

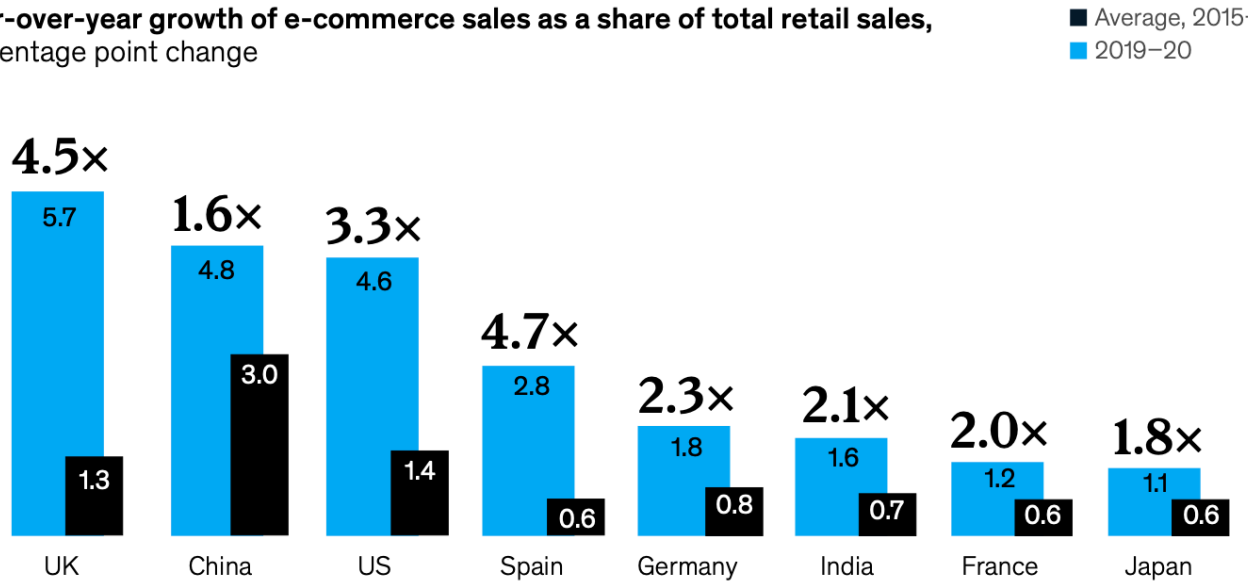
- **Impact on consumer preferences**: consumers are increasingly oriented towards **online sales**, **convenience shopping** and **proximity stores** as well as purchase of healthy products.

- **For Low-income groups price has become a key food choice** determinant often to the detriment of the healthier options.

Exhibit 1

E-commerce has grown two to five times faster than before the pandemic.

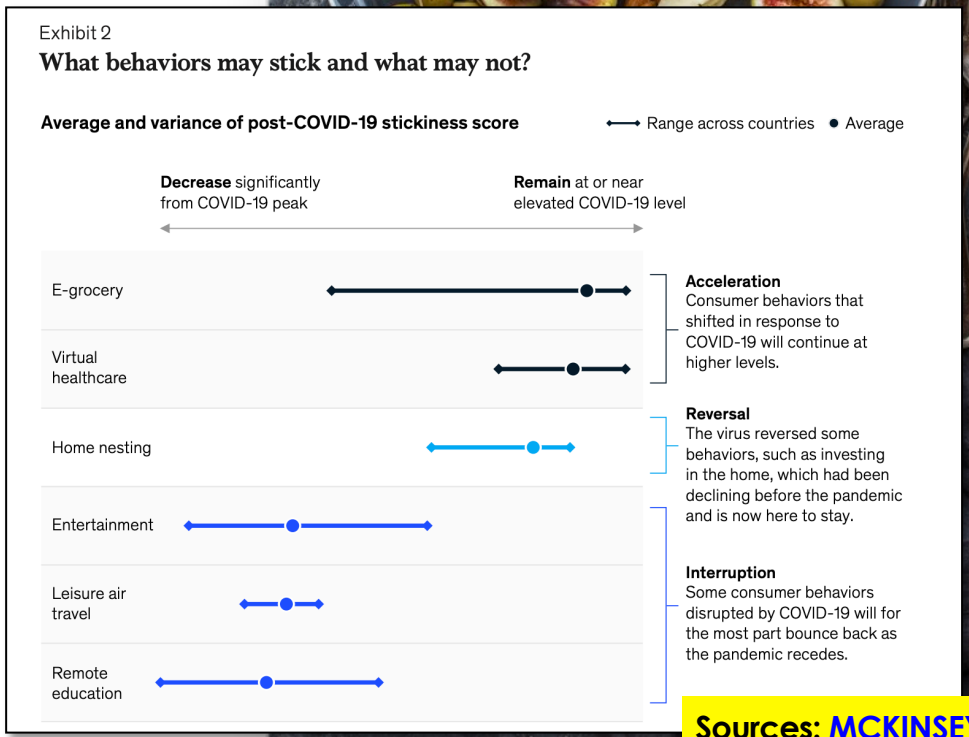
Year-over-year growth of e-commerce sales as a share of total retail sales, percentage point change



Source: Euromonitor Passport; McKinsey Global Institute analysis

Exhibit 2

What behaviors may stick and what may not?

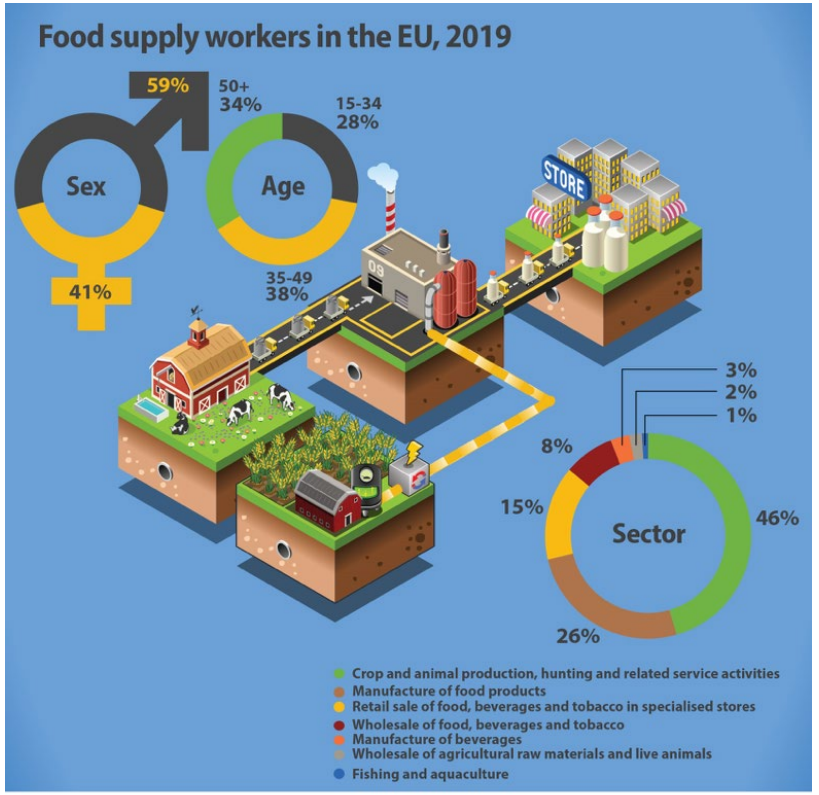


Sources: MCKINSEY

EU AGRI-FOOD SECTOR OUTLOOK

The agri-food industry remains being the largest manufacturing and employer industry in Europe

- EU food and drink industry **employs 4.82 million people**.
- Generates a **turnover of €1.2 trillion** and €266 billion in value added.
- It is a major contributor to Europe's economy **(1,9% GDP)**.
- **46%** of total food supply **workers** in the EU works **in crop and animal production.**



eit Food

Co-funded by the European Union

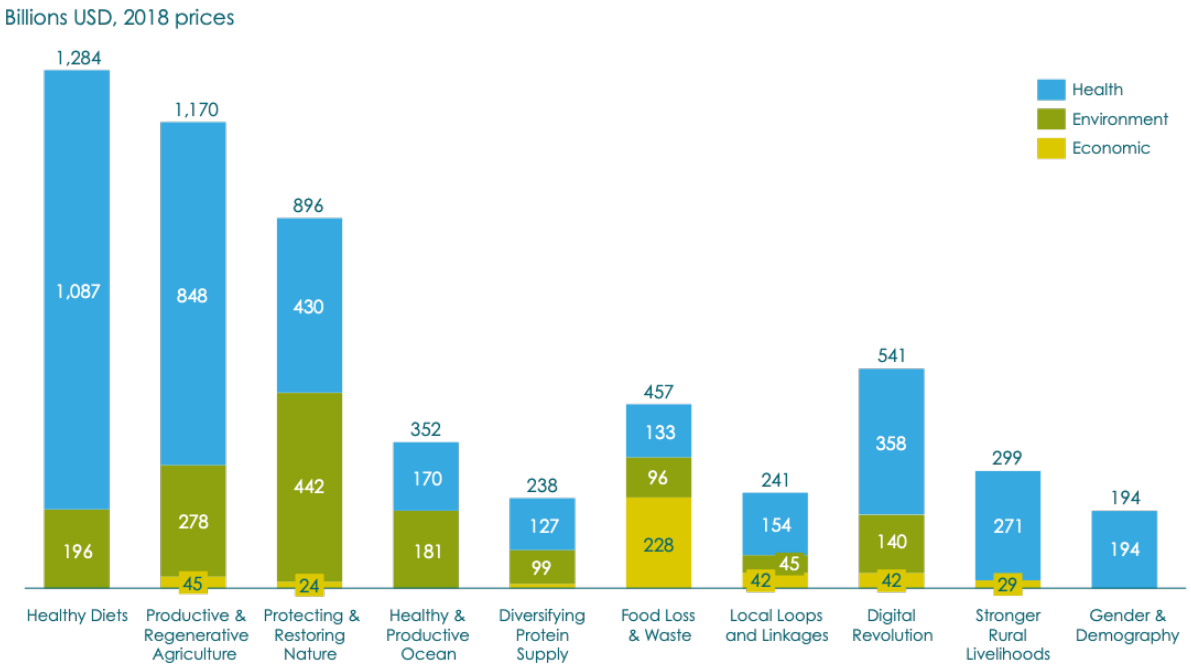
Sources: FOOD & DRINK EUROPE; EUROSTAT; EUROPEAN COMMISSION

GLOBAL AGRI-FOOD SECTOR OUTLOOK – OPPORTUNITY

There is a 5.7 trillion USD economic prize from reducing hidden costs via the critical transitions by 2030

- Transforming the world's food and land use systems is **necessary to achieve SDGs.**

- This transformation can be made with a **societal return that is more than 15 times the related investment cost** and creating new business opportunities worth up to $4.5 trillion a year by 2030:
  - Investment requirements: $300-$350 billion per year
  - $5.7 trillion economic prize by 2030 based on avoided hidden costs.
  - $4.5 trillion annual opportunity for businesses



Source: SYSTEMIQ, Food and Land Use Coalition, 2019 (see online technical annex for methodology).

eit Food

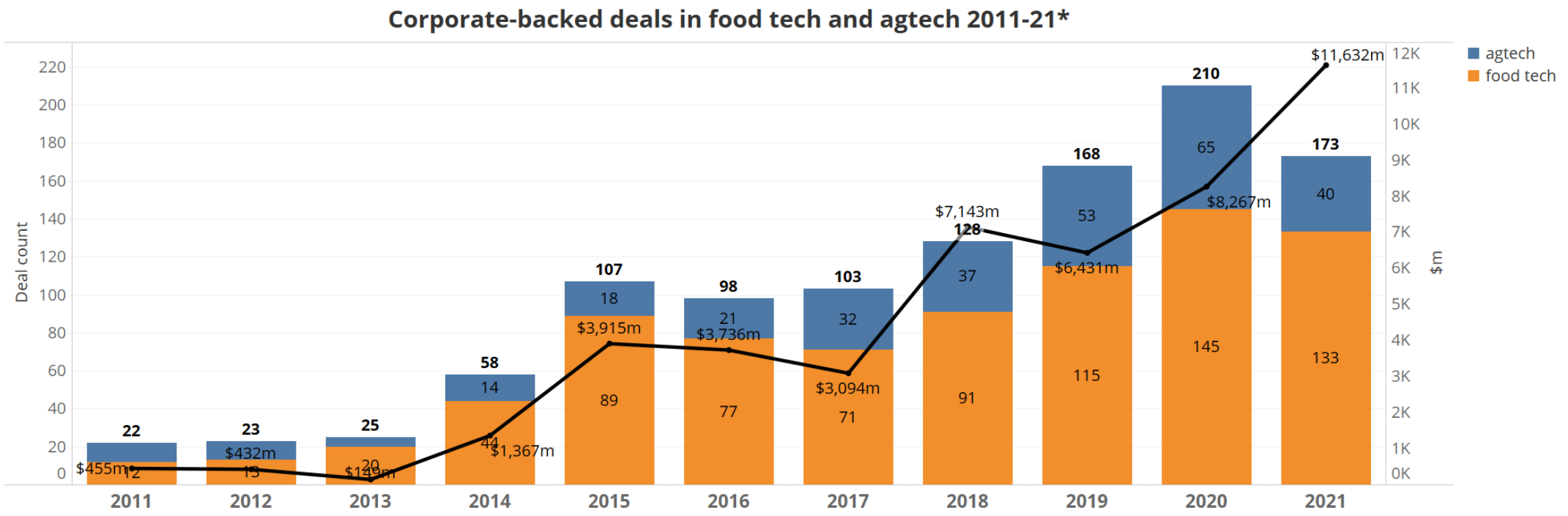
Co-funded by the European Union

Sources: FALU

Corporate venturing in food tech and agritech

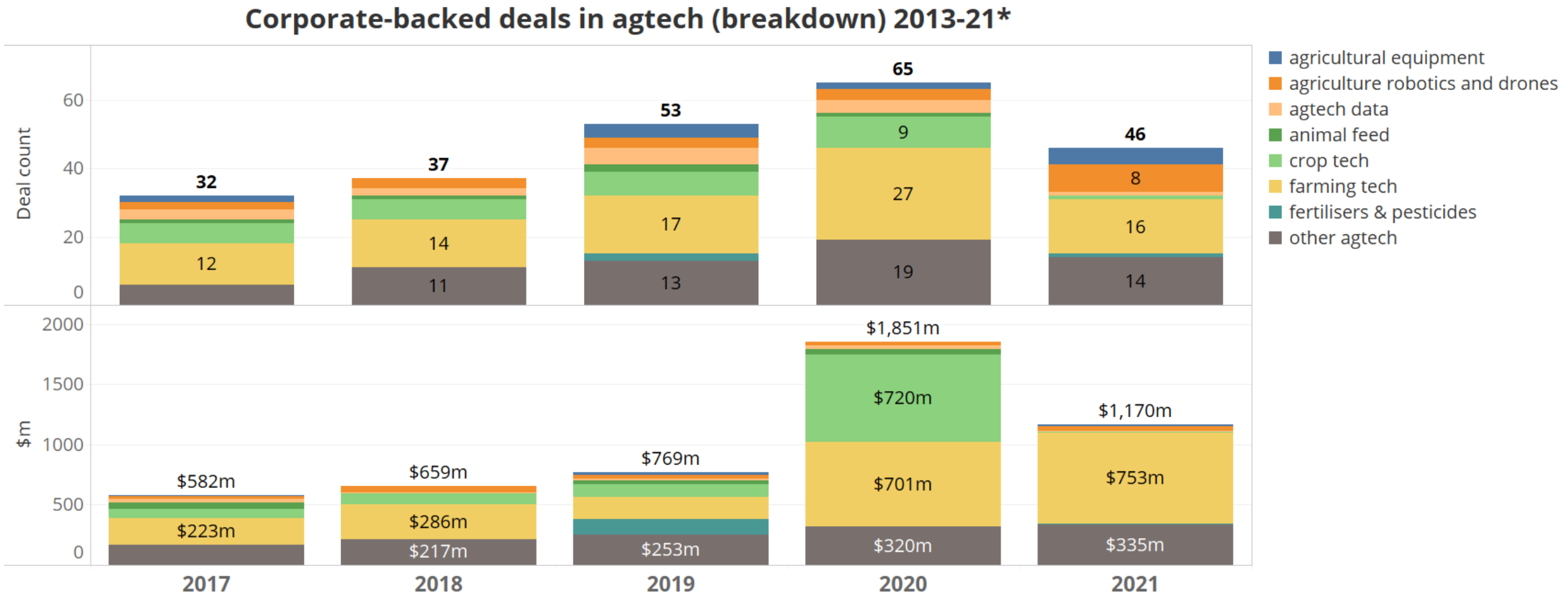
eit Food

Surge in corporate-backed deals in food tech and agtech



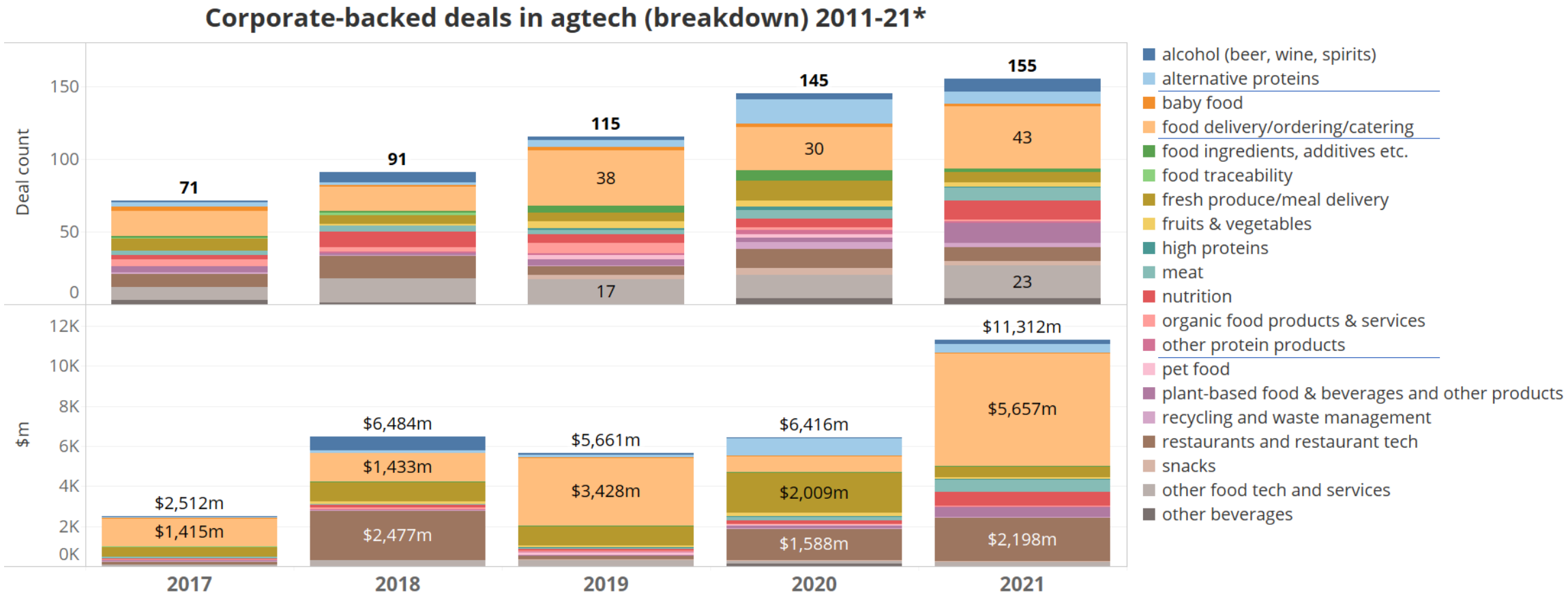
Data as of 9 Sep 2021

Most deals in agtech have been from farming and crop tech



Data as of 9 Sep 2021

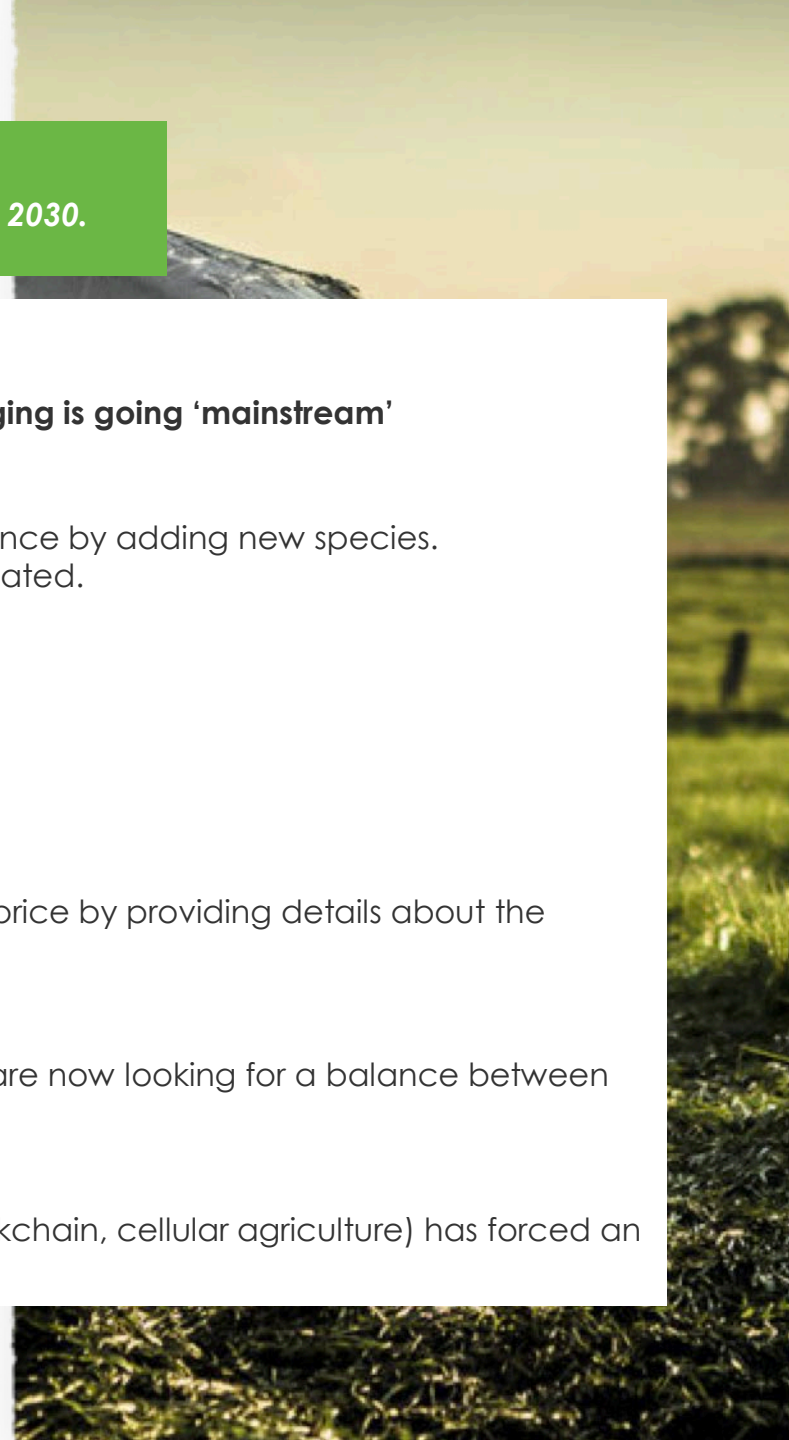
In food tech, leading categories have been food delivery, alternative proteins and other plant-based products



Data as of 9 Sep 2021

OPPORTUNITIES

EMERGING TRENDS - *COVID-19 pandemic has accelerated some trends expected for 2030.*



- **Packaging's dual concerns**

COVID concerns about food contamination enhances food safety.
Packaging producers have to meet more than ever **sustainable and hygiene goals**. **Bio-materials packaging is going 'mainstream'**

- **New focus on underused and forgotten crops**

Incorporating them into new products, looking for new flavours and contributing to the food system resilience by adding new species.
It will also contribute to add value to the local communities and natural ecosystems where they are originated.

- **Upcycled & rescued ingredients are becoming trendy**

- **"Immunofoods": food for boosting immune system.**

Personalized nutrition shows great promise in helping to improve immune resilience

- **Quality redefined:**

Consumers are seeking to **return to what is essential.** Brands have to be more transparent about product price by providing details about the ingredients, processes, and social responsibility.

- **Healthy eating, mental and emotional wellbeing:**

Malnutrition and obesity have been reported to increase the severity of COVID-19. European consumers are now looking for a balance between mental health and pleasure

- **Tech-celleration**

The way consumers are changing consumer habits and the way food is produced (online shopping, blockchain, cellular agriculture) has forced an acceleration of the use of technology.

Sources: THE FUTURE LABORATORY; MINTEL; WSGN

The 6 EIT Food Innovation Focus Areas andcross-area enablers

ALTERNATIVE PROTEINS

SUSTAINABLE AGRICULTURE

TARGETED NUTRITION

SUSTAINABLE AQUACULTURE

DIGITAL TRACEABILITY

CIRCULAR FOOD SYSTEMS

CONSUMER CENTRICITY

DIGITAL TRANSFORMATION OF THE FOOD SYSTEM

eit Food

Co-funded by the European Union

DIVERSIFIED PROTEINS

Co-funded by the European Union

Big Market opportunities

Alternative-Protein Market to Reach at Least $290 Billion by 2035 (up 11% of protein category by 2035)

While conventional proteins are currently growing at approximately 2.4% per year,

20 alternative proteins are estimated to grow at more than 36% per year.

- The total alternative protein **market size between US$77 billion and US$153 billion by 2030,** up from between US$5 billion and US$10 billion in 2021.
- **Global Protein Extracts from Single Cell Protein** and Other Conventional Sources Market to Reach $27.3 Billion by 2027.
- In 2020, **$527 million was invested into alternative proteins** in Europe, more than **quadrupling** investment flows in 2019.
  - **70% of the €566M raised in Next-Generation Foods in 2020 was raised by alternative protein startups.**

By 2027, the edible insects market is projected to reach $4.63 billion

Greater predisposition of consumers to this type of products
Alternative proteins consumption is increasing specially in Millennials and Gen Z Population.

Sources: BOSTON CONSULTING GROUP; THE FOOD & LAND USE COALITION; REPORT LINKER; THE GREEN REVOLUTION

eit Food

Co-funded by the European Union

DIVERSIFIED PROTEINS - Opportunities

- **Insect protein**
  - Diversifying diets and improving food security in many parts of the world, especially where there is food scarcity.
  - Animal-feed & pet food: Processing by products from food waste, agricultural residues and agri-business are being considered as a sustainable source of substrates for farmed insects.
- The increased **interest in proteins from cultivated meat** stands out, due to different advances, both technological and legislative
  - A move to **direct-to-consumer** and public engagement is expected in next months.
- **Investments will move towards proteins obtained through fermentation processes.**
  - While Single Cell Protein (SCP) faces high investment costs, the use of microbes to produce proteins offers advantages over conventional methods and will play a major part in the future of protein production, once inputs are accesible and affordable.
- **Plant-based Meat and Fish category, that expands beyond the burger and meatballs**
  - Greater effort by manufacturers to increase their product lines, adapting them to an increasingly faithful demand (especially in dairy products), to meet the needs of diverse cuisines and applications and to move to direct-to- consumer.
- **Focus on non-allergenic substitutes and more variety of ingredients**
  - sunflower, mung bean, potato, rice, duckweed, chickpea, navy bean, oat, and fungi

Sources: PRNEWSWIRE; FAO

DIVERSIFIED PROTEINS – Sucess Cases

- **Beyond Meat** has been the biggest IPO of 2019 over all industries (stock price grew 645% at its session high)
  - We witness the emergence of B2B models in meat mimicking industry, aiming to achieve scalability price parity as fast as possible (ex: Seattle Food Tech, Nova Meat)
- **Planetarians** (ingredient provider of upcycled plant-based protein) ran successful pilot and got follow-up **investment from Barilla & Amadori**)
- **Ynsect** raised a $150 million Series C in February.
- **AgriProtein**, another insect protein company, raised $105 million in June of 2018.
- **InnovaFeed**, a France-based insect protein company, raised a roughly $43 million round in 2019.
- Switch slowly starting to happen on the consumer side regarding insects as brands like **Exo** or **Eat Grub** hit the shelves at mass retailers

SUSTAINABLE AGRICULTURE

Co-funded by the European Union

SUSTAINABLE AGRICULTURE HIGHLIGHTS

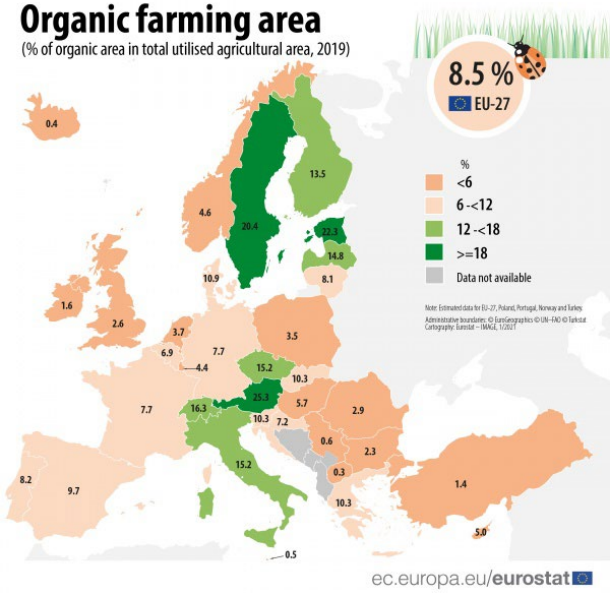
Sustainable farming is increasing

- **An increase of 6,25%of the total utilised agricultural area of the EU-27 to organic farming (8,5%).**

- **Organic farm managers tend to be younger**.

  The share of farm managers under 40 years of age was twice as large for organic farms (21 %) as for non-organic farms (10.5 %).

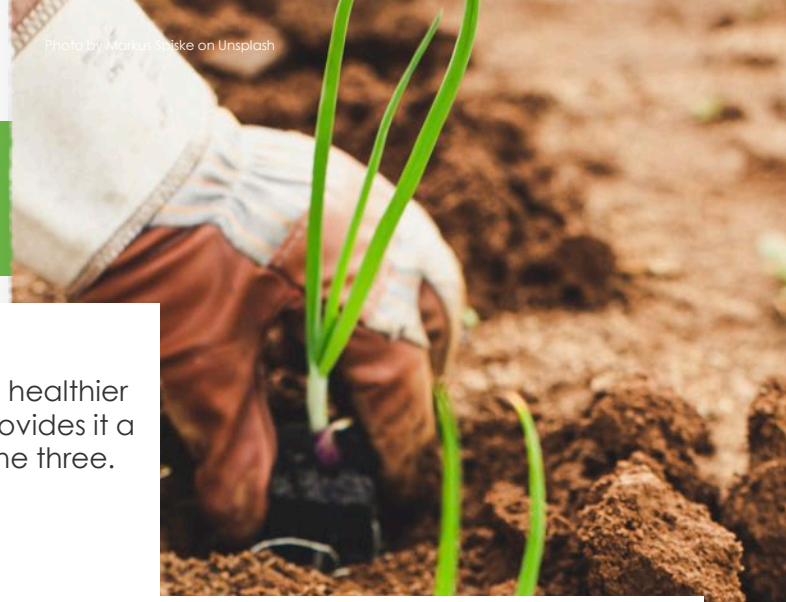
- Digitalization offers agriculture a faster **pathway to recovery from COVID-19 crisis**.



Sources: THE EUROPEAN CONSUMER ORGANISATION; FALU

eit Food
Co-funded by the European Union

SUSTAINABLE AGRICULTURE - Opportunities



Regenerative agriculture

Poised to move into the mainstream faster than many people expect. It is a classic **triple-win situation. Consumers** can receive healthier foods, **farmers** can have a more secure and prosperous future and the **planet** will benefit because regenerative agriculture provides it a better chance to heal and restore itself. At the confluence of these forces will be the grocer who serves as a conduit among the three.

Innovations:

Pasture Cropping—the No-kill, No-till System.

Water Management

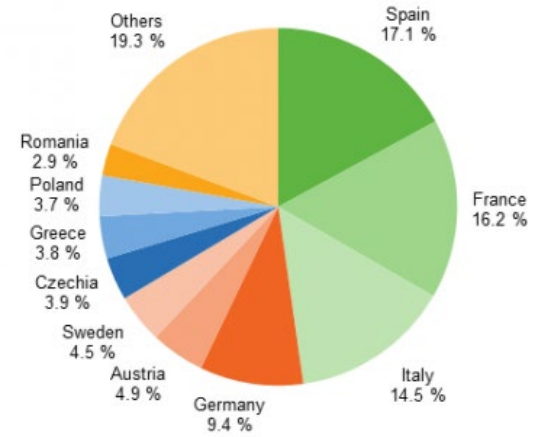
- Unlocking the potential of **rainfed agriculture** calls for improved water management.
- **Investing in irrigation** for improved water productivity will be key to addressing scarcities.
- Improving **water productivity in animal production** can ease pressure on water resources.

Digitalization

- **Blockchain** for a better visibility.
- Delivery **drones** and the environment.
- Sensor and crop/animal monitoring systems

Plastic-free products: bioplastics, paper, reusing materials.

Share of total organic area (fully converted and under conversion), EU-27, 2019
(% of total EU-27)

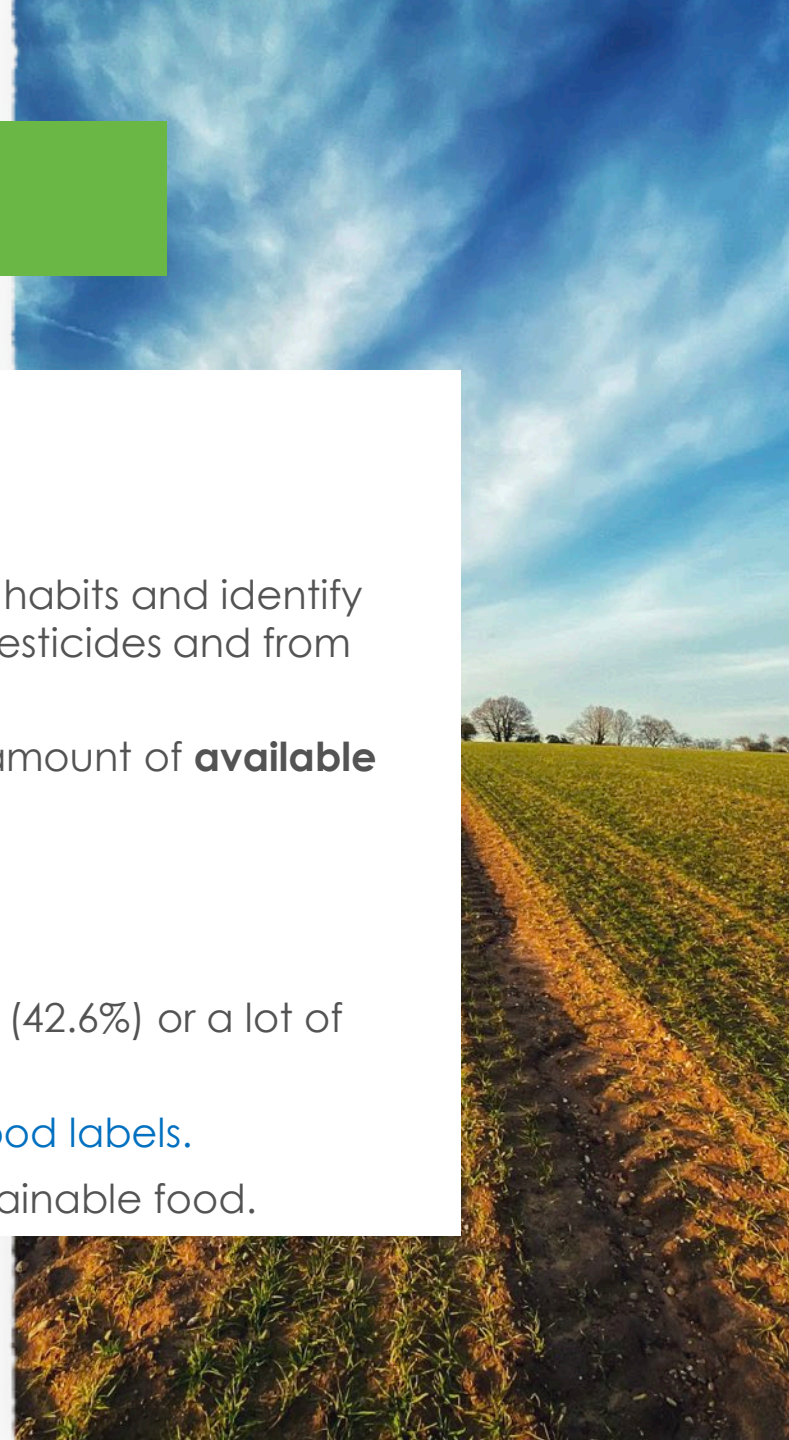


Source: Eurostat (online data code: org_cropar)

eurostat

Sources: THE EUROPEAN CONSUMER ORGANISATION; FAO; EUROPEAN ENVIRONMENTAL AGENCY; FARM TOGETHER

SUSTAINABLE AGRICULTURE HIGHLIGHTS



CONSUMERS UNDERSTANDING

⊙ ENVIROMENTAL IMPACT

- **Citizens tend to underestimate the environmental impact** of their own eating habits and identify 'sustainable' as a synonym for environmentally friendly, without GMOs and pesticides and from local producers.
- More awareness about Water Scarcity: In the last two decades, the annual amount of **available freshwater per person has declined by more than 20 %**

⊙ CONSUMERS DEMAND

- Over half of consumers say that **sustainability** concerns **have some influence** (42.6%) or a lot of influence (16.6%) **on their eating habits**.
- Most consumers (57%) want **sustainability information** to be compulsory on food labels.
- Only one in five consumers say they are **willing to spend more** money on sustainable food.

eit Food

Co-funded by the European Union

Sources: THE EUROPEAN CONSUMER ORGANISATION; FALU

TARGETED NUTRITION

Co-funded by the European Union

TARGETED NUTRITION FOCUS AREA HIGHLIGHTS

Trends & forecasts updates (ANA and KHNI)

⊙ **Immune Resilience**:

- 54% of global consumers say they have spent time educating themselves on ingredients that can support immune health

⊙ **Proactive health**

- Using diet to improve day-to-day life, rather than focusing on fixing a health problem once it has already occurred.
- "Food as medicine", "naturally functional", and "superfoods" all come to mind when thinking about proactive health.
- Health and nutrition is one of the reasons behind plant-based meat alternatives, Healthy ageing and protein, Digestive health: reducing gastrointestinal symptoms as well as Sugar: Foods with similar calories can be very different in their nutrient profile. The Quality Calorie Concept

⊙ **High-Tech Innovations**:

Data-driven research and AI-based algorithms will continue to gain importance. Including self-monitoring and self-tracking capabilities, enabled by digital and wearables.

⊙ **New Directions in Nutrition Research:**

Heavy focus on novel **biomarker discovery** to study groups of people historically underrepresented in nutrition research.

⊙ **Advancing Food Science**:

Quantify thousands of food components in order to better understand the links between foods, nutrients, and health.

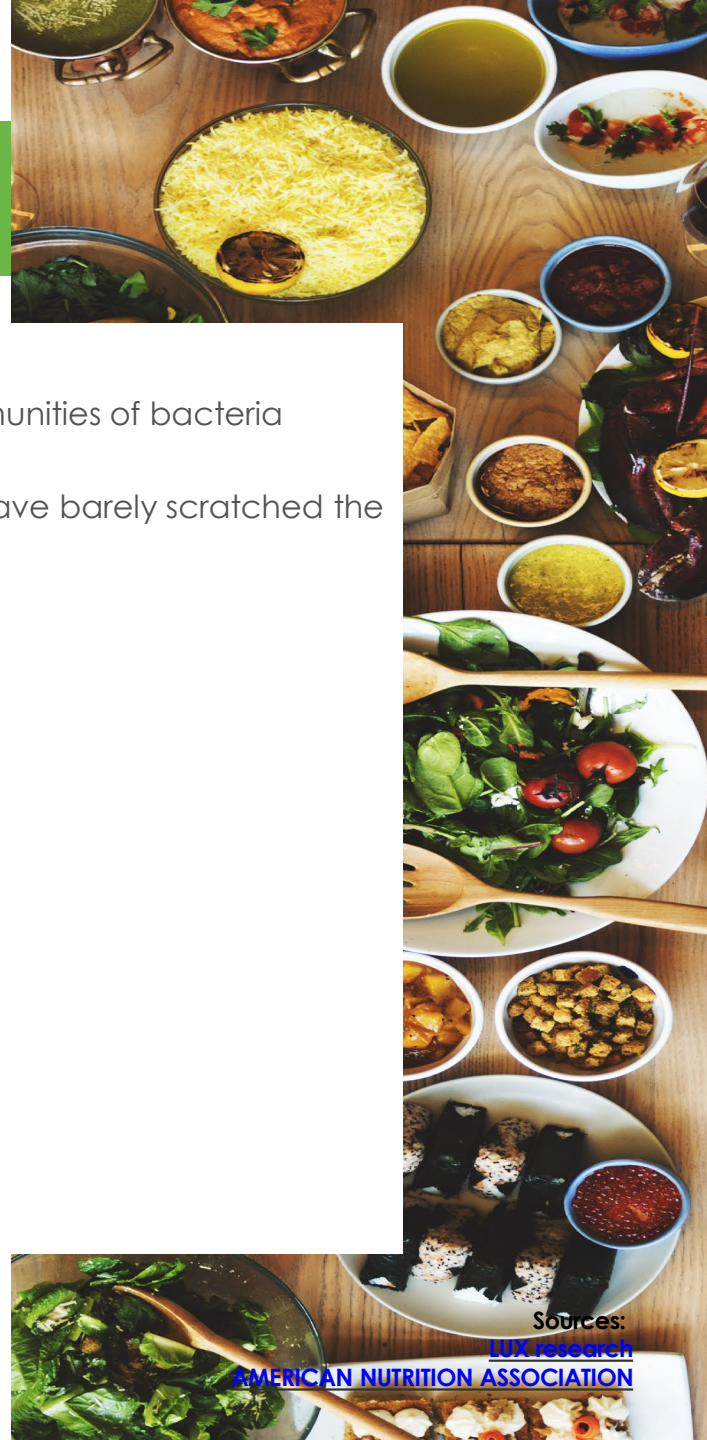
⊙ **Mood & mental wellness through Nutrition**

- Nutritional psychiatry is emerging as a field - the scientific role that our diet can play in our mood and mental health.

Sources: AMERICAN NUTRITION ASSOCIATION

Sources: KERRY HEALTH AND NUTRITION INSTITUTE

TARGETED NUTRITION FOCUS AREA Opportunities

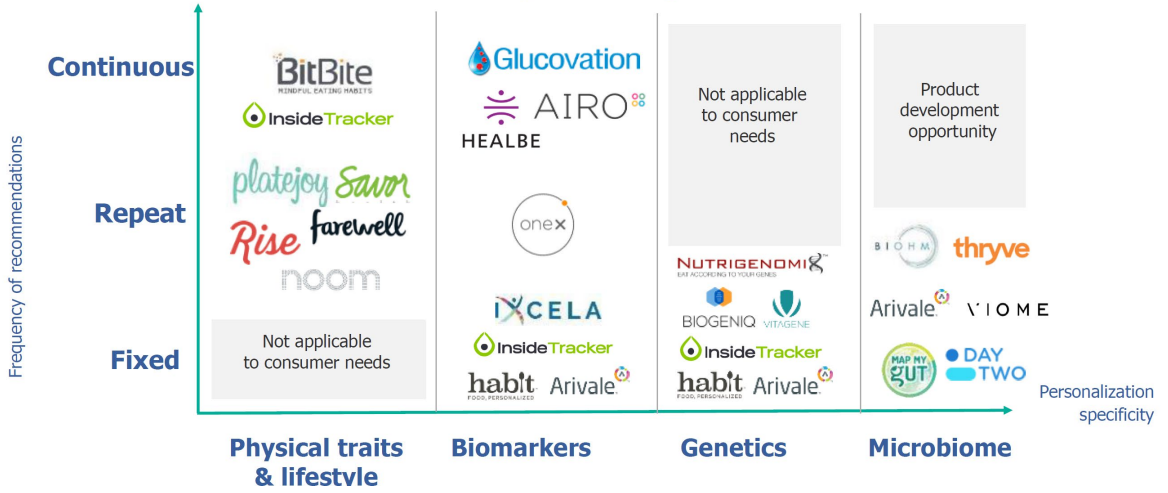


⊙Microbiome Boom: microbes do more than help us digest our food.

We are in the middle of an explosion of microbiome research to identify new species of bacteria and how communities of bacteria throughout and around the body--not just in the gut--function.

- Understanding of the microbiome has increased dramatically over the past decade, yet developers have barely scratched the surface
- The microbiome has the potential to unlock a new layer of personalization
- Advancing microbiome research will affect how we approach personalization

Personalized nutrition solutions include many technologies offered at several levels of specificity



Sources:
LUX research
AMERICAN NUTRITION ASSOCIATION


Photo by kyanopteros on Flickr

SUSTAINABLE AQUACULTURE

Co-funded by the European Union

SUSTAINABLE AQUACULTURE HIGHLIGHTS - Opportunities

Aquaculture value accounts for EUR 4 billion (USD 4.7 billion).
The European aquaculture sector - is unable to meet the current and increasing market demand for aquatic produce
More needs to be done to ensure demand is met in an economic, social and environmentally friendly way.

OPPORTUNITIES

The European **algae industry** is a promising emerging sector of the **EU Blue Bioeconomy** with many data gaps still to be filled with, inter alia, studies

- Novel molecular technologies for **genetic improvement.**
- **Recirculating aquaculture systems (RAS) and renewable energy**
- Alternative proteins and **fish oil**
- **Oral vaccines** against diseases
- **DIGITIZATION**
  - Robotics to carry out laborious work
  - Drones for data collection
  - Sensors to measure water parameters and monitor feeding and health status
  - AI empowers rapid and precise decisions
  - Virtual reality (VR) for training and consulting
  - 3D printing technologies to produce tools for aquaculture
  - Internet of things connects different parts of the aquaculture industry
  - Blockchain as a trustworthy traceability tool

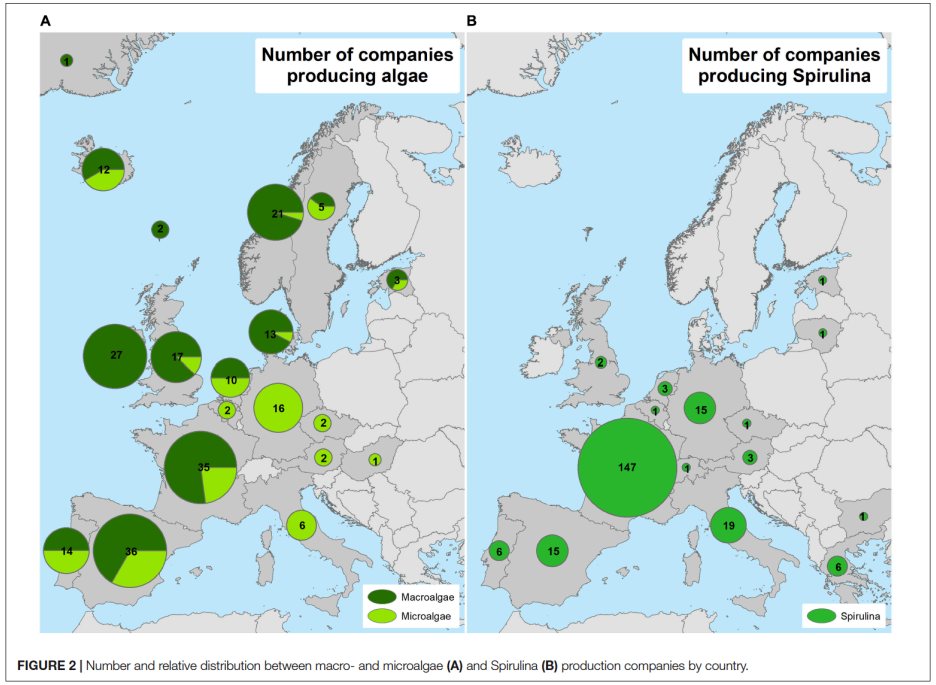
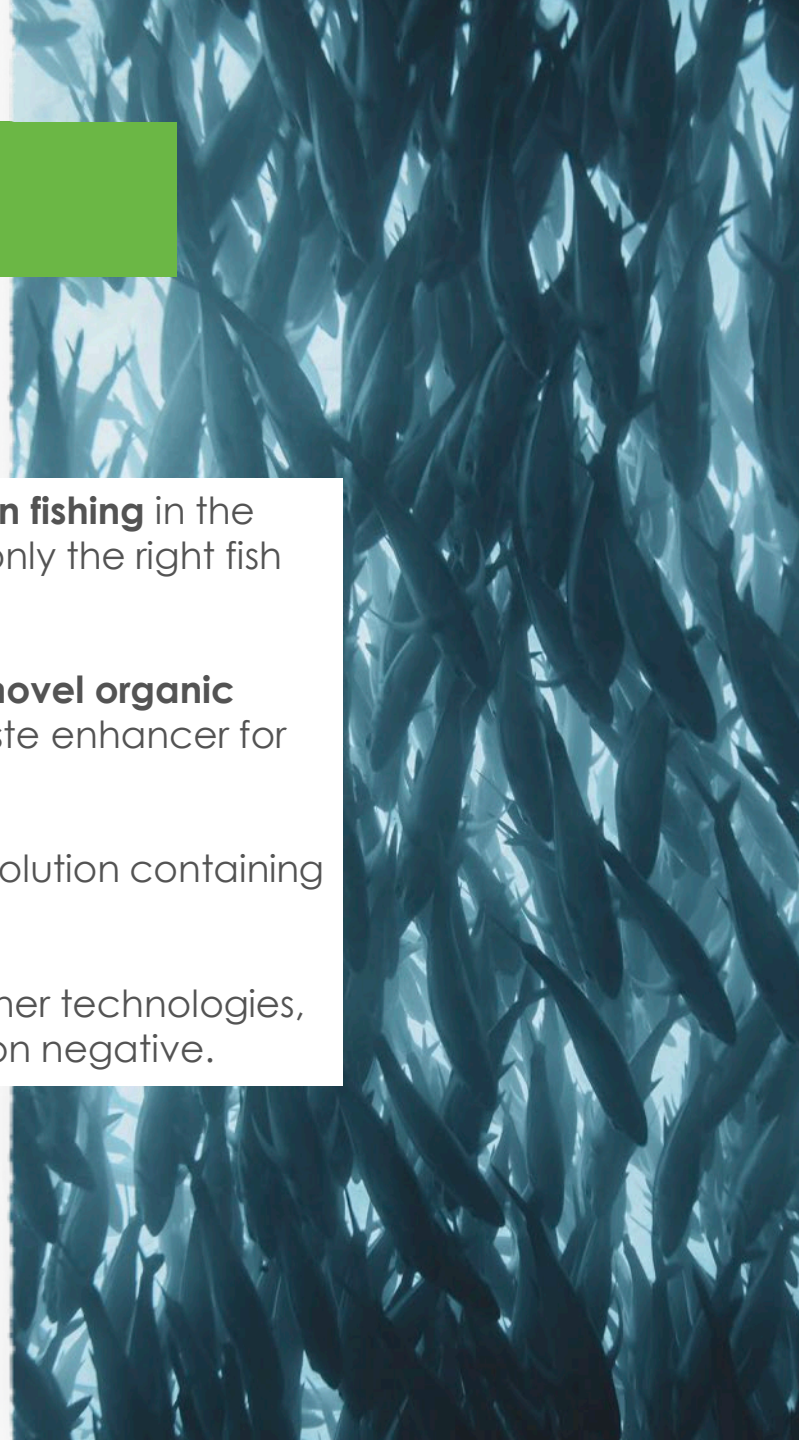


FIGURE 2 | Number and relative distribution between macro- and microalgae **(A)** and Spirulina **(B)** production companies by country.

Source: EUMOFA

SUSTAINABLE AQUACULTURE- Success Cases



•SafetyNet Technologies, designs and builds trusted and valued solutions that enable **precision fishing** in the fishing industry. Supplied via a Hardware-as-a-Service model, enables fishing crews to catch only the right fish using a light device.

•Marine Feed uses Sea Squirt cultivation to offer feed producers and aquaculturists a **unique novel organic protein** feed ingredient with a low carbon footprint. Marine Feed also produces an umami taste enhancer for the food market.

•SuSea an innovative **preservation technology**, dehydrates seafood with a proprietary liquid solution containing natural ingredients which improve seafood safety and reduce waste by increasing shelf life.

•Vaxa new technology platform for cultivation of **omega-3 rich microalgae.** Compared to other technologies, Vaxa's platform requires less than 1% of fresh water, less than 1% of land footprint and is carbon negative.

Source: EIT Food

eit Food

DIGITAL TRACEABILITY

Co-funded by the European Union

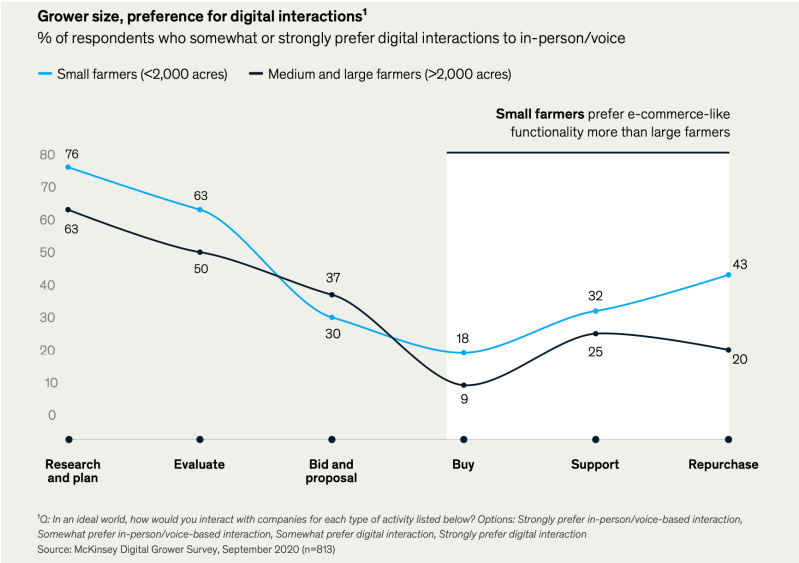
DIGITAL TRACEABILITY - Opportunities

⊙ Transparency identified as the top food trend for 2021:

- 6/10 consumers are interested in learning more about where foods come from.
- **Increasing transparency** to meet consumers demands on **ethical, environmental, clean label, human/animal welfare**, supply chain transparency, and **sustainable sourcing**

Top technologies/products:

- **Precision Agriculture** Market is expected to reach $7.8 billion by 2022
- **Image recognition and machine learning**
- **Blockchain** powered trading platforms
- Smart sensors & remote sensing to build predictive models
- 'FAAS' models (Farming as a Service): integration of automated machinery with prediction softwares
- Vertical farming



- ⊙ **Farmers' and consumers comfort with digital channels has grown** markedly since 2018
- ⊙ **Two-thirds of farmers also use the web** and mobile devices for research and planning

eit Food
Co-funded by the European Union

Sources: (source: Allied Market Research)
NATURAL NEWS; INNOVA MARKET INSIGHTS; FAO; PWC; MCKINSEY

DIGITAL TRACEABILITY – Success Cases

Using technology to rebuild trust and Improve supply chain safety

- **Amazon** invested in **Plenty** (Vertical farming), and **Google Ventures** invested in **Farmers Business Network**.
- **Connecting Food** has created a digital platform that can follow a product in real-time, tracking and digitally auditing each batch of products as they go through the supply chain
- **SwissDeCode**, DNAFoil® technology allows farmers, food manufacturers and other agents in the food value chain to quickly detect soil, animal and plant diseases, as well as food contamination or adulteration, on the spot and without long lab delays.
- **Farm to Plate**, a **blockchain platform** designed for the food supply industry that will enhance and extend data sharing **transparency from the point of origin to the consumer**. Farm to Plate offers a one-of-a-kind solution created to elevate supply chain resistance and support food safety compliance, ultimately strengthening brand trust.

Sources: NATURAL NEWS; INNOVA MARKET INSIGHTS; FAO; PWC; EY; EUROPEAN PARLIAMENT

CIRCULAR FOOD SYSTEMS

Photo by Petr Magera on Unsplash

Co-funded by the European Union

CIRCULAR FOOD SYSTEMS HIGHLIGHTS

- **European online grocery market would grow by 66% by 2023.**

- Food loss and waste are a huge challenge

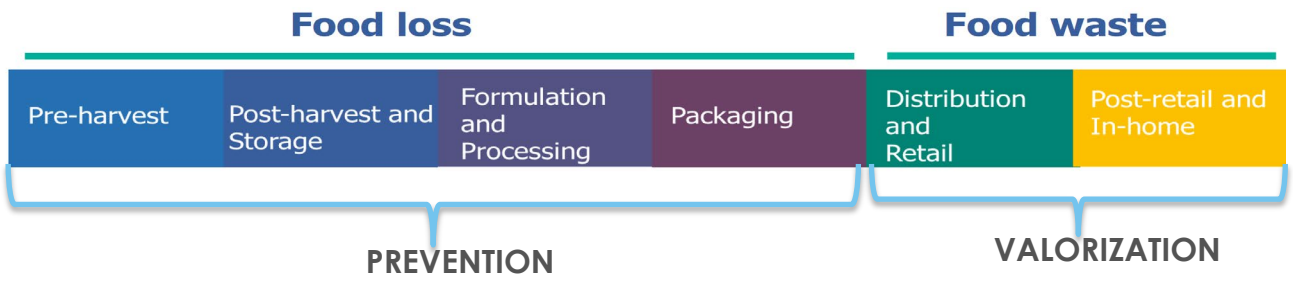
931 million tonnes of food is wasted each year in Europe: 173 kg/person. Globally, food waste is responsible for 6% of global greenhouse gas emissions.

- The global food **waste management market size** was estimated at **USD 34.22 billion in 2019**.

- The Upcycled Food Association has published its first ever **draft certification standard**. It is also in the process of developing a **food label for certified products.**

Sources: Amcor, INNOVA MARKET INSIGHTS; SUSTAINABLE FOOD TRUST

CIRCULAR FOOD SYSTEMS - Opportunities



Top technologies, products and services:

- Biodegradable & Edible packaging
- Food sharing apps - minimising waste streams and finding new uses waste
- Products made of food surplus
- Upcycling waste for byproducts
- Smart solutions for retail & food service – cold chain management
- Increasing shelf lives through ingredients and sustainable packaging
- Education and behavioural changes

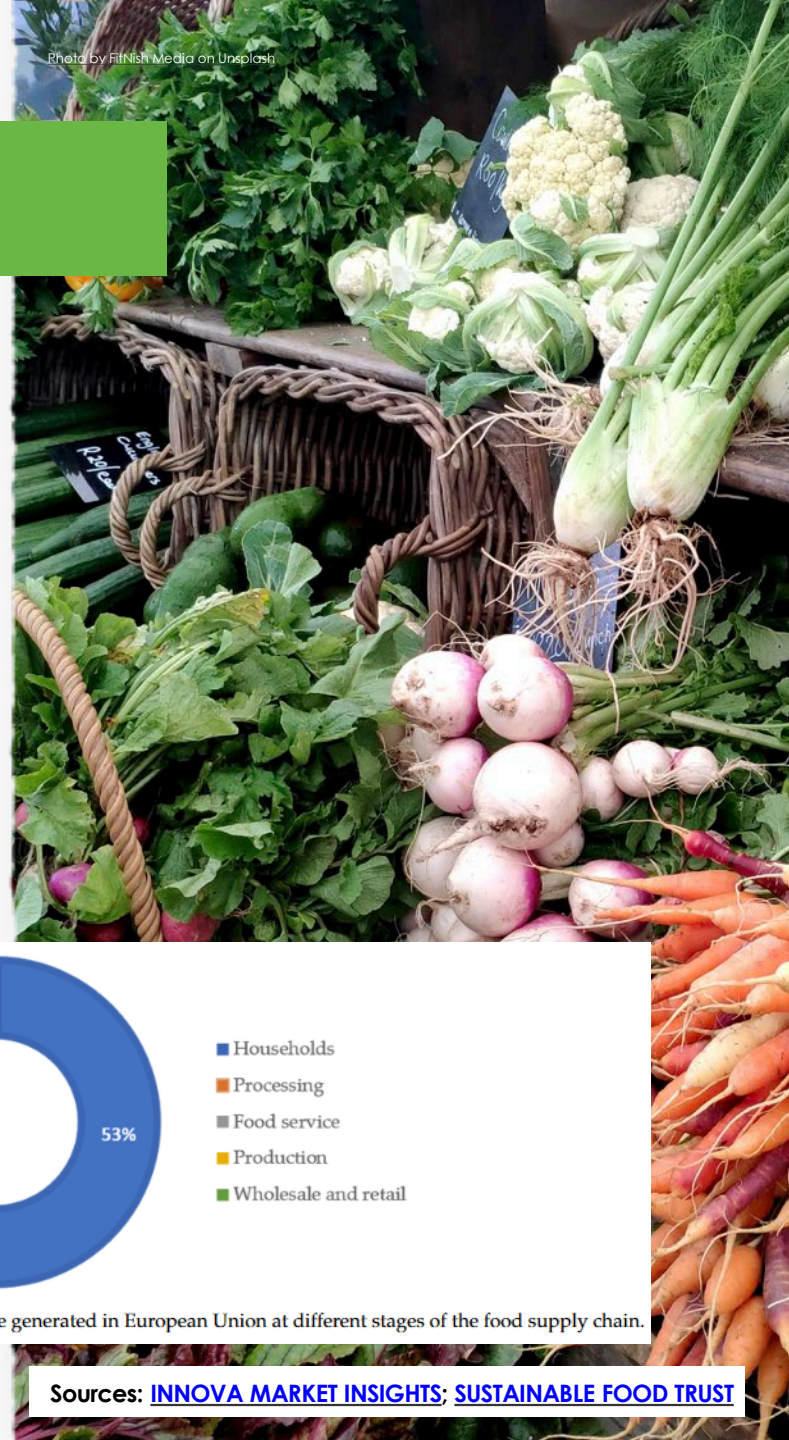


Figure 1. Food waste generated in European Union at different stages of the food supply chain.

Sources: INNOVA MARKET INSIGHTS; SUSTAINABLE FOOD TRUST

CIRCULAR FOOD SYSTEMS – Succes Cases

- **Bio-materials packaging** is going 'mainstream' (Huug)
  Large manufacturers are making the switch (eg. Nestle with Yes)
- **Upcycled & rescued ingredients** (eg. Regrained received investments from Barilla, ToastAle is expanding in the US), Mondelez is testing 2 snack products through their brand incubator Snack Future: Dirt Kitchen (rescued fruits vegs) & CaPao (cacao fruit)

Solution	Description	Companies
Produce Specifications	Integrating "off-grade" misshapen, odd sized, and shorter shelf-life fruits and vegetables as well as trimmings and peels into product lines and menus	eatlimmo, MISFIT
Processing Procedures	Value-added processing and manufacturing line optimization of fresh food and food products	APEEL SCIENCES
Cold Chain Management	Transportation and storage of perishable food and ingredients - standardized for temperature and time. The creation of more direct lines from farms to consumers with fewer stops and transfers along the way	nanoICE, FreshSurety, wakati
Portion Sizing	Portioning food in manageable amounts by using smaller plates, eliminating trays, and adjusting cost to encourage realistic and timely consumption of foods	Grimmway Farms, Nabisco
Packaging Adjustments	Innovation in materials used for packaging to prevent spoilage and extend shelf-life	IoP MAGIC ADD
Inventory Management	Systems to track shelf-life and time-on-hand for fresh food items to inform stocking and ordering intervals	foodloop, wasteless
Tracking and Analytics	Generating data on wasteful practices to identify behavioral and operational weak spots	LeanPath
Donation Services	Standardized regulation, transportation, storage, handling, and donation matching software to minimize waste costs, save meals and capitalize on tax incentives for charitable giving	Food Cowboy, Spoiler Alert
Consumer Habits	Products and technologies that inform consumers about food waste and change purchasing, storage, and consumption habits	wasteless, FOODsniffer

EU AGRI-FOOD SECTOR OUTLOOK

Photo by Chris Spalton on Unsplash

2020-2030 Projections

- **Digitisation will be key for the arable crops sector**, supporting yield productivity gains, improved labour conditions as well as higher environmental standards.
- **Bio-materials packaging is going 'mainstream' Sustainable and hygiene goals**.
- **Milk, dairy and meat sectors** will be shaped by the transition towards increased sustainability.
- Higher demand of the **fruit and vegetables sector** due to rising consumer health awareness and convenience.
- **Insect farming** would be used **to reduce food waste**, by feeding it to insects, with several uses in aquaculture and biodiesel production
- Reinforcement of some pre-existing trends: Demand for locally produced food and **Shorter supply chain.**
- With adequate **financial and technical support, agriculture could become a key engine for economic development.**
- The **farm workforce** is expected to decline at a slower rate, at 1% per year, driven by technological progress in machinery and equipment.

Further readings: EU Agricultural Outlook

eit Food

Co-funded by the European Union

EIT Food

Improving food together

THANK YOU!

Elvira Domingo
RIS programme Manager
Elvira.domingo@eitfood.eu

eitfood.eu

Co-funded by the European Union