

# BIOECONOMY INNOVATION

CommBeBiz Magazine 2017-2018

## FOOD 2030 –

Transforming our food  
systems through  
science



# BIOECONOMY INNOVATION

CommBeBiz Magazine 2017-2018

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# Editorial

## The global horizon of EU's Food and Nutrition Security Research and Innovation

Challenge-oriented research and innovation (R&I) has become the central theme of the EU's bioeconomy research, addressing some of the major problems on Earth. These span climate change, food security and healthy nutrition, reaching from issues such as sustainable and circular agriculture and fisheries, to the transition, from a fossil-free, to a biobased economy. With its new Bioeconomy Innovation CommBeBiz Magazine 2017-2018, CommBeBiz the EU-funded communication action to support researchers in the bioeconomy wants to emphasise the topic of Food and Nutrition Security research within the EU's FOOD 2030 framework, and to orient towards the World Food Day 2017 dealing with hunger-related migration.

With interesting interviews and features, infographs and photo panoramas, this edition covers the rich spectrum of current debates, trends, important research developments, and projects on Food and Nutrition Security. The community of stakeholders is targeting healthier, more future-proof, and more sustainable food systems on all levels, encompassing tasks of a magnitude and complexity that require the expertise, and various different perspectives, of many different thought leaders, policymakers, scientists and innovators. A special thank needs to be addressed to the members of the FOOD2030 -sector in the Bioeconomy Directorate of DG Research in the EU-Commission which has actively contributed to this publication through valuable support and appreciated advice.

## The World Food Day 2017 – a focus on hunger-related migration

During the drafting process in autumn 2017, the UN's FAO issued an alert on a new hunger crisis — driven by climate change and conflict — with the potential to again push up the amount of hungry people on the planet. After decades of declining hunger, the world organisations dealing with global Food and Nutrition Security were hoping to reach Sustainable Development Goal number 2, 'zero hunger by 2035'. However, between 2015 and 2016 the number of hungry people soared again, by nearly 40 million. Although globally industrialised food systems deliver in abundance, and their outputs stress the soil, water systems and the atmosphere, the rates of international migrants rose by over 40 % due to conflicts and war, but also due to hunger. These worrying developments have persuaded the FOOD 2030 sector of the EU Commission's Bioeconomy Research Directorate to hold its Science Policy Dialogue together with the World Food Day 2017, which is under the motto 'Change the future of migration — Invest in food security and rural development' with, among many others, keynotes speakers from the FAO. Two out of the four root causes of migration today are related to food insecurity, in many cases triggered by the climate-driven losses of rural livelihoods and war-related undernourishment and deprivation.

Europe, affected by these alarming developments in manifold ways, can contribute to R&I to mitigate persisting nutritional imbalances between North and South; and strive to decrease the risks of food insecurity and to foster the health and well-being of citizens and communities. The research communications project CommBeBiz, feels honoured to contribute to the communication of the World Food Day themes by opening, with this publication, a space for debates among scientists about the important topics in agriculture-, food- and nutrition-related research. By linking food system topics to exciting innovations from EU-funded researchers we hope to be able to do our bit in the push for a better food-future.

The Bioeconomy Innovation: CommBeBiz Magazine 2017 – 2018 showcases these developments in a structured way, to present research contents in a comprehensible and entertaining style using storytelling, features, interviews and visual material. The magazine is composed of five sections:

**Trends** — This section features global trends in Food and Nutrition Security R&I, and topics of the World Food Day 2017. The focus is on foodsystems and sustainability as well as on food poverty and migration, complemented by articles on EU research funding as well as with new approaches to communications on Food and Nutrition research.

**Nutrition for Sustainable and Healthy Diets** — Along with the priorities of FOOD 2030, a wealth of EU-funded projects in the food and nutrition research sector are showcased in this section dealing with healthy food, sustainable food processing, sustainable food sources and urban agriculture.

**Climate-smart and Environmentally Sustainable Food Systems** — This section features new sustainable technologies in aquaculture and horticulture, with projects that foster biodiversity and foodwaste recycling; and includes interviews and articles on projects related to the priority topic of Circularity and the Resource Efficiency of Food Systems.

**Food Systems Innovation and the Empowerment of Communities** — Here we deal with innovative and promising developments in urban farming, novel smart food labeling solutions, food tracking for animal welfare, veterinary innovations, agricultural data infrastructures, and food community networks.

**The Final Pages** are dedicated to the outlook comprising a portrait of a senior economist as a passionate blogger, and also glance at future topics related to FOOD2030, the EU's Food and Nutrition Security R&I.

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# “Dr. Bell, what is the background story behind FOOD 2030?”

Interview with **John Bell**,  
Director of Bioeconomy in European Commission's  
Directorate-General for Research and Innovation,  
**on the FOOD 2030 initiative**



**Mr. Bell, can you explain the background to FOOD 2030, please?**

**John Bell:** Developing a coherent research and innovation (R&I) agenda for sustainable food and nutrition systems is crucial to our future. In Expo 2015 Milan, the European Commission (EC) made a promise to consult and debate on how the European Union could future-proof our food systems through innovation and investment.

**How did the EC react to the demands to ensure more food and nutrition security?**

**John Bell:** They led to the launch, in October 2016, of the FOOD 2030 initiative, which was accompanied by an EC Staff Working Document. The document describes the current R&I landscape regarding European and global food and nutrition security. It includes answers on how we can use R&I more coherently, and with more impact, to address the major societal and economic challenges involved in ensuring food and nutrition security.

**Where do you see the most pressing challenges arising?**

**John Bell:** Today we make reference to an oncoming ‘perfect storm’ where the effects of population growth, urbanisation, migration, resource scarcity, and climate change are capable of disrupting the entire food chain. Food production is the largest consumer of global fresh water supplies, with agriculture responsible for 70% of consumption. It is also responsible for 30% of the total global energy demand and contributes around 25% of greenhouse gas emissions. Meanwhile a predicted global population of almost 10 billion by 2050 would require boosting productivity by nearly 60%, yet we waste or lose 1.3 billion tonnes, or one third, of the total food produced each year.

**Does this mean our food chain systems are in a precarious state?**

**John Bell:** These figures are derived from extensive global

foresight studies and expert reports released these past few years, indicating that we have entered a new and precarious phase for food and nutrition security. FOOD 2030 can be seen as a response to help shape a future R&I policy landscape and an agenda to meet the challenge.

**Will the research and innovation behind the FOOD 2030 initiative spark a change?**

**John Bell:** The initiative has already gained wide support throughout the EC and the Member States. The agenda has been cited as a tool to help reach our Sustainable Development Goals (SDGs). It highlights the need for new business models and for proper investment to provide enough sustainable and safe high-quality food, citizen involvement, and capacity and skills raising. It also supports future framework research programming towards a ‘food systems approach’.

**What does a ‘food systems approach’ mean exactly?**

**John Bell:** We believe that effective R&I will come from adopting a ‘food systems approach’, underpinned by sustainability, linking land and sea, and encompassing the entire food value chain — connecting all the players involved, from producers, those in business sectors, people working in scientific disciplines, to consumers, and back. Food systems, by definition, embrace all the necessary chain-elements and activities, including the preparation and consumption of food; impacting on nutrition for health and socio-economic and environmental outcomes — from the local to the global, and back again.

**Does the current EU food and nutrition security policy have enough clout to tackle these issues?**

**John Bell:** The high degree of R&I fragmentation and low policy coherence is a hot topic at the moment; it is one of the major contributing factors to the low impact of the current R&I landscape and the decrease in competitiveness of the EU food and drink industry. Although we have agriculture, food



safety, consumer and environment policies, there is no single EU-consumer-focussed food policy or strategy answering to the demand for high-quality, nutritious, safe and affordable food across the food system. The current framework consists of numerous regulations and strategies from a range of policy areas. The main policy interface is with the farming- and production-based policies of the Common Agricultural Policy (CAP), the Common Fisheries Policy (CFP), and with related public health and food safety legislation.

#### Is there lack of coherence in the R&I landscape?

**John Bell:** The food and nutrition security policy fragmentation that I describe, is further supplemented by a wide landscape of R&I actions and programmes led by different EC services, and supported by different funding instruments.

#### How could FOOD 2030 help to improve R&I structures?

**John Bell:** FOOD 2030 can play a pivotal role here. The agenda can provide a more coherent arrangement, which can structure, connect and scale-up EU R&I for more challenge-driven, societally relevant outcomes with greater impact. It will provide a thematic policy framework for future trans-disciplinary research, innovation and investment. Altogether this should contribute to a systemic and transformative approach, with a goal to improve today's underperforming food systems in response to society's needs and expectations.

#### How will FOOD 2030 contribute to reaching the UN's Sustainability Development Goals?

**John Bell:** It will deliver directly on the SDGs, and in particular on SDG2, which aims at ending world hunger. This mission includes: achieving food security; improving nutrition; and promoting sustainable agriculture, because food connects them all. It will focus on four priorities that are key to ensuring long term food and nutrition security: a) improved nutrition for sustainable and healthy diets, to fight malnutrition and non-communicable diseases; b) climate-smart and environmentally sustainable food systems to adapt and mitigate climate change, improve biodiversity and quality, and reduce pollution; c) circular and resource-efficient food systems to reduce food waste, water and energy use; d) innovation and empowerment within communities to improve self-sufficiency, societal engagement and skills development, and access to safe, healthy and affordable food.

#### Are there appropriate funding instruments already in place?

**John Bell:** To support these goals, the initiative will employ a variety of funding instruments available within, and complementary to, the EU R&I Framework Programmes like the European Structural and Investment Funds (ESIF), the Regional Development Fund (RDF), and the European Fund for Strategic Investments (EFSI).

Could you give some examples of EU policy fields that directly support the topics of the FOOD 2030 agenda, please?

**John Bell:** A number of EU policy drivers are being developed

where food and nutrition are intrinsic elements. These include the circularity and digital agendas, risk investment strategies, consumer health and food safety, agricultural and fisheries reform, and international development. A consistent message from these developments has been the need for better food and nutrition security policy coherence across the R&I landscape, and for a more inter- and trans-disciplinary approach.

#### How does this fit into current EU policy drivers?

**John Bell:** To activate current EU policy drivers, FOOD 2030 will solicit the wide engagement of a diversity of EC services and Member States, via, for example, the Standing Committee on Agricultural Research (SCAR), and other external stakeholders, including researchers, industry, public authorities at all levels, and civil society.

#### Should the socio-economic dimension be better integrated in the food R&I sector?

**John Bell:** In the end, food and nutrition security is about more than feeding and nourishing the world. It's about empowering people, planning for the impacts of climate change on populations everywhere, and using the time we have now to anticipate the problems of the future. Research, science and innovation must be present and active every step of the way. FOOD 2030 aims at strengthening the science-policy-society interface with actions fostering the principles of sustainability, urbanisation, safety, circularity, and diversity, while seeking to balance innovation with precaution.

#### What should the next priority steps be?

**John Bell:** I see four areas to be prioritised. Firstly, food and nutrition security needs to develop a stronger political footprint, as it is an intrinsic entity of migration, a digital Europe, circularity and energy — the main political concerns of the current Commission.

Secondly, we must vastly improve collaboration in innovation, investment, and the sharing of data on an institutional level. We must also address the low take-up of financial instruments, along with the poor stimulation of smart specialisation and local- and place-based innovation throughout EU regions.

Thirdly, we must stimulate the huge potential of the food sector to bypass incremental change and provide transformative breakthroughs, leaving huge scope for more unicorn-type food companies and for better innovation take-up.

Lastly, the sustainable and secure delivery of nutritious food will remain a significant opportunity for the future of a modernised CAP.

#### Would a better EU-wide R&I alignment be a decisive step towards overcoming underperforming food systems?

**John Bell:** The whole food value chain or 'food system approach' of FOOD 2030 will go a long way towards helping address these challenges by providing structural improvements to the European R&I landscape, including a joint mapping of existing and future food and nutrition security R&I actions. A better public sector R&I policy alignment will definitely be a decisive contribution to better performing food and nutrition security R&I systems in the EU.

Thank you very much for this interview!

“ John Bell,  
A perfect storm  
can disrupt our  
food chains ”

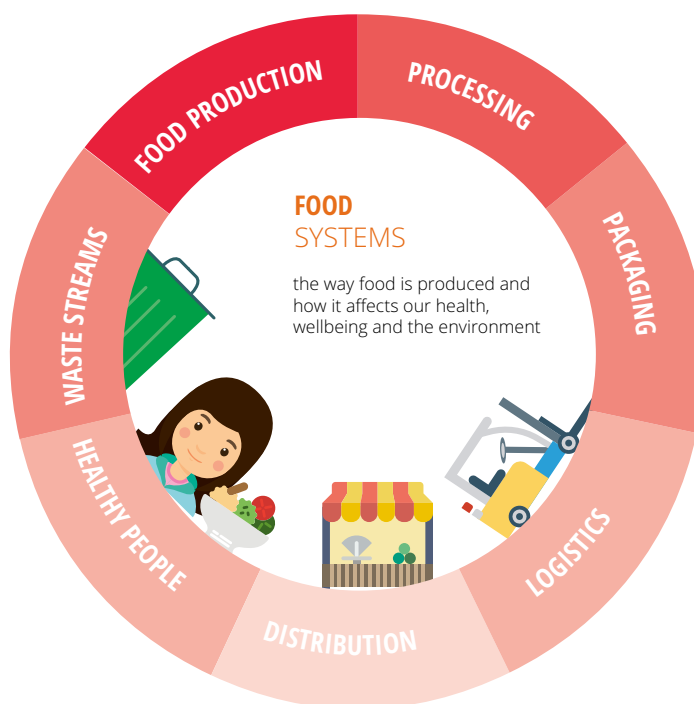
## John Bell on innovative ideas for future-proof food-related R&I topics:

“ Providing structural improvements to the R&I landscape can allow for a smoother development of the innovative ideas that currently exist to improve food and nutrition security. In future, food and nutrition will be more personalised and customised. Here, we can talk about how microbiome knowledge can provide better quality soil, higher yielding plants, healthier livestock, more nutritious food, and healthier human beings.

We can see food production moving away from the land or the sea with advancements in new protein developments, from laboratory meat and printing technologies, to urban and vertical farming. Genomic knowledge and precision editing can help to breed better and more diversified farming techniques. Advancements in digital technology, data handling and the food cloud can normalise prediction and make food production and distribution smarter. We also may expect new and disruptive technologies for food and nutrition technologies.

Providing circularity through the eradication of food waste can go a long way in helping to address the 70 % increase in food demand.

The sustainability of water practices is increasing through new irrigation, water delivery and recovery systems. Ways of bringing the applications of these technologies to the developing world are also in progress. We are confident that the successful uptake of these exciting ideas and technologies will ensure that population growth will not outstrip nutritious food supply.



# BIO EXPRESS

**John Bell**, Director of Bioeconomy, Directorate-General for Research and Innovation, European Commission

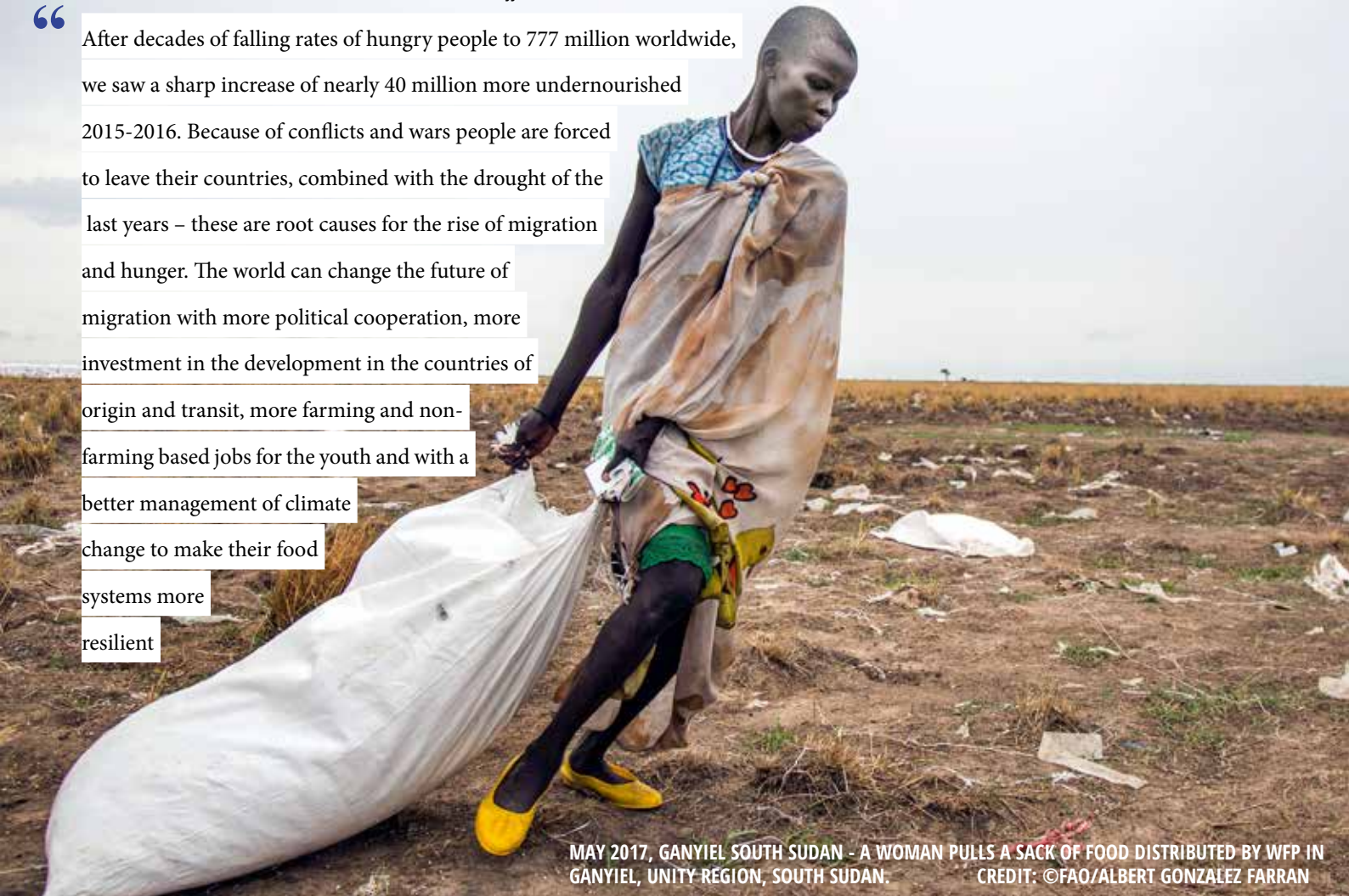
... has been a European Commission official since 1993. During his career he has worked in external relations on financial aid assistance programmes in the former Yugoslavia, public administration reform in Central and Eastern Europe, and on Poland's accession to the EU. Dr Bell was a Member of the Cabinet of Commissioner David Byrne, with responsibility for enlargement, food safety, public health and global health security issues, including bioterrorism. He was Head of Cabinet for European Commissioner Meglena Kuneva on Consumer Affairs, and Head of Cabinet for Commissioner Máire Geoghegan-Quinn on Research and Innovation, who was responsible for developing and funding Horizon 2020, and mainstreaming innovation and simplification. John Bell was born in Dublin and started his academic career at University College Dublin. He completed his doctorate at St John's College, University of Oxford, in 1993.



# World Food Day 2017 – **CHANGE** THE FUTURE OF **MIGRATION**

**Cristina Amaral**, *Director FAO – Liaison Office Brussels :*

“After decades of falling rates of hungry people to 777 million worldwide, we saw a sharp increase of nearly 40 million more undernourished in 2015-2016. Because of conflicts and wars people are forced to leave their countries, combined with the drought of the last years – these are root causes for the rise of migration and hunger. The world can change the future of migration with more political cooperation, more investment in the development in the countries of origin and transit, more farming and non-farming based jobs for the youth and with a better management of climate change to make their food systems more resilient



MAY 2017, GANYIEL SOUTH SUDAN - A WOMAN PULLS A SACK OF FOOD DISTRIBUTED BY WFP IN GANYIEL, UNITY REGION, SOUTH SUDAN. CREDIT: ©FAO/ALBERT GONZALEZ FARRAN

Nutritional imbalances in both Europe and Africa are increasing, characterised by growing diet-related, non-communicable diseases and persistent under-nutrition. Food systems in Africa need to improve to create employment for young people, better rural-urban linkages to deliver sustainable, healthy and affordable food to cities and take advantage of export opportunities to high value markets. The EU and Africa are engaged in collaborative research and innovation for food and nutrition security and sustainable agriculture. The High Level Policy Dialogue (HLPD) on Science Technology and Innovation launched as a first priority the EU-Africa Research and Innovation Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA). Among the concrete first outcomes are research and innovation partnerships such as LEAP-AGRI with a total budget of 33 million euros, based on funding of the European Commission, European and African countries. So far the FNSSA priority has attracted more than 70 million euros in funding. The FOOD 2030 concept, Food Systems Africa can be expected as one of the research and innovation priorities in the upcoming Horizon 2020 call. More information: <http://ec.europa.eu/research/iscp/index.cfm?pg=africa>

# The Global Picture

**Food and Nutrition Security (FNS):**  
major pillars of development

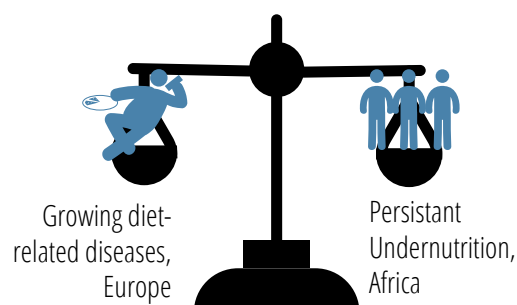


**10 out of 17**

UN Sustainable Development  
Goals FNS related

Source : UN

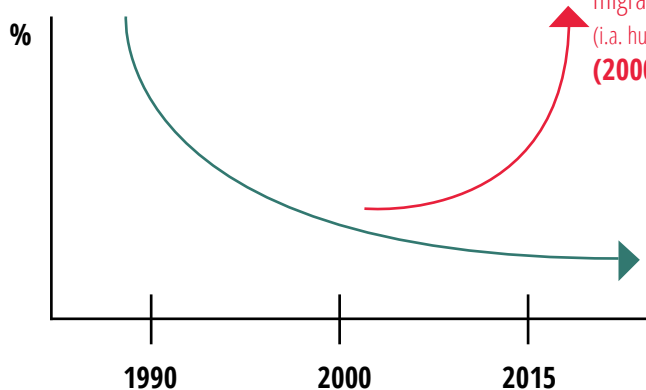
**Growing nutritional  
imbalances in  
Europe and Africa**



Source : EU Commission

## Slowly Decreasing Hunger vs Fast Rising Migration

42 % reduction of  
hungry people globally  
(1990-2015)



40 % rise of international  
migrants globally  
(i.a. hunger-related)  
(2000-2015)

Source : FAO, UN

**Hunger and Climate** driven migration

**Two** out of **four** root causes of migration :  
**Food and Nutrition Security** related



**War /  
Persecution**



**Hunger**  
(also war-related)



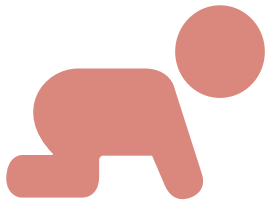
**Climate**  
(drought, floodings)



**Better Life**

## Stunted Growth

(less height than age, hampered physical and mental development )



**155 mio  
CHILDREN**

(1/4 of the world)  
,5 years are stunted (2015)

*Low income countries with more stunted children today than in the year 2000 (Sub-Saharan Africa, South Asia)*

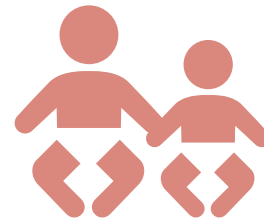
## Child Obesity

( $\leq 5$  , overweight or obese, increased risk of early and lifelong diseases)



2015 globally

**41 mio  
CHILDREN**



by 2025 globally

**70 mio  
CHILDREN** ( with current trends persisting )

*High and middle income countries with growing rates and/or with overweight and undernourished children at the same time*

Source: WHO, UNICEF

## Global Hunger vs. Global Obesity

Currently more people on the planet die of obesity-related diseases than of hunger



**815 million people**  
undernourished



**2 billion people**  
overweight/obese

Source: WHO, UN



## Climate related displacements.....

an average of 26.4 million people displaced annually by climate or weather-related disasters



## 75% of the world`s poor and food insecure

.....depend on agriculture and natural resource-based livelihoods  
..... large shares of migrants from these rural areas



## By 2050 world population growth from 7 bn to 9,5 bn people –

..... increase in food demand of 60 %  
.... rise in animal protein production of 76 %  
..... surge of Greenhouse Gas emissions of 80 %

Source: UNEP, FAO, EEA, OECD



# FOOD DEMOCRACY –

How citizen-led initiatives can  
help to shape sustainable  
Food Systems



By **Olivier De Schutter**

From uniformity to diversity, and  
from consumers to citizens:  
a dual transition

Global food systems appear to be changing in front of our eyes. The news that Amazon is set to purchase healthy grocery chain Whole Foods sent shock waves through the sector, sparking predictions of imminent revolution in our food and farming systems. For many, this is further evidence that conscious consumerism and responsible retail is changing food systems for the better, bringing healthy and sustainably-sourced food to the doorsteps - literally - of a growing number of people. Lower stocking requirements (leading to reduced waste and environmental footprint) and cheaper prices are touted among the additional benefits of Amazon bringing its logistical clout to bear in the food industry.

The significance of this buyout is not to be underestimated. Too often, healthy and sustainable diets remain out of the reach of poor families or those living in areas with few fresh grocery stores. However, it also speaks to the illusory nature of change in food systems.

A private sector-led transformation of food systems has long been heralded. Turning to new players offering new scale advantages has long been the agri-food industry's preferred response, both in terms of adapting to new market conditions and addressing challenges such as sustainability. New players entering the chain, so the ideal assumptions, will push

the change. However, successive shifts in the industry have tended to reinforce the cheap commodity complex that underpins food systems and leaves a devastating social and environmental toll.

Ever-more concentrated and large-scale retailers generally prefer to source from large wholesalers and large processing firms, leading to a mutual reinforcement, often seen as a price-race to the bottom. In addition, large buyers can use their bargaining power to compress costs or pass them down the chain. The farmers who do gain access are systematically squeezed, and forced to scale up and shift to input-intensive monocultures in order to provide the requisite volumes of uniform crop commodities. Globalisation has accelerated concentrations with mergers and acquisitions of multi national industry players in agri-chemistry, commodities and foodprocessing leading to dependencies and uniformity in our food systems.

That is not to say that nothing is changing. Indeed, there is

no shortage of companies who are willing to shift this baseline upwards in the interests of sustainability - particularly when the customers on whom they rely are demanding it. However, the unfortunate reality is that where it is not profitable to invest in sustainability policies, companies may not do so. The 'business case' itself is a fragile one, given the costs that might be required to shift practices meaningfully - potentially translating into higher prices. As seen above, this runs against the key imperative of compressing commodity prices, seeking economies of scale and driving prices down at all costs.

If private companies are not well-placed to spark the shift, can consumers meaningfully reshape food systems themselves? Much has been written in recent years about the 'consumerist turn' and the increasing power of the fork to drive the farm. Increasing sales of organic and Fair Trade produce, among other ethical and sustainable sourcing initiatives, testify to this significant shift. However, here again, there are important limita-

tions to such a wholesale consumer-led transition. Firstly, the tastes and consumption habits of the average consumer remain those that years of industrialisation and globalisation have shaped. Moreover, today's consumers have little time to spend buying food and cooking.

Others, still, look to governments to spark the shift to sustainable food systems - or at least to ensure that developments in the agri-food industry are serving the public good. Indeed, governments have a crucial role to play in aligning economic incentives (e.g. taxes and subsidies) with the requirements of sustainability. They could also support good practices, and reward the ecosystem services provided by sustainable agricultural production: attempts at valuing such services or, conversely, at 'full cost-accounting' of the impacts of industrial food systems, prepare the ground for such interventions.

Governments could also tackle imbalances of power in food chains. Democratically governed farmers' cooperatives could allow smaller-size farming units to have better access to markets and to strengthen their bargaining position vis-à-vis both input suppliers and buyers. And they could use competition law to address the question of concentration or abuses of dominant position.

But governments, in turn, are constrained by the underlying dynamics and power relations in food systems. Policy decisions are only the topsoil of a complex ecosystem. For decades, governments have interpreted their duty to deliver the public good as a duty to support competitive industrial agriculture and the cheap calories it yields. The expectation of cheap food from consumers, combined with the strong ability of farmers to lobby for the preservation of their interests, has led to a system in which high subsidies remain in place, mostly rewarding the larger-size farms. It would hardly be possible for politicians to campaign on a platform

of higher food prices. Indeed, cheap calories are sacrosanct and locked in by broader social policies, or the lack of them: until now cheap food has functioned as a de facto substitute for redistributive social policies that would allow all families, including low-income families, to have access to healthy diets.

What emerges is a picture of industrial food systems that are locked in place. The challenges are urgent and the failings of current food systems increasingly clear. Yet, the various components of food systems have co-evolved and have now become mutually supportive, meaning that choices made a long way in the past continue to define current and future trajectories. Investments in research and development and in infrastructure have been made in the interest of export-led agriculture, benefiting primarily the largest agrifood corporations controlling global supply chains, or (increasingly) by these private actors themselves. Meanwhile, the needs of small-scale farmers, producing food crops to feed their own communities or to serve local markets, have been largely neglected.

These decisions, in turn, are reinforced by the intellectual edifice - the way of thinking - built around industrial food systems. For example, the way we define food security and the way we measure success in food systems tends to reflect what industrial agriculture is designed to deliver - not what really matters in terms of building sustainable food systems. Measuring the yields of specific crops, or productivity per worker, tends to favour large-scale industrial monocultures and to under-value the benefits of alternative systems. As such, we tend to ignore the ample benefits offered by diversified agroecological systems, often practiced by smaller farms. These can include higher total outputs taking all crops cultivated in combination; greater resilience to shocks; more diversity resulting in improved nutritional quality; and the provision of ecosystem services on and off the farm.



In this context, change in food systems cannot come from consumers, companies or governments alone. The Amazon buyout promises to update the roster of dominant players in food systems, and to usher in new modes of delivery. But it offers little in terms of meaningful change in the logic underpinning food systems. Indeed, logistics firms and e-retail giants like Amazon are merely assuming the role that has previously been played by traditional retailers, processing giants, grain traders and state marketing boards before them.

How then, might change occur, and from where? What is required is not simply new ways of consuming food, but for people to change their relationship to food systems more fundamentally. In other words, they must shift from being consumers to being citizens. Bottom-up citizen-led initiatives are springing up around the world, including community-supported agriculture (CSA), in which people contribute to support local farmers by entering into direct producer-to-consumer marketing schemes, joint management of community vegetable gardens, and fair trade schemes.

While dwarfed by the scale of mergers and acquisitions in the global agri-food industry, these social innovations may yet prove to be more significant in the long run. They are calling into question the fundamental assumptions of the industrial food model, proving that people value equity and sustainability over price alone, and are willing to play an active role in building the food systems they want. It must not be forgotten that unsustainable practices and misaligned incentives are locked into food systems at every turn. Steps to circumvent the multiple middlemen of food systems, e.g. through direct marketing schemes, may therefore be the only way to truly change food systems. Beyond those participating directly, the new logics and preferences embodied in these schemes can force all actors in the food system to rethink their positions, and to cast off the assumption that there is nothing to be done.

However, a shift to sustainable food systems also requires parallel shifts in policy. Ultimately, consumer and retail revolutions versus policy-led change may be a false dichotomy. People from all walks of life must reengage with politics beyond elections, reasserting themselves as legitimate stakeholders in the policies that determine the food we eat. This is food democracy. This does not simply mean that elected politicians should work in the public interest, and avoid capture by special interests. It means, rather, that specific bodies should be established, in which various stakeholders of the food systems construct a diagnosis of the food systems on which they depend and develop proposals for reform.

Food policy councils of that sort have developed since the 1980s in the United States and Canada, and more recently in the UK and other parts of Europe. They have been institutionalised in a number of Latin American countries, with Brazil taking a leading role in this regard. Many are established at the local or municipal level, often at the initiative of municipal authorities; others have been set up as initiatives of civil society; and some States show examples of food policy councils established at national level.

This development is important and promising, because of the potential for food democracy to overcome the obstacles to reform identified above. Recommendations emanating from food policy councils can both broaden the imagination of elected politicians and ensure that they will be held accountable if they fail to consider solutions that have shown their potential in real-life experiments. In turn, such recommendations can help to shape the market realities and supportive policies that will allow grassroots initiatives to truly flourish. This revolution may not be as eye-catching as the mega-mergers of the agri-food industry, but it promises to be just as disruptive. And crucially, it holds the key to breaking current cycles and putting food systems onto genuinely sustainable footing.

## BIO EXPRESS

**Professor Olivier De Schutter** is a law professor specializing in economic and social rights at the Université Catholique de Louvain, Belgium. He is the former UN Special Rapporteur on the right to food (2008-2014) and the co-chair of the International Panel of Experts on Sustainable Food Systems (IPES-Food). Founded in 2015, IPES-Food's expert panel brings together environmental scientists, development economists, nutritionists, agronomists and sociologists, as well as experienced practitioners from civil society and social movements, to inform the debate on food systems reform around the world. IPES-Food's 2016 report, "From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems" reviews the latest evidence on the outcomes of these contrasting production models, and identifies the major potential for diversified agroecological systems to succeed where current systems are failing, namely in reconciling concerns such as food security, environmental protection, nutritional adequacy and social equity. The report also identifies why this shift is not yet occurring on a major scale, pointing to eight key factors locking industrial agriculture in place.



# A DIET CHANGE COULD BE THE CLIMATE SAVER



Cheap calories hide true costs: How a grain and meat-based agriculture accelerates the harmful greenhouse gas emissions

Bioeconomy Innovation interview  
with **Tim Benton**,  
Professor Strategic Researches

**Professor Benton, do we need a second planet if we continue the current style to produce and to consume food?**

**Tim Benton:** This question highlights a paradox. We have invested massively in the last 30 or 40 years to produce commodity crops at scale in order to underpin the fight against hunger. This created a large-scale agriculture, supporting an economically efficient food system generating vast amounts of food cheaply, traded on a global scale. However, in many parts of the world we are flush with calories and we waste huge amounts of food. In all, we use of this natural capital much faster than we can substitute. We need to see agriculture in a different way: to provide us, in a sustainable and healthy way, with a nutritious diet and not just see it as a system to provide economically valuable commodity crops. This different approach would allow us to live on our one planet.

**The animal proteins are regarded as one of the bad guys in the game. Why are they harmful?**

**Tim Benton:** If we want to have a nutritious diet we need proteins, vitamins, fats and calories, and in the right amounts. These nutrients can be supplied by plants, and this requires a relatively small amount of land. But, if, instead, you want to have these nutrients from animal sources, then you need first to grow a whole lot of crops and grass for feeding the animals, with the typically low efficiency of converting their feed into human food. On top of that, if we are worried about climate change, ruminants, like cows, while digesting in their multi-chambered-stomachs, produce a lot of methane, which is a very potent greenhouse gas. Almost one half of the greenhouse gas footprint of agriculture is from livestock production. In other words, not only do they produce proteins inefficiently, they also contribute significantly to global warming. These are two reasons why livestock, especially red meat, have such a bad press.

**Would you recommend to stop eating meat therefore?**

**Tim Benton:** I do not say we should stop eating red meat – it has many properties we value - but we should think about eating less meat in general. My mantra is “meat as a treat”: between us, eating the meat we know we can produce within our “planetary boundaries”.

**Would this require a global reference to cap meat production?**

**Tim Benton:** The agreements of COP 21, the Paris Climate Summit, in 2015, are to think about how each country can manage its climate emissions. Each signatory nation identifies its car-

bon-budget – whether from powered stations, transport or agriculture – and tries to find ways to reduce it. At the moment agriculture and food have had little attention, but that is changing as other sectors reduce emissions. Production of feed or livestock is part of the mix, and if countries keep to commitments, it implies a long-term direction of travel.

#### **Has the Paris Conference opened the eyes to climate damaging food systems?**

**Tim Benton:** Two things have not yet found the way in mainstream consciousness. The Paris Climate Agreement is to limit climate warming to two degrees, or better for 1.5 degrees. To curb this, we only can put a certain amount of carbon dioxide equivalent into the atmosphere, that's the carbon budget. The critical thing is, our current food systems alone will use the entire Paris climate budget. If we don't change anything, by 2040 or 2050: leaving no space for emissions from other sectors. That implies in itself that we have to have a radical movement in agriculture or with the demand for agricultural produce.

#### **Who could be the drivers to change?**

**Tim Benton:** The literature around agriculture suggests that there is more scope to reduce emissions by changes in our diets and in what we grow than there is by changes in how we farm. The Paris carbon budget, therefore implies that we should incentivise people to eat different.

#### **Is such a call for a global shift in diets realistic at all?**

**Tim Benton:** The other message of Paris was that, to keep well below the two-degree-goal, we will to reach zero-net carbon emissions round to the middle of the century. This means we have to stop using petrol, we stop using coal. I think we are recognizing that this is increasingly unlikely to happen by 2050. The consequence of this is that after 2050, to keep below the two degrees we effectively have to suck carbon dioxide out of the atmosphere.

#### **How could this happen?**

**Tim Benton:** By using a “negative emissions technology” called biomass-energy carbon-capture and storage (BECCS). And that is jargon for growing things, burning it, capturing the carbon

dioxide and locking it up underground. A current calculation of the amount of land we might need for this part of the bioeconomy is up to two thirds of the total global arable area.

#### **What is this implying for our future lives?**

**Tim Benton:** The Paris message says clearly that, to meet the climate trajectory, we need to change diets. If we don't do this, we won't have either reduce the speed of climate change, or have enough land to manage it with the aforementioned BECCS. Both ideas about managing climate change push in the same direction: At the moment our food systems are very inefficient. Healthy diets, sustainably produced, would leave enough land for the biomass-energy carbon-capture and storage. But, if we carry on emitting from the food system in the way we are, that will keep us on track for “dangerous” climate change. In turn, this would affect yields dramatically with a result that we need to intensify further, with more input and more water, and expand the land under agriculture, both will likely make things worse. In other words, continuing the past decades' trends creates a vicious circle escalating things. Eating more healthily and more sustainably can contribute to a “virtuous circle” instead.

#### **Will this kind of vicious circles accelerate migration from the southern hemisphere ?**

**Tim Benton:** We see this already happening. People who do not have food, especially in the poorest parts of the world may migrate to places with enough food and stronger economies in response. There is also a literature on the conditions that led to the Syrian civil war: one of the underlying drivers was a long-term drought leaving to people leaving the land and moving to cities.

#### **Any new contributions of science to that?**

**Tim Benton:** As a scientific community, I don't think we have articulated well enough what a world of “two or four degrees” of climate change will feel like for people. When you start to say a three-degree-world will mean a radical displacement of people, much more extreme weather conditions, potential food and water shortages and it might also involve large-scale step-wise changes in the climate, then the human impacts for our children and grandchildren start to feel scary.





## Could our societies cope with those things?

**Tim Benton:** The consequences looks really, really painful. We have not been good at telling people and engaging with people about the realities of climate change's impacts. It's not a matter of blame, we have not thought it important enough to explain. I have to say in my case, I also used to have a greater faith in politicians doing the right things for the good of society. My thought was, scientists provide knowledge, others will explain it, and politics will use it. But there is a huge oversimplification and for our politicians to buy in seriously, we as scientists have to make much stronger cases. Strong political action is much more likely if citizens understand and are clamouring for change.

## At what cost will these changes be possible?

**Tim Benton:** There is not a day that goes unpassed without some news stories on the health impacts of our diets. These recent stories range from obesity being classified as disease and Alzheimer bearing similarity to diabetes and linked to obesity, or people with healthier diets living for much longer after a cancer diagnosis. On a global scale, under 50 percent of the population, is of a healthy weight. Eating better may create more benefits than costs.

## How to incentivise people to a healthy diet?

**Tim Benton:** As climate changes and health care costs raise, there might be a rapid shift in social norms in the direction of eating. I would not be surprised that over the next 10 or 15 years people will change significantly in preferences.

## What would you recommend to a 20 year old man, if he asks you what to eat better?

**Tim Benton:** With colleagues, I am looking at our available food, and asking what would a diet that provides nutrition and sustainability look like? The real challenge is to get healthy diets and sustainable diets both together. The number one message is to eat less and waste less. Eat more fruit and vegetables – and to afford this, perhaps eat less meat. Most people eat far more than they do actually physically need.

## What would be better from a sustainability perspective?

**Tim Benton:** Where I live in England we are good at producing carrot, potatoes and rhubarb. It would be better to eat that, rather than to air-freight asparagus from Peru. There is a notion that locally produced food with a short supply chain often has better "sustainability" credentials over mass-produced food from a long supply chain, and whilst not exact, short supply chains can be more transparent and less likely to externalize costs on the environment, health, welfare or livelihoods.

## So, you recommend actually a diet our parents or grand parents ate?

**Tim Benton:** If we eat that what we ate as kids, more locally grown crops and fewer mangos, pineapples or asparagus from overseas, we would probably eat healthily and sustainably at the same time. If we are buying more expensive ingredients, sustainably produced, perhaps we can afford less convenience food, and so return to the social glue of cooking at home and developing a more positive food culture. I am not saying "turn back the clock" so much as there may be benefits – and not just costs – in eating differently.

## Beside the price tags on food, would we additionally need environmental tags on each product informing consumers on the footprint of their choice?

**Tim Benton:** The only way to make food systems sustainable is to recognize the external costs of producing. It's known as the "true cost" approach. It might not be about providing labels, rather recognizing that if our food system is eroding soils, we ought to ensure soil health and that costs money, making the food more expensive.

## Raising food prices might hit the poor

**Tim Benton:** Yes, making food more expensive would hurt today's poor. But which people do you want to hurt most? Is it today's poor or tomorrow's whole population? This is the intergenerational equity issues which offers a different framing of the issue: should we subsidise prices and risk encouraging unsustainability, or should we find ways to support the poor better if food prices rise?

## Who could spark a change to healthier diets for the climate's and the healthier lives' sake?

**Tim Benton:** Government cannot impose that. It won't happen unless citizens do not desire it. It's got to be an entire partnership if we manage to go through this transition. The job of government is surely to enhance the health and the wellbeing and security of its citizens, and that includes the food system. The current food system and the climate system are two of the biggest market failures I can think of. To keep food prices artificially down as we do it now, will on the long run be much more expensive than to spend now for a systems change.

Thank you very much for this interview!

# BIO EXPRESS

**Professor Tim Benton** is Dean of Strategic Research Initiatives at the University of Leeds, UK. He is also Distinguished Visiting Fellow at the Chatham House, the Royal Institute of International Affairs. From 2011-16 he was the 'champion' of the UK's Global Food Security (GFS) programme which was a multi-agency partnership of the UK's public bodies (government departments, devolved governments and research councils) with an interest in the challenges around food. The key role of GFS was to undertake systemic analysis and horizon scanning, in order to identify priorities to mitigate the challenges of providing sufficient, sustainable and nutritious diets for all. Tim Benton holds degrees from the Universities of Oxford and Cambridge and he is a frequent contributor to events around the world.



# WHERE THE RESEARCH MONEY GOES TO ...

SCAR-pilot mapping of Finnish R&I funding can guide future food policies— Others will follow

Research and innovation (R&I) activities surrounding the Grand Challenges of Food and Nutrition Security (FNS) play an important role in Europe. Between 2014 and 2017, through its major research programme, HORIZON 2020, the EU has spent more than EUR990 million on the four FNS priorities — Nutrition, Climate, Circularity, and Innovation. The most surprising issue is that this EU-funded FNS research represents only about 15% of all the money spent on FNS R&I across Europe. The biggest part, about 85% of the public money for R&I in FNS, is directly funded by the Governments of the EU Member States.

Finland is the first EU Member State to have analysed the research money streams in the four priority areas with a mapping pilot study. 'The interesting thing was to watch the flows, to where and how the research money is spent and how it is divided,' explains Minna Huttunen, Senior Officer on Food Policy from the Finnish Ministry of Agriculture and Forestry and member of the EU Scientific Committee of Agricultural Research (SCAR). SCAR has called for several Member States to also conduct pilot studies. Mapping in Hungary is finished and Belgium is almost ready, the next countries interested in analysing their research spending in the agrifood sector are the Netherlands, Ireland, Spain, the UK and France.

The Finnish mapping study on 'Government funds used for food system research, development and innovations in Finland

2011–16' has generated valuable statistics on public expenditure. By following the FOOD 2030 structure, the analysis shows that, out of a total of more than EUR162 million spent on research funding in Finland, the biggest shares of government money were spent on those parts of the foodsystem such as foodstuff' (42.3%), i.e. food processing, and 'primary production' (36.3%), i.e. agriculture. Smaller shares of the funding went to sectors such as 'distribution', 'waste flows', 'consumers', 'logistics', and 'packaging'.

Minna Huttunen adds that, with a workforce of 13% active in the Finnish food and nutrition sectors, the country has a vital interest to show, 'where future employment opportunities are, and how the gaps in food policy may be identified.' The Ministry expects important information and guidance for the direction of future innovation to come from the mapping exercise, as well as from the countrywide Food Policy Report 2017.

In particular, the data show, that within 'foodstuff and 'primary production', the majority of the funding is diverted to the research area of 'innovation and cooperation' (allocated about 50% of the total budget), whereas the shares for areas such as 'nutrition and health', 'climate and sustainability' or 'circular economy', vary only from 5.6% to 28.6%. Minna Huttunen explains these patterns using one of the country's flagship enterprises — Finnish milk production: 'We are one of the greatest milk-drinking countries in the Earth,' she sums up. Many renowned innovations stem from Finland, such as lactose-free products, the dental-friendly sugar Xylitol, or functional health foods (such as the lactobacillus LGG).

The Finnish government is well aware that mapping shows only a picture of the past, they know that shifts in the money flows will become more pressing with climate change and health challenges. Research into packaging (with a high relevance for future waste streams) has only received 4.7% of all the research money so far. 'Future employment is an important consideration at a political level in terms of deciding where funds go,' Minna Huttunen explains, 'but we also need to better involve consumers to tackle the many health problems.' For consumer research on this topic, the Finnish government funds were only at 4.9%.

A better proximity to the sources of agrifood, more transparency in food and waste streams, and health and behavioural changes — these are current trends in the debates between the Finnish Government and civil society. 'We need to think more about the quality of food and the inclusion of health and sustainability costs in the whole food system,' Minna Huttunen explains.

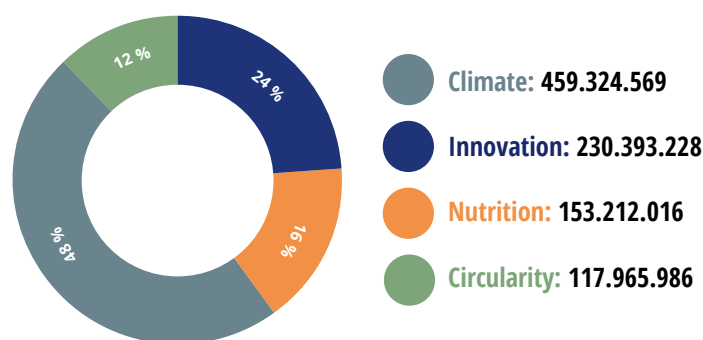
The more mapping studies on agrifood funding streams delivered by the EU Member States

In addition to a mapped EU funding, the clearer the overall picture will be. As a consequence, agrifood research priorities may be shifted towards the FOOD 2030 priorities, both on the EU level and on national levels. As a final thought the Senior Officer on Food Policy says that, 'to alter the food production systems we need the facts, but also long term thinking.'

*The full Finnish food policy report in english translation can be received on the website: [http://mmm.fi/documents/1410837/1923148/lopullinen-03032017ruoka2030\\_en.pdf/d7e44e69-7993-4d47-a5ba-58c393bbac28](http://mmm.fi/documents/1410837/1923148/lopullinen-03032017ruoka2030_en.pdf/d7e44e69-7993-4d47-a5ba-58c393bbac28)*

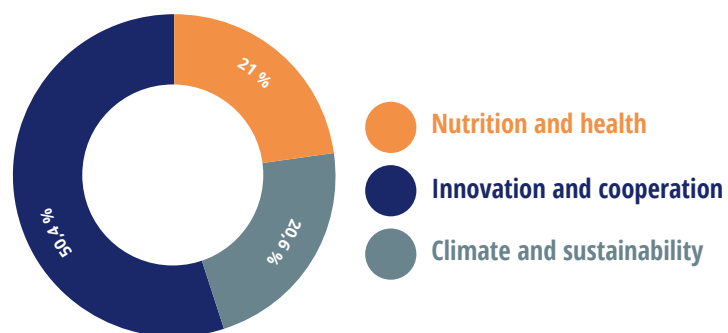
# Funding of Food and Nutrition Security (FNS) related Research & Innovation (R&I)

EU Research Investment  
EUR 960.895.799 (2014-2017)  
**HORIZON 2020 Investment in 4 priorities  
of FOOD 2030 - R&I projects (507 projects)**



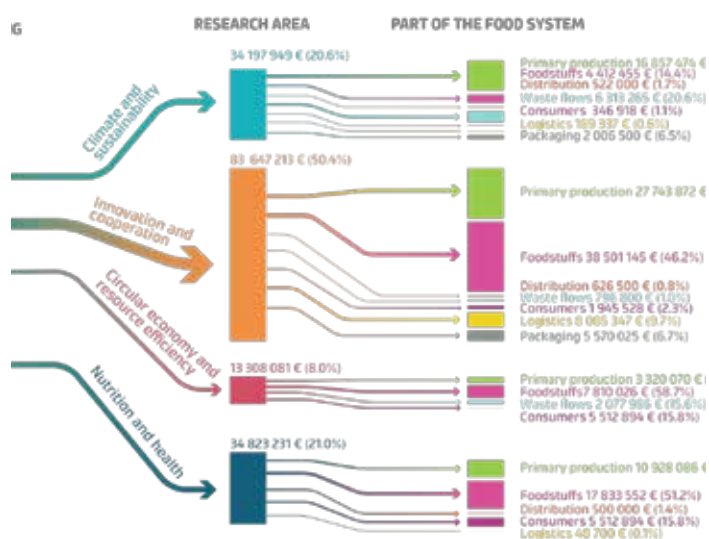
Source: EU Commission

National Research Investment, Finland  
EUR 162.048.477 (2011-2016)  
**Food and Nutrition Security R&I  
expenditure, Finland**

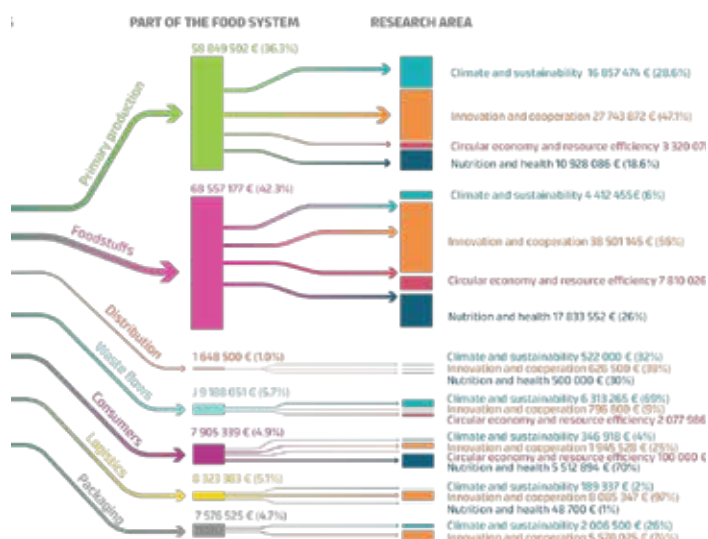


source: SCAR-Pilot Study, Ministry of Agriculture and Forestry, Finland

## Funding of Food Research & Innovation areas, FINLAND



Source: SCAR, Ministry of Agriculture and Forestry, Finland



# Communications on FOOD2030 RESEARCH



**3** EU wide FOOD2030 Conferences



**10** Video-Clips on EURONEWS on EU funded FNS research stories

**23** Journalistic Articles on FNS research in HORIZON 2020 magazine

**12** Agriculture and Food projects live-chats with CommBeBiz webinars

**25** Journalistic Project Brief-leaflets on FNS research from CommBeBiz

**45** FNS researchers and their research featured in two Bioeconomy Innovation CommBeBiz Magazines (2016-2017/ 2017-2018)

**42** FNS-Success Stories at the European Commissions Infocentre



Over **2/3 projects networking** in CommBeBiz to communicate the bioeconomy from the FNS segments



**Three Joint Programming Initiatives** in FNS research: **FACCE=** (Food and Climate Change), **HDHL** ( Healthy Diets, Healthy Lives), **OCEANS**



**18 ERA-NET Cofunds**, with a budget of about 170 M€ collaborating in the FNS area under HORIZON 2020 (Platform DB)



# Better Communication = More Impact

How CommBeBiz supports bioeconomy researchers  
on their journey to innovation

CommBeBiz is there to better communicate the bioeconomy. The EU-funded Coordination and Support Action has one clear aim – to enable EU funded research projects and researchers working in the bioeconomy to fulfil their innovation potential. CommBeBiz provides tailor-made support to bioeconomy researchers through networking opportunities with peers & experts, skills training, marketing & communications training, photo competition & innovation burseries, the creation of visualizing project briefs and story-telling articles to reach a wider public and the media. The CommBeBiz final conference will be held in Budapest, February 2018. More on : [www.commbebiz.eu](http://www.commbebiz.eu)

# MORE UNIVERSAL THAN WORDS

The Language of Science: Photos as a Medium to communicate about the Bioeconomy - CommBeBiz Photo Competition

by **Áine Regan**, Teagasc

**How European researchers are communicating their work through the medium of imagery – going far beyond their own language.**

There's no agreement on the number of languages which exist in the world. The Ethnologue lists 6,909 distinct languages in their catalogue. But depending on your definition, L'Observatoire linguistique contends that there could be anywhere between 4,000 and 11,000 languages.

Some might feel that 'science' should occupy a rightful place on any index of world languages. The complexity of the words, terminologies, and concepts used mean that conversations about 'science' (with its many different branches and fields) are reserved mainly for those who are able to converse fluently in that tongue. For the vast majority of the population, scientific language is viewed as too technical and out of their reach.

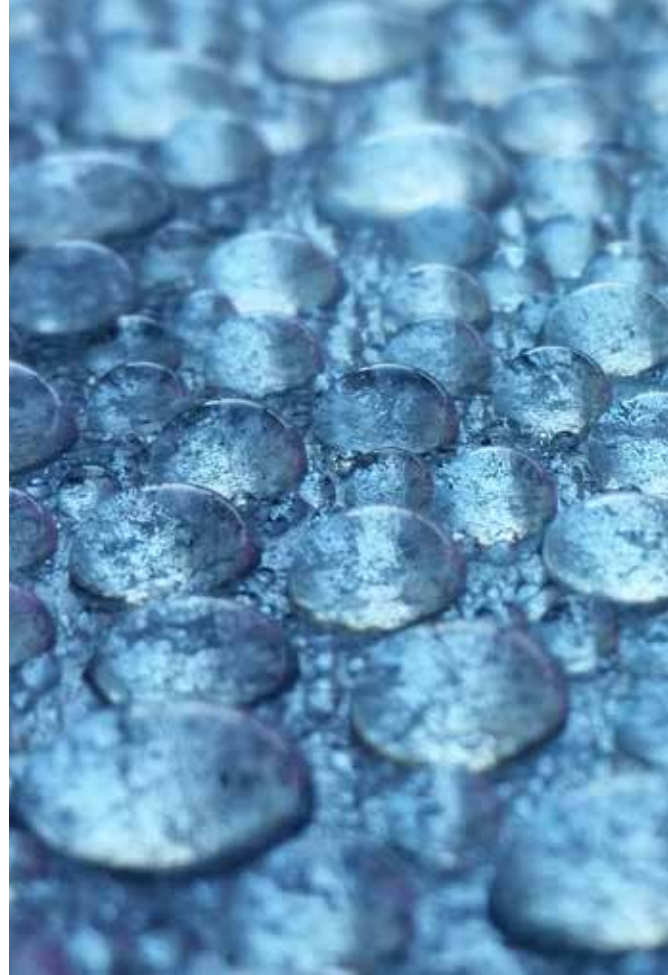


A language which is not easily accessible runs the risk that knowledge goes unnoticed, unused and unappreciated.

Science Communication and Public Engagement initiatives encourage scientists to make science accessible for everyone; to communicate in a language that everyone understands. That's the concept behind the CommBeBiz Bioeconomy Photo Competition, a photography competition for bioeconomy researchers to show how images can help them document and demonstrate the relevance and impact of their work. In its second year, the 2017 competition received over 100 entries from researchers across 9 European countries; each image communicating each scientific study in a 'language more universal than words' to borrow the phrase from Minor White.

The winning entry from Dheeraj Singh Rathore of Teagasc, Ireland – One to many: in-vitro regeneration of multiple potato shoots from callus – shows the roots and stems of a potato plant in a study which documents biologists' efforts to grow thousands of pest- and disease-free plantlets in a small amount of space. The potato plantlet pictured has been grown out of the tissue of another plant and can live for up to nine months.

The photo selected for second place – Axis of the Fruit





World – submitted by Juozas Lanauskas, from the Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry, focuses on one of the most regularly consumed fruits in the world - the apple. The apple in the image is a specific apple cultivar called Ligol, known for its storage properties. Researchers like Joazas want to optimize not only yield but also the taste of this particular variety.

The third placed photograph - Mussel Fascinator – submitted by Karen O'Neill, KerryLIFE and Teagasc, Ireland & University of Dundee, Scotland, shows an adult freshwater pearl mussel partially buried in river gravel. When Karen and her research team returned to track this pearl mussel, she found that it had moved a significant distance; an indicator that of an unsuitable habitat as mussels only move when they are under stress. With the freshwater pearl mussels a critically endangered species in Ireland, researchers like Karen are exploring the effects of extensive land uses on mussel habitat to help inform more sustainable practice in agriculture and forestry.

«In the galaxy of languages, each person's voice is a star» – L'Observatoire linguistique

The motto of L'Observatoire linguistique reminds us that for a language to thrive, it requires a collective effort. As all linguists know, a language which is not widely spoken is a language in risk of extinction.

Collectively, we must ensure that language is not a barrier when it comes to demonstrating the impact and relevance of science for the development of the European bioeconomy. We are looking for more stars to help us communicate the wide range of research which is underpinning the European bioeconomy: why not consider entering one of your images in the 2018 competition? You can find more details on our website: <http://commbebiz.eu/?page=2311>





# INSPIRING PEOPLE: PLANT PROTECTION ON THE STAGE

**Science & Entertainment:**  
How theatre puts bioeconomy in the spotlight

by **Laura Vivani**, *Moverim*, et al.

The EMPHASIS project – dealing with plant protection – is putting the topics of food security, biodiversity and different ecosystems in the spotlight. The theatre scene in Turin now includes an eclectic mix of plays, music, debate and poems addressing issues more commonly tackled by bioeconomy scientists.

In 2016 the actors of the Teatro Stabile di Torino reached the hearts and minds of an enthusiastic audience of more than 400 spectators in one evening, with dramatic and musical work addressing the grand themes that underpin the EU-funded research on integrated plant pest management. So inspiring was their success, that Turin's theatre producers went on to explore another scientific topic on the stage: with the EMPHASIS project's experience, the RESPIRO project provided another piece based on Mark Twain's *The Diary of Adam and Eve*. With the support of the Teatro Stabile Di Torino, and Tangram Teatro, RESPIRO was performed at the Teatro Carignano in June 2017, entertaining another 450 spectators and drawing huge national media attention.

Andrea Masino and Maria Lodovica Gullino, researchers from the University of Turin, together with Lamberto Vallarrino Gancia, President of the Teatro di Stabile and Laura Vivani of Brussels-based Moverim Consulting all contributed accounts of these experiences to the Bioeconomy Innovation magazine. Reporting on the play-based method of science communication that appeals not only to the cognitive parts of our brains, but also to the emotional ones, they summarise: 'Theatre can explain to the public, through a very original format, the role of plant health for the environment and landscape protection, food production and human health. It ensures the effective and efficient spread of the scientific results to a wide public.' The President of the Teatro Stabile di Torino adds that, from his professional viewpoint, 'Communication should combine sciences with entertainment, especially when addressing a young audience. The right communication, therefore, is fundamental, but it must be concrete and innovative as well as having useful methods and timing.'

Since 2004, Agroinnova, the University of Turin's Centre of Competence for Innovation in the Agro-environmental Sector, has dealt with European projects. EMPHASIS, coordinated by Agroinnova, touches on highly relevant issues, such as market globalisation, the effects of climate change on agriculture, technological innovation and new challenges for Europe. The project aims at a multi-actor approach, with new ways of engaging with civil society and policymakers.

Communicating scientific messages is not the easiest task, as the simple facts and figures generated in labs and institutes are difficult to translate into popular formats. Sponsored by Dow AgroSciences, a company inte-

rested in innovative communication, Agroinnova liaised with renowned experts seeking to entertain the public using scientific and environmental topics. This was the moment when the musical piece EMPHASIS per l'Ambiente was born, combining guest stars and testimonials from an American architect, an oenologist and a travel writer, and exhibiting the performances of Italian actors and a pianist, all directed by Ivana Ferri, Director of Teatro Tangram.

'When Lodovica and Lamberto suggested that I bring science to the theatre I was not sure of the results,' reveals Ivana Ferri, 'now I am really satisfied.' Research has to be closer to people, she explains; 'No other communication format can inspire more passion or credibility than theatre.'

Contemporary works addressing scientific topics through theatre are more common than might be assumed. The UK-based Protein Dance Theatre, working with voice and text, was founded in 1997 by the Italian Luca Silvestrini and the Swiss Bettina Strickler. They have produced award-winning stage works on consumerism and obsession with body-care image. Protein's most recent show, *May Contain Food*, examines our complex relationship with food.

Physics, chemistry and biology have long played prominent roles in literature and theatre, as evidenced by Friedrich Dürrenmatt's *The Physicists*, and Heiner Kipphardt's *In the Matter of J. Robert Oppenheimer* (first performed in 1964), which both explore the political and moral dilemmas of the scientists who developed the atomic bomb.

More recently, Alain Prochiantz, Director of the Department of Biology at the École Normale Supérieure in Paris, has brought science to the stage. His *Biology in the Bedroom* — named after Sade's *Philosophy in the Bedroom* — explains, through didactic dialogue, notions of embryology and neurobiology, and thus the concept of individuality, to a young girl.

As a final thought, we may note that 'theatre' has the same etymological root as 'theory'. The two words derive from the Greek *théa*, which means 'a view'. Though science is strongly connected to observation and vision, there are an increasing number of plays dealing with the moral, political and philosophical aspects of science — paving the way for a change in the perception of science. Science is a part of our culture; the researchers involved in it need to communicate their findings more clearly and more regularly.



# CHILD OBESITY –

Food plays a part, but only a part, in this modern multi-dimensional epidemic  
i.Family: Findings of a longterm study and how media bought in to it

By **Rhonda Smith**, *Minerva Communications*

There is no one answer to the question ‘what causes obesity?’ Neither is there one answer to the question ‘how to prevent obesity among children?’

It is accepted by global, regional and local authorities and health and care experts, across many disciplines, that the increasing presence of obesity in a population has many root causes of varying degrees of influence. The weight of these influential factors is dependent not only on the ‘nurture’ factors experienced by an individual – environment, family & peers, work – but also on their ‘nature’ – genetic make-up, emotional and neurological responses.

These two powerful influences can be further complicated by factors that could be defined as ‘hidden’ to populations. Availability of calorie-dense and cheaper foods, direct and subliminal marketing, absence of open areas for exercise and recreation, easy access to fast food outlets, coupled with the decline of home cooking using local produce.

## **Multi-cultural and multi-ethnic populations increases complexity**

Additionally, the rise of mobile populations, resulting in multi-cultural, multi-ethnic countries and regions, makes it much more complex for local authorities and health professions to construct policies and best practice guidance suitable for application across their populations and patient groups.

Research has a vital role to play in helping to unravel these complex and interactive factors in order to help governments design and deliver the environments and professionals provide

the support that can help hinder, if not halt, the march of obesity. To produce data of optimal use for application by nations, such research must be multi-dimensional, with several centres working with cohorts over a significant period, measuring biological, physiological, emotional factors, as well as collecting individual data on food intake and lifestyle choices.

## **Longevity of cohort a key factor for research success**

The design of the EU’s FP7 funded I.Family Study matched these criteria, with cohort longevity secured as it built on the cohorts established in the IDEFICS project. The I.Family mission was to identify the determinants of food and lifestyle choices within European families, the aim being to help the family unit make choices that better support lifelong health. Finding answers that could help provide the evidence base to design environments and programmes to contribute prevent childhood obesity was therefore one of the key targets.

Seventeen institutions in 12 countries examined the health, genetics, diet, physical fitness factors together with the environments and peer and family influences of more than 16,000 children and their parents across eight countries. That’s the biggest ever cohort of European families.

## **16 000 children and parents screened: From sleep to screen time, from genes to games**

Throughout its five years of research, I. Family has produced a significant body of data and evidence. These results underpin the need to identify and address a multitude of issues if governments



and professionals are to successfully stem the tide of obesity and other nutrition and lifestyle choices that impact on lifelong health, and deliver effective support for families, both children and parents, to combat this modern epidemic.

### **Key messages distilled, policy briefs and presentations to start conversations**

I. Family researchers were aware throughout the life of the project that they needed to develop key messages from their complex studies that can be presented to and utilised by those agencies anxious to reduce the burden of obesity on the individual as well as the state. In preparation for the final conference, the I. Family team worked on producing policy briefs and presentations designed to start those conversations and engage with these vital stakeholders.

### **..... and a brief on “Big Food” – Restriction on food ads to children demanded**

Succinct briefs on children's food choices, sleep and screen time, patterns and levels of physical activity, the nature of neighbourhoods, family and sibling relations, the influence of friends and peers, and measured health inequalities were all created for the final conference. In addition, a brief on ‘Big Food’ presented one of the core messages to which the I. Family ‘family’ subscribes.

The I. Family core message is that the actions that individuals, families and health and welfare professionals and campaigners take to challenge obesity must be underpinned by interventions by governments. Increased regulation on the composition of daily foods, restrictions on online and TV advertising to children, action to reduce supermarkets ability to put temptation in the way, must be coupled with policy recommendations to town planners to ensure access to family friendly play and exercise areas for all.

At a population level, families and individuals cannot combat obesity on their own. The obesogenic environment, making it easy for children and families to choose actions that mitigate against lifelong health, must be challenged. Politicians, policy-players and professionals, armed with the body of scientific evidence demonstrating the harm of inaction, created by I. Family and other research teams, can drive that challenge.

Environments shape children's and family's diets and behaviours. To improve health, policy needs to address systemic factors and the obesogenic environment.

### **I. Family communications played its part- extensive media coverage**

The I. Family's final conference in Brussels (February 2017) attracted gatekeepers and influencers across a range of agencies relevant to family health policy at local, national and European levels. The presentations sparked interesting and constructive discussions and resulted in a number of direct follow-on opportunities. In addition, the key findings and messages presented at the conference featured in extensive media coverage around the world, including Australia and the US as well as across Europe and in particular in Germany and Belgium.

### **One core and consistent message: ‘Families can’t tackle obesity alone’**

Why did the conference secure this wider communications success? The first key factor was the adoption of the one core and consistent message - Families can't tackle obesity alone - a message that had taken considerable discussion and compromise to reach agreement. This message was a clear call to action, relevant to all countries, professionals and agencies and on which all could agree.

### **The project had scientist speakers to communicate with journalists - with credibility and enthusiasm**

The second key factor was a Coordinator who was not only willing to engage with and make time for media communications, but who was also adept at answering questions from journalists with enthusiasm and precision.

The third key factor is that obesity is a topic that is making its presence felt not only on the pavements, in schools, clinics and hospitals, but also in the calculations of budget holders in health authorities and governments.

The results from research projects such as the I. Family Study that are helping to unravel the multi-dimensional causes of obesity must continue to shout as loud as they can, using all communications channels, and help drive the call for government interventions in the longer term, whilst also providing best support to agencies and professionals dealing with the here and now.

Log onto the I. Family Study website for full information on the project and its final conference: [www.ifamilystudy.eu](http://www.ifamilystudy.eu)

*Our photo below: The I. Family Study mobile clinic visited schools and community centres to undertake measurements of study participants and collate questionnaires.*



# THE NEW BUZZ

## Co-Creation; Do-It-Yourself Science (DIY); Citizen Science

Social Innovators with new ideas about avoiding food waste and plastic waste

There are fancy new words swirling around the open science scene — co-creation; do-it-yourself-science (DIY science); citizen science — all of them focus on better citizen participation in the scientific process.

The term ‘co-creation’ is often used synonymously with ‘crowdfunding’ — meaning that a group of people contributes money to a project they wish to see realised because the market cannot provide the right investment. This is often seen in renewable energies, food waste treatment and IT. ‘DIY science’ means that single scientists or other people start experimenting or researching on their own for the sake of better results. It is often seen in environmental pollution areas such as noise, air, and water. ‘Citizen science’ can be a merger of both of these, and always has one central feature in common: citizens contributing to a scientific project with quantifiable results, and asking researchers to participate in an open and transparent process. It is most often seen in biodiversity or biology projects.

Food waste is about to become a favourite field for co-creators, who like to participate and to emphasise those areas that consumer societies ignore. Modern life is wasteful. Co-creators and DIY scientists are about to find exciting solutions to problems, from organic food waste to the plastic packaging that fills our kitchens and makes its way to the oceans where it creates havoc for the planet.

### Beer from Unsold Bread: ‘BABYLONE’ -The Brussels Beer Project (BBP)

In Brussels, bread is a major player in the local food waste problem, comprising 20% of the sustenance that ends up unsold. In 2013, BBP co-founder Sebastien Morvan discovered that about one-and-a-half slices of bread per bottle can reduce his brew’s barley usage by 30%. He teamed up with Atelier Groot Eiland — a nonprofit organisation focused on employment and education — to retrieve unsellable bread from local supermarkets that could be processed into meal suitable for making beer. About 500 kg of the uneaten bread can be processed using yeast and sourced hops and made into a 4000-litre batch the beer — a 7% amber called Babylone.

‘Co-creation is in our DNA. The BBP has been built by 2500 crowdfunders, who want to explore with us and discover new beers,’ the founders say. Meanwhile, they have created five new varieties of the bread-beer, and the idea is now being replicated around the world.

In 2016, Toast Ale was launched by the UK-based Hackney Brewery, with much of the usual barley malt replaced by toasted, crumbed bread sourced from local bakeries, delis and factories. Tristram Stuart, the brain behind Toast Ale, is founder of the food waste charity Feedback. Every year, 24 million slices of bread go to waste in the UK; Tristram’s hope is to change this shocking stat with his beer.

### Refill: Get water from the tap and refill your bottles again and again

Stephanie Wierman from Hamburg has been trying to live plastic-free for several years. In April 2017, the web-designer teamed up with bloggers to start a website that would identify places such as restaurants, shops or official institutions where urban dwellers can receive a refill of their water bottles from the tap — for free. Soon they had listed 55 stations across the Hamburg region with shop owners that allow consumers to refill their bottles with fresh water. The young community’s intention is to take action against the growing mountains of plastic waste by re-using bottles again and again. A sticker with a blue water drop, the logo can be customised for each city and is available for free use under a Creative Commons license. It is placed at the entry of the shops, demonstrating that followers are in the right place. Already, in more than 50 German cities, the refill stickers can be found in the windows or doors of pharmacies, grocery stores, libraries, office buildings and kindergartens, and a countrywide web map of Refill Cities has been drawn up — the one-woman-initiative has grown into a movement!

The designer took the idea home from Bristol, where the free-tap-water movement was started in 2015. Meanwhile, one of the world’s most famous food markets, the London Borough Market, ditched plastic bottles and installed free water fountains for customers instead.



# CAPACITY RAISING: OPEN PLATFORMS FOR FOOD SMES AND FOOD RESEARCHERS

Taste of Science & Design4SMEs — communication networks  
linking science and business and training networks

**Helena, what is 'Taste of Science'? Could you describe your initiative in a few sentences, please?**

**Helena McMahon:** Taste of Science is an online magazine designed as communication platform for food-producing SMEs. We bring academic output to the practitioners, through clear writing and journalistic articles — supporting practitioners with the necessary knowledge for innovation. In a nutshell: we rewrite scientific articles, translating research results for SMEs in the food business.

**Who benefits from your activities?**

**Helena McMahon:** We work with a network of 8000 SMEs that regularly read our content worldwide. Our web-analytics tell us these figures. Those food SMEs visiting our platform are early adopters; they like to receive expert knowledge and have access to projects.

**What kind of popular content does your platform offer?**

**Helena McMahon:** We also run a huge network of contributing food researchers who are invited to blog on their research, and to publish articles on our platform. Our team of editors—the content curators—add style to the blogged content and, if necessary, translate the publications for a non-scientific audience. At the same time, the editors are constantly looking for new contributions. They also write articles of their own.

**Do researchers need a specific motivation to contribute to the platform?**

**Helena McMahon:** An article in the Taste of Science online magazine expands the outreach of their findings and increases

their impact. The magazine was designed to a high professional standard — journalists and coordinators have simulated in a kind of editorial lab the roles of the parties involved: the users, the SMEs; the contributors, the scientists; and the content curators, the editors. This was most enjoyable for us, and everyone is now benefitting from the platform's professional set-up.

**Could you give an example of a typical article?**

**Helena McMahon:** One of the most memorable stories for me was the piece on 'Natural Antioxidants in Meat'. This one informed butchers and meat processors on the findings from two universities in New Zealand about alternatives to synthetic antioxidants. Natural polyphenols, found in grapes, tea and Vitamin E, have proven to be effective free radical scavengers, reducing the oxidative stress that changes meat's colour, taste, chemistry and fat. Firms can use this knowledge about natural additives for their products, and for their marketing too.

Breda, you are running the Food Business Academy, Design4SMEs, where such a case could be elaborated on in more depth by different firms and researchers. How would this work?

**Breda O'Dwyer:** Indeed, Design4SMEs offers food firms and researchers a Business Summer School programme, where they come together for four-day workshops to find the best solutions for practical problems — aiming at achieving operational solutions that can be commercialised for the food markets.

**What kind of SME, and which researchers, do you invite?**

**Breda O'Dwyer:** On the SME side we mainly work with cheese makers, bakers and butchers. On the research side, it's a perfect fit for technology-centre managers as well as for postgraduates in



food technology or food chemistry. Of course, others are also welcome. During the academy the scientists look through a commercial lens. Working with the practitioners also sparks the postgraduates' entrepreneurial fire.

#### **How should we picture your live-case approach?**

**Breda O'Dwyer:** It's a living lab with a design-driven protocol method. In 2016 we had 40 PhD students from Potsdam, and a Spanish meat-processing company. The students were tasked with finding and providing solutions on how research could help the firm with scaling-up, defining future challenges, and enhancing health benefits by adding lactose bacteria to the meat production process. Other groups elaborated on skills development in accounting or labelling for new clients. At the end of this co-creative process, six ideas emerged for the company to take home.

#### **And how did the researchers benefit?**

**Breda O'Dwyer:** Some develop long-standing partnerships with the companies or the consumer

groups. Others enhance their knowledge while receiving a framework for the commercialisation of RDI outcomes, or they benefit from a framework they might use to collaborate with SMEs. And some of them come just to improve their presentation and pitching skills.

#### **Pitching as a communication skill is becoming ever more relevant. How can you teach this?**

**Breda O'Dwyer:** At Design4SMEs it's immersed learning and co-creation for all parties. The academic participants need to explain the basic outcomes — which could be potentially useful to the SMEs — using a minimal number of sentences and in a minimal amount of time, while remaining understandable to the non-scientific audience. To have catchy panel talks, we also constantly listen to the feedback from the SMEs and refine the pitching.

#### **What does this mean for you as an organiser and teacher?**

**Breda O'Dwyer:** I really like to see people transform.



The majority start suspicious, and leave convinced. This is true for the firms and the students alike.

### **Do Taste of Science and Design4SMEs share common roots?**

**Helena McMahon:** Both were developed during the EU-funded TRADEIT Project, where we intended to open up food science to SMEs in the food sector. Both platforms are 'spin-outs' that have exceeded the original project's lifetime. And both are managed by the Institute of Technology Tralee in Ireland.

### **What drove the need to open the platforms?**

**Helena McMahon:** There is clear evidence for the low levels of research commercialisation within the SME sector. In many instances we see a mismatch between innovation outcomes and SME needs, especially in the main sectors we work with, such as dairy, bakery and meat.

### **The biggest hurdles?**

**Helena McMahon:** For the most part, food researchers produce innovations for the larger companies or the multinationals. Many of them do not notice that SMEs represent the majority of the European food sector. Research-driven food innovation may not be designed on an SME scale in many cases, nor are researchers sufficiently informed about the technological and operational needs of smaller, and traditional, food firms.

### **And the hurdles on the business side?**

**Helena McMahon:** They are manifold as well. Only a few SME owners have formal technical or food-science training. Moreover, they are far from time-rich and have multiple responsibilities to juggle. SMEs first need to be made aware of the benefits innovation and research results can bring them.

### **Are food SMEs ready to understand all content in English?**

**Helena McMahon:** The language barrier is still a huge obstacle — not many firm owners can converse in English on their specific technological or economic issues. We need to have more nicely-tailored, language-customised approaches when it comes to the commercialisation of research results in the future.

### **How did your initiatives help?**

**Breda O'Dwyer:** Since 2016 a total of 90 graduates and 10 SMEs have benefited from the concept — we've seen robust results, and heard success stories from the pitching panels.

### **And the next big things?**

**Breda O'Dwyer:** We are looking for corporate partners to make our Business School-Living Lab concept for the food sector self-sustainable.

### **Would this also be a pathway for Taste of Science?**

**Helena McMahon:** Of course, the Taste of Science platform is also expanding, but we elaborate it differently to Design4SMEs, because of our different targets. We constantly do market research and media research to enlarge the community, including its outreach. We may also steer the portfolio more towards consumer-related articles and tech-articles. These are currently free, but may become accessible on a fee-paying basis only.

### **How could you attract paying customers?**

**Helena McMahon:** Basically it's promotion, marketing, recruitment and refreshing pitching — in the sense of selling ideas to an SME in 30 seconds. We tweet, we share platforms. Sharing content with other platforms is a matter of mutual trust, and developing this trust takes some time.

### **Are there new projects on the horizon?**

**Breda O'Dwyer:** To take Design4SMEs to the next stage would be exciting. Why not transfer the approach to other business sectors and make an open-innovation model out of it? The biggest hurdle is how to convince a company of the value of a five-day stay.

**Helena McMahon:** Our formula is devised with the following in mind: who are our typical readers or typical customers? We visit food conferences and congresses, such as Anuga in Cologne, to get to know the market better. We are looking for start-ups that could be interested in dissemination. Together we can develop new projects. Finally, we hope — with the CommBeBiz Award and the contact with the coaches that it provides — to develop a business model for the commercialisation of our services.

Helena and Breda, thank you very much for your time!

# BIO EXPRESS

**Helena Mc Mahon** is the Chief Operational Officer of the online magazine 'Taste of Science'. She is a biotech professional with activities focused in the areas of facilitation of SME collaborative actions, innovation, technology transfer, commercialisation and multi-actor networks. Helena holds a Masters in Molecular Medicine, and a PhD in Gene and Cellular Therapeutics, Trinity College Dublin. She works as Program Manager at the Irish Institute of Technology in Tralee.

**Breda O'Dwyer** has worked in innovative learning practices across multi disciplines for over 25 years. She holds degrees in Business, MBA, and an NCEE fellow in Entrepreneurship and PBL Certificate from Harvard University. Currently she is leading the Centre of Entrepreneurship and Enterprise Development at the Institute of Technology, Tralee in Ireland. Continuing with innovative learning practices Breda now leads Design4SME, integrating the SME and researcher communities.

# FOOD 2030

## The EU Commission's initiative to improve food systems Four EU Priorities in Food and Nutrition Security Research & Innovation

On 25 September 2015, the United Nations adopted a Sustainable Development Agenda encompassing a set of global goals to end poverty, protect the planet, and ensure prosperity for all. With a list of 17 UN Sustainable Development Goals (SDGs), the world community answered to the most pressing challenges faced by the planet: the rising global population, mounting climate change, and food and nutrition security. Each goal has specific targets and sub-sets to be achieved by 2030. Additionally, in the light of climate change, in December 2015, under the Paris Agreement finalized at COP 21, 196 Heads of State agreed to pursue efforts to limit temperature increases to 1.5°C, and to reduce greenhouse gases while striving towards low-carbon, non-fossil-based economies.

Both the SDGs and COP 21 have acute implications for worldwide food systems — more specifically, ten out of the 17 global SDGs are directly linked to food and nutrition security. Under its current political mandate the European Commission is fully committed to these global priorities. One response has been to launch the FOOD 2030 initiative to bring greater coherency and coordination of all Food and Nutrition Security EU funded Research and Innovation (R&I). The FOOD 2030 approach is to apply holistic system-based principle to meeting the SDGs, and to future-proofing our food systems under four main priorities: Nutrition, Climate, Circularity, and Innovation. This systemic approach views the way food is produced (and how it affects health, well-being and the environment) as a circular issue comprising all elements of food production, processing, packaging, logistics, and distribution, healthy people, and recovered waste streams.







## 1. Nutrition for Sustainable and Healthy Diets

The first FOOD 2030 priority endeavours to meet important challenges relevant to Europe and beyond, and to develop R&I solutions for areas such as: malnutrition and obesity; healthy ageing; the rising global protein demand; animal proteins and husbandry that demand a high carbon-footprint; fraud and microbial hazards in food; monocultures and the decreasing resilience of major crops; hunger and malnutrition in the African continent. Under the Horizon 2020 programme, between 2014 and 2017, over EUR153 million were invested in relevant R&I projects to tackle Nutrition for Sustainable and Healthy Diets, and to meet SDG 3: ensuring healthy lives, and promoting well-being for people of all ages. The Horizon 2020 projects under the Nutrition priority showcased in this publication include: PROMISS, New Gluten World, MyNewGut, PROMINENT, SUPUR-FOOD, Genosa, RUMINOMICS, BEHENT, TRADEIT and Spira.



## 2. Climate-smart and Environmentally Sustainable Food Systems

This second FOOD 2030 priority focuses on how food systems can be made more climate-smart, resilient, biodiverse and environmentally sustainable. The R&I topics addressed under this priority will contribute to finding answers to the challenges being posed by an ever-rising demand for meat, which requires a system of animal protein production that over-exhausts soil, energy and environmental resources. It also looks at solutions to cope with the under-supply of seafood in Europe, whose fishery production only covers 44% of the demand. The FNS R&I within the climate area, is therefore concentrating its efforts on: demonstrating and developing sustainable aquaculture in Europe; adapting precision farming for small farmers; maximising the process of photosynthesis in food production; increasing crop yields; synthesizing biofuel cells or bio-batteries; developing solutions for the sustainable use of land to keep soils healthy. Under the Horizon 2020 programme, between 2014 and 2017, over EUR459 million have been spent on funding R&I under the Climate priority, to tackle SDG 2 (end hunger), SDG 14 (protect life under water and promote the sustainable use of marine resources), SDG 7 (ensure access to affordable and clean energy for all), and SDG 15 (protect life on land and land resources). The Horizon 2020 Climate projects showcased in this publication include: INAPRO, ATLAS, TREASURE, CASCADE and BIOAGRIBOOSTER.



## 3. Circularity and Resource Efficiency of Food Systems

The third FOOD 2030 priority aims at coordinating R&I efforts, focus on better circularity and resource efficiency of food systems by minimising food waste or energy waste. Important topics in this area include: reaching zero waste by tackling the economic, environmental and societal impact of food losses; tackling waste from primary production through greener farms; efficiently recycling food waste from side-streams to produce added-value bio-based products; rethinking food packaging and labelling to engage consumers in reducing waste; promoting better-tailored, short-circuit food systems to respond to local food demand.

Under the Horizon 2020 programme, between 2014 and 2017, over EUR117 million have been invested in funding R&I on tackling the challenges in the context of Circularity and the Resource Efficiency of Food Systems and, at the same time, meeting SDG 12 (ensure responsible consumption and production), SDG 8 (promote inclusive and sustainable growth and decent work for all), and SDG 2 (end hunger, achieve food security and improved nutrition and promote sustainable agriculture). The Horizon 2020 projects showcasing Circularity-related projects in this publication include: NoAW, AGROCYCLE, DECISIVE, INCOVER and AGRIFORVALOR.



## 4. Food Systems Innovation and Empowerment of Communities

The fourth priority under FOOD 2030 aims at establishing FNS-innovation ecosystems, leading to new business models and the development of value-added products, goods and services that address society's needs and values, and the SDGs. Here, R&I also focuses on developing new jobs to foster thriving urban, rural and coastal economies and communities. Key challenges addressed are: sustainable and accessible food in cities; the engagement of citizens in food science and policy; the development of a sharing economy for commons-based food production and consumption; the implementation of data-driven food and nutrition systems. The research conducted under the Innovation and Communities priority will contribute to achieving SDG 11 (sustainable, safe and resilient cities and human settlements), SDG 16 (peaceful societies operating with justice and strong institutions), SDG 9 (foster inclusive and sustainable industry, innovation and infrastructure), and SDG 2 (end hunger, ensure functioning food commodity markets, facilitate timely access to market information). To date the Horizon 2020 programme has spent over EUR230 million on R&I projects to support Food Systems Innovation and the Empowerment of Communities. Projects showcased in this publication that are contributing to the fourth priority include: INFARM, FRESHCODE, AGRINFRAPLUS, PROVICOL, DIGITANIMAL, STRENGTH2FOOD.



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# Future-proofing foodsystems through smart personalized nutrition

By **Hannelore Daniel** *et al.*

Societies are diversifying with growing financial and social inequalities but also with huge differences in diets and in the nutrition and health status. A better understanding of the interplay between biological, behavioural and environmental factors, influencing people's ability to live healthy lives, is therefore needed. Enabling citizens to make choices that result in healthy diets addressing their individual nutritional needs, likes and dislikes, health status, diseases, metabolic type or other personal categories, (and that are also sustainable and affordable using goods that are produced in a socially and environmentally responsible manner), is therefore of highest priority.

Personalized nutrition can offer answers to meet these requirements not only on an individual base with benefits for citizens' health and well-being but also for future-proofing our foodsystems by enabling decisions for more responsible and sustainable food choices, decreasing food waste and fostering inclusiveness and innovation. In the fusion of advanced food production and supply methods with e-commerce, smart connected objects, Internet of Things, Big Data, Future and Emerging Technologies (FET), digital tools and solutions, ICT and applications in eHealth and m-health, SMART PERSONALIZED NUTRITION (SPN) creates a window of opportunities. People will have a choice in the future for a nutrition that fits to the person, adjusted to health data and personal preferences. No one-size-fits all recommendations will longer prevail.

Any type of service or product can only be personalized if appropriate information about the individual or a population subgroup (e.g. malnourished people, certain metabolotypes, females vs. males, diabetics, elderly, ect.) is available. Personalization aims to integrate customers into the production process as "co-designers" or "prosumers", allowing them to affect or personalize the integral design or configuration of their intended purchase or choice.

SPN offerings need to account for likes and dislikes, ethical, cultural, religious and social constraints, food allergies and intolerances, phenotypic data (e.g. gender, age, body height and mass) and physical activity levels. It may include: biomarkers that report on the health status such as blood glucose, cholesterol levels or blood pressure and status markers on possible nutrient deficiencies or at least intakes below the recommendations require

This applies in particular to the growing number of elderly that are malnourished as well as to people that despite a proper caloric intake show selective nutrient deficiencies (hidden hunger). SPN approaches with

dedicated services can help to tackle these problems – also via caretakers that may not have the expertise to identify and treat these deficiencies.

However, all data provided by the consumer on which individualized solutions are based are also sensible and that raises questions about data protection, privacy and ownership. SPN thus should have a proper legal and ethical framework.

With the data generated on lifestyle parameters and on food consumption, citizens are also empowered - like never before - to have their share in the food systems and to take over responsibilities for food and health based on knowledge and experience.

Furthermore, SPN could as well help to reduce the negative impact of food production and distribution on the environment for example by reducing food waste and by providing food products (or the information on such products) with little environmental impact.

The extent to which people will act on nutrition advice based on health parameters analyzed by machine-learning algorithms remains to be determined. It may be the case that for some people it will be a sufficient motiv. It will still be necessary to ensure that people have the psychological and physical capability and the physical and social opportunity, to adopt healthy diets.

A point of concern is that SPN may not serve the groups that could benefit most from a healthy diet, i.e. those with a low interest in health, thus resulting in more inequality. That asks for special efforts to bring SPN solutions to consumer groups of low income and low educational status but also to minorities and the elderly that may not have access to or may not be familiar with the technologies. SPN needs to be underpinned by robust biological and social scientific evidence to deliver services and products that promote healthy and sustainable diets.

This article is a shortened version of the report on "SMART PERSONALIZED NUTRITION: QUO VADIS", authored by Prof. Hannelore Daniel, Technische Universität München/Germany; Pamela Byrne, Food Safety Authority of Ireland and Monique Raats, University of Surrey / UK. The paper builds on the discussions of the European Commission FOOD 2030 workshop entitled «Smart Personalised Nutrition», that was held on the 16th of June 2016 in Brussels. It also draws on knowledge gained with the EU-funded research project "Food4Me" elaborating i.a. on health benefits of individual biomarkers-based nutritional advice.



# FIGHTING THE MALNUTRITION CASCADE

Healthcare and communications professionals will bring PROMISS-results to the older adults

‘The world is facing a situation without precedent: We will soon have more older people than children and more people at extreme old age than ever before. As both the proportion of older people and the length of life increase throughout the world, key questions arise. Will population ageing be accompanied by a longer period of good health, a sustained sense of well-being, and extended periods of social engagement and productivity, or will it be associated with more illness, disability, and dependency? How will ageing affect health care and social costs? Are these futures inevitable, or can we act to establish a physical and social infrastructure that might foster better health and well-being in older age?’

These are the questions posed by the World Health Organization (WHO) in its report on ‘Global Health and Ageing’, which outlines concerns on the coming global shift in what our societies will look like in only a few years. As a nutritionist and health epidemiologist, Professor Marjolein Visser from Vrije Universiteit Amsterdam is very familiar with the WHO’s findings. She views them as a challenge, as she has, for a long time, studied how lifestyles are related to health and, especially, how this correlation impacts the older generations. As well as this, since 2016, the Dutch food and health researcher has been coordinating a vast consortium of specialists in the EU’s PROMISS project, assembling a worldwide body of expertise in epidemiology, clinical trials, geriatrics, nutrition, physical activity, and microbiomics, as well as in behavioural, consumer, sensory and computer sciences.

Together, the experts aim at finding the appropriate answers and strategies to encourage active and healthy lifestyles in ageing societies, including the prevention of malnutrition (which is at the root of many deterioration disorders and diseases in later life). Marjolein Visser points out the precise problem, ‘We need to stop the malnutrition cascade.’ The topics the PROMISS project is clearly focused on dealing with are: a better understanding of malnutrition in the later stages of life; a protein-rich diet combined with physical exercise for maintaining health and physical functioning; and pathways, strategies and concepts that can convey the relevant knowledge to older citizens.

Initially, the scientists involved exploited existing data from scientifically well-established cohort studies on ageing and national nutritional surveys from Europe and ‘Third World’ countries. This will now be combined with new data from short- and long-term intervention studies on older adults at risk of malnutrition. Three specific main areas came under the team’s lens: the relations between vanishing appetite, gut microbiome and the mouth’s sensory faculties in later life; the links between protein and physical activity for the functioning of the body; and the role of communication technologies in sparking behavioural changes among older adults.

To put it in numbers: more than 90% of older people in Europe are living at home. A very poor appetite is reported by 10–15% of them, which, consequentially, causes malnutrition, and a ‘cascade’ of deteriorated body functions and illnesses; muscle loss, cognitive decline, weak immune systems and slowed wound healing. As a result, the healthy-ageing specialists first investigate the ‘body system changes to gain more insights and understand better what the physiological causes of appetite could be,’ the coordinator explains.

### **Optimal protein intake combined with physical activity at certain time points – extra positive effects on ageing bodies**

Another area being developed by PROMISS is centred on an adequate diet for older adults. Research suggests that most malnourished people have a protein deficiency; their muscles are exploited as an energy source by the body, causing severe decay. Here, PROMISS' focus is on the optimum amounts of proteins in the diets of older consumers. Are animal or plant proteins the better choice? What quantities are appropriate? How can the dietary advice given support sustainability? These are the questions the nutritionists are elaborating on in several intervention studies.

Combining an optimal protein intake with physical activity may lead to extra positive effects on ageing bodies. The scientists therefore will test the impact of eating more proteins at those time points during the day when older persons are physically active. Healthcare professionals working with older adults at home need to be made aware of these links. They are the ones best placed to pass on the dietary advice, to ensure healthy supplies of proteins are provided at the right time of the day and that they are combined with exercise.

### **The focus is on teaching people at home by healthcare professionals**

What may seem obvious, is often not the case. Marjolein Visser refers to national data showing consistent patterns of low protein intake in subgroups of older persons, 'even in the Netherlands' — with plenty of dairy and meat products on the shelves. With its focus on teaching people at home and by healthcare professionals on the relations between low appetite and low protein intake, the project aims at making a contribution in terms of preventative health measures. 'Through reaching people living at home we can make the most cost-effective prevention,' the research coordinator stresses.

The study, therefore, not only encompasses the development of tailor-made food products for older persons with low appetites, and their easy integration into regular diets, but also the right communication methods and tools. Specific messages for different cultural zones and their different dietary habits are elaborated on, as well as the use of modern communication technologies to spark lifestyle changes. For example, there are ideas to install electronic signs on fridges that are activated if they have not been opened for a day or more. This could be the right reminder for those people with a poor appetite or insufficient dietary intake. More educative tools could also come into action: a physical activity monitor that sends a reminder to eat a protein snack after exercise, for example. Though tool developments are only at the pilot stage, digital mobile communication technologies using bracelets, sensors or the connected internet of things could soon be at the service of ageing populations. The researchers' goal is to develop holistic strategies combining diet and physical activity with enough scientific evidence to support future recommendations from medical doctors, healthcare professionals, policymakers and industry.

With an efficient stakeholder involvement from the professional side, the PROMISS coordinator Marjolein Visser is confident that they 'have a strong voice for our case.' According to her, the broad multi-disciplinary consortium contributing expertise and opinions from many different angles is a valuable extra asset. PROMISS is also a member of the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA), which can serve as an efficient dissemination tool for the study results and the diffusion of guidelines to many players in associations, industry and policy across Europe, and beyond — the project will present its results during the 21st International Congress of Nutrition, organised in Argentina by the International Union of Nutritional Sciences (IUNS), adding to growing networks and the global recognition of the PROMISS-ing results.





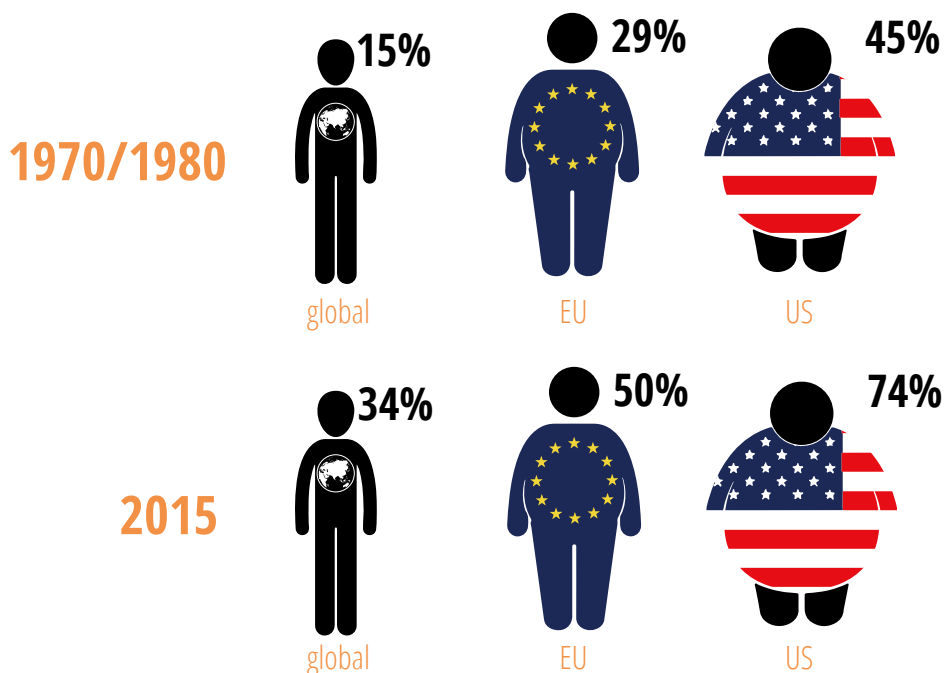
## The MICROBIOME – a new R & I star in nutrition and health

Our gut is almost as important to us as our brain, yet we know very little about how it works. The young German gastroenterologist Giulia Enders hit a mark with her book: “Gut - The Inside Story of our Body’s Most Underrated Organ” which was published in more than 40 countries. Enders took the reader to an entertaining, informative tour of the digestive system from the moment we raise a tasty morsel to our lips until the moment our body surrenders the remnants to the toilet bowl. No topic was too lowly for the author’s wonder and admiration, from the careful choreography of breaking wind to the precise internal communication between the human microbiota and the brain until the cleansing vomit. The young Doctor was awarded several prizes in science communication for her fresh and unconventional way to tell about an exciting unknown organ. After having toured the world with book presentations, she is finalizing her Doctoral studies in Germany.

Meanwhile, on scientific level the microbiome - the bacterial mini-ecosystems in our intestines made up of communities of symbiotic, commensal and pathogenic bacteria - has reached a pivotal role in health and nutrition research. The International Human Microbiome Consortium, IHMC is coordinating the world wide research in the unknown organ ensuring that large-scale, genomic analysis projects accelerate progress in human microbiome research and contribute to development of a robust data set that is freely available to the scientific communities. Representatives of 10 countries, including USA, Canada, Japan and Australia and the European Union are cooperating in the IHMC. At EU level, the EU funded research project MyNewGut runs animal and people studies to help identify specific intestinal microbes that can contribute to or even predict disease at critical stage and whether foods or nutrients can transform the gut microbiome. Thirty-three partners are involved, including universities, research institutes and industry. MyNewGUT-results will provide proof that dietary interventions with food and ingredients can control or reduce the numbers of diet-related diseases, such as obesity, metabolic syndrome and behavioral disorders. ([www.human-microbiome.org](http://www.human-microbiome.org); [www.mynewgut.eu](http://www.mynewgut.eu))

# Food and Nutrition Security / EU, Global

**Development of Overweight and Obesity:**  
Nearly doubled 1970/1980 – 2015



Source: WHO, Lancet

Nutrition (EU): **Over consumption proteins**



**0,8 g protein per kg bodyweight required**  
≈ 56 g per day  
Actual protein over-consumption EU citizens:  
80 – 100 g per day



**Vegetarians/Vegans need 10-20% more to compensate**  
lower digestibility of plant-proteins  
5%-10 % vegetarians/vegans, varying per EU countries



**Major challenge**  
EU-risk of food poverty

**122**  
**mio people**  
( 24,4, % ) at risk of  
**poverty**

**55**  
**mio people**  
( 9,6 % ) **not a warm meal** with meat/ fish / chicken every second day

**10 %**  
of elder Europeans ( ≥65 ) at risk of **undernutrition**



# A DELICATE DANCE WITHIN BREAD, PASTA AND PIZZA

NEWGLUTENWORLD: To avoid gluten sensitivity through detoxified grain proteins

CREDIT: NEWGLUTENWORLD

An estimated one third of the world population carries genetic markers indicating a risk of developing celiac disease or some degree of gluten intolerance. For people with celiac disease, common global crops containing gluten, such as wheat, rye, barley and certain oats, are a real enemy. Bread, pasta, pizza or other dough-based products are strictly forbidden. If celiac patients visit a canteen or restaurant they fear the possibility of unidentified gluten content in menu items, and the symptoms that come with it. They can be afflicted by a wide range of health issues, from intestinal damage and skin problems to neurological disturbances and muscle pain.

The answer offered by conventional food producers, so far, is 'gluten-free' products. These foods are sometimes highly processed. Producers often make up for consistency and taste by adding fatty acids, sugars, and additives to increase shelf life.

However, for Professor Carmen Lamacchia, gluten-free food products need not be the only answer for lovers of wheat-based food. "We Italians love bread, pasta and pizza. As researchers we cannot simply cross our arms and accept the gluten-free diet as the only horizon," exclaims the food researcher from the southern Italian region of Apulia.

The scientist's curiosity was captured by the possibility of recreating bread products that are safe for people with celiac disease and gluten intolerances, using a high-value flour with the full range of micro-nutrients and all the traditional organoleptic properties, keeping the typical taste and mouth-feeling. The chemist and food scientist therefore took a closer look at the gluten protein itself, which is based on a network of proteins that give the dough elasticity and make it function.

Gluten Friendly: "Detoxified gluten passes unnoticed "

After years of rigorous research, Professor Lamacchia, today the CEO of the start-up New Gluten World, discovered a striking method: she figured out a way to detoxify gluten inside wheat kernels. The formula is based around the principle of a significantly reduced immunoreactivity.

When Lamacchia tested her flour on Celiac cells that are responsible for sending out an alarm in the intestine, there was no alarm. The same positive reaction could be demonstrated in vivo: Passing through the intestinal tract of celiac patients, the modified gluten is no longer recognised, and thus cannot trigger auto-immune reactions. 'Detoxified gluten passes unnoticed,' is her brief summary of the proven principle. And more: For the new food technology, she already has received the protected trademark 'Gluten Friendly'.

On the technological side, Carmela Lamacchia describes the process of gluten detoxification as a, 'delicate dance among high temperatures, humidity, cooling down and drying periods.' Taken together, these operations are a vehicle to change the shape of the protein molecules in the wheat, to ensure they have non-reactive effects. The end product of the process is a conventional flour with a new gluten. The goal is to create a standardised and widespread detoxification technology, that can be used by millers, industrial bakers and pasta makers around the world.

The team at New Gluten World is composed of researchers, lab technicians, milling engineers and administrators. The team not only focuses on standardising methods and designing new industrial machinery, but they must also continually cope with 'the



consistent skepticism of doctors in Italy and abroad,' explains the CEO. The company was born at the University of Foggia, where Carmen Lamacchia did her teaching and research. Striving to overcome many obstacles, she says that, 'The biggest challenge was always to trust our vision.'

The young company found an investor and partner in Casillo Group, a big Italian cereals trader, which holds the license to sell the product in 25 countries. At the Casa Sollievo della Sofferenza hospital, the team found a host for the ongoing clinical trials on humans. A group of 50 celiac patients are participating in the study. Two groups are administered bread rolls containing between three and six grams of detoxified gluten. Their reactions are tracked against a third, gluten-free control group. 'After two months of eating Gluten Friendly bread rolls, the patients did not report any symptoms,' the researcher highlights.

Good news for the friends of real bread, pizza and pasta

Finally, supported by a grant from the EU's HORIZON 2020 SME Instrument, the start-up company has entered into an incubator phase working towards industrial up-scaling. The coaching provided through the grant taught the team to speed up all the processes in the innovation cycle. From the technological stage, right up to industrial levels, New Gluten World expects to create new patents. At a later marketing phase, a trademark registration and new sales expertise will allow for market entry. The start-up is already talking to milling companies interested in buying the licenses, including some in Asia.

The planned commercialisation, expected after the termination of the clinical trials in 2018, would bring the founder and CEO, Carmen Lamacchia, a step closer to her goal — which is nothing less than a paradigm shift: "We really hope to improve the lives of many, and, allow me to add, to burst the 'gluten-free' bubble. Gluten-free products are on average two or three times more costly than conventional wheat products. New Gluten World plans to impose fair prices that are comparable to those of conventional wheat products, to ease this cost burden for patients". Good news for the fans of real bread, pasta and pizza.





# Food SME nets: When science meets tradition

The food sector in Europe is made up of hundred thousands of SME. They often lack access to knowledge and to technology, a big hurdle to become more competitive and adaptable to modern consumers' needs. The TRADEIT hubs brought together food scientists and traditional food producers. A model, that carries on with new initiatives beyond the project's lifetime through Summer Schools and online platforms.

Three examples with a common ground: There is the Spanish baker who found a packaging solution to prolong the shelf life of his bakery products, the Finnish cattle breeders offering their 'franchising model' to South Africa, and a Polish dairy bringing lactose-free dairy drinks to consumers and producers in Ireland. What do they all got in common? They all found contacts and advice on the TRADEIT platform for innovation and technology transfer, which supports small businesses in the traditional food sector across Europe.

Traditional and artisan food production are an integral part of the cultural heritage of each country in Europe, with small and local businesses using materials and recipes that date back sometimes as many as 2000 years. An estimated 300000 small companies — often family owned — operate in the dairy, meat and bakery sectors. Their commercial landscape is highly fragmented, and often lacks access to new knowledge as well as an in-house capacity to finance engineering-science or marketing techniques. It was the ambition of Joan Lockyer, entrepreneurial educator for the TRADEIT Project, to support the small producers in 'their growth beyond the local'. Joan Lockyer, from the International Centre for Transformational

Entrepreneurship at Coventry University, tells the story of a Polish dairy to give an example of how the transfer of knowledge can help: 'There were a series of dairies producing a fantastic sheep's milk cheese in the Polish hills. The recipe was handed over from father to son or daughter for generations. But somehow some things got missed in transformation leading to some in-

The butcher, the baker, the cheese maker  
— 300 000 SME in traditional sectors in  
Europe. Food Tech-transfer and training in  
TRADEIT

consistencies in the products, from batch to batch – sometimes the cheese was too dry, or overly salty; it was too variable to be able to be sold in a cooperative way across the region.'

The local TRADEIT project managers, the Hub Advisor, who is also a scientist and cheese specialist brought in other knowledge providers and experts that helped the local produces to introduce some very basic testing and process-control techniques to introduce a degree of standardization without compromising the original product. This classic TRADEIT approach ensured an improvement in safety and reliability that achieved the desired production results.

TRADEIT promotes a grassroots, demand driven approach. It would not have succeeded without the Hub Advisors — the local managers who spoke the language of the bakers, butchers and cheese makers, familiar with the specific, mostly rural cultures involved. 'They were the spiders in the web,' the manager Lockyer explains.

Nine regions across Europe were involved in the process — from the UK and Ireland to Finland, from Poland to Germany, and from Portugal to Spain and Italy. The regional hubs offered different dimensions of learning to their SMEs: knowledge transfers, such as IP management, supply chain management or pricing strategies were taught beside sector-specific techniques



in baking, dairy and meat processing. This was complemented by technology hubs offering expertise in packaging, sustainability and food safety.

The scientists became involved in these learning models through a knowledge web and met the entrepreneurs during a variety of events — at knowledge transfer workshops, tech-brokerage events and SME missions. Forty-five TRADEIT cases were drawn from these platforms, and assessed using the entire business case process, from problem identification to technology and economic requirements — and were offered business process solutions. By having the researchers working directly with the SMEs, ‘a real innovation dynamic was developed on both sides,’ reports Joan Lockyer, ‘they co-innovated and co-created, from labs to market, going back and forth.’

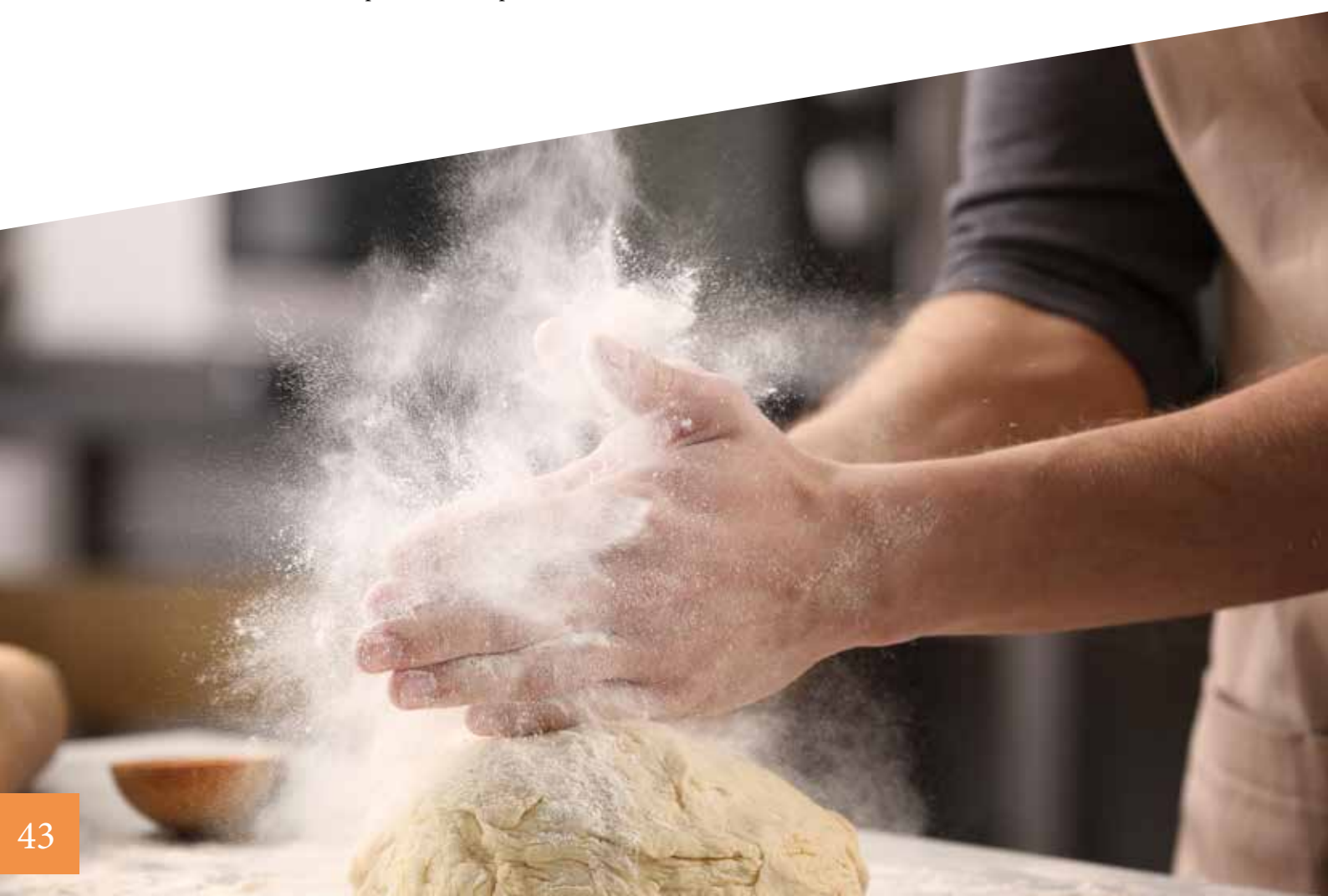
Some figures round the image: The TRADEIT Project during the three years of its lifespan has grown, from a grouping of 44 regional SME organisations, to a membership of 516 knowledge providers and 385 regional SME networks and connections. An estimated 14 000 small firms were reached — and connected to over 100 000 food researchers working in close collaboration with over 1000 SMEs — through the roll-out of more than 150 events, meetings and consultations.

Between 2013 and 2016, 45 micro food businesses that could profit from innovation and knowledge transfer were elaborated on during the project, which has engaged over 100 PhD students and researchers. It has helped business developers to unlock their commercial potential, and advised small firms in terms of the next levels of product development, outreach,

cross-border contacts and competitiveness.

Though nominally completed, TRADEIT has managed to keep valuable platform elements ongoing as its legacy: a virtual Marketplace where agri-food producers, scientists and stakeholders from business and consumer organisations exchange information online in the form of ‘offers’ and ‘demands’; a Summer Academy, (“Design4SME”) where scholars study live cases so that they can learn to think and act as entrepreneurs; and, finally, the online magazine Taste of Science, which showcases interesting stories from the food sector ( see also page 24 of this publication). For its ongoing networking effort — connecting the traditional food sector with the world of research and business development, with a focus on enhancing outreach to new sectors (such as IT for example) — TRADEIT has won a CommBeBiz Award.

The particular tastes of the new, millennial consumer groups — constantly seeking new food experiences and exciting adventures — are a substantial reason to support the rich, artisan food-producing traditions of Europe, according to TRADEIT coordinator Helena McMahon, Principal Investigator at the Biotechnology Section at the Irish Institute of Technology Tralee. ‘It’s the sense of place, history and individuality that will matter more than ever in the sector,’ she explains, ‘micro-SMEs, with often less than 10 employees to meet the huge market demand of globally-connected consumers, need support in capacity development and productivity enhancement.’ The ongoing TRADEIT networks demonstrate the potential to master this future.





# PLANT PROTEINS **WILL** **PROP UP OUR DIETS**



How PROMINENT taps cereal brans as a source for high-value proteins  
Interview - Food Technology Professor Kaisa Poutanen (VTT) and Food  
Communication Specialist Gerard Klein Essink

With the world population growing, and a huge increase in the number of middle class people, protein consumption is set to raise by 75 % by the year 2050. In this scenario, an increased consumption of animal proteins from meat and dairy will mean extra stress for the environment as animal-based proteins are produced with high-resource inputs. Though different in composition to animal proteins, plant proteins (also known as 'green' proteins), derived from cereals or pulses, are much more resource-efficient to raise providing the preferred response to the growing global protein hunger of the future. The HORIZON 2020 project PROMINENT, is a research-industry-project from the strand "biobased industries, bbi". It's goal: to mine wheat and rice residues for proteins after their regular processing for cereal consumption.

## **What's the big picture behind your research on proteins from wheat bran and rice bran?**

**Kaisa Poutanen:** There is a growing amount of people, asking for more and more protein, on this planet. This will pose enormous sustainability challenges. In PROMINENT we are, therefore, looking to valorise plant materials by exploiting wheat bran and rice bran using new and varied technological pathways to unlock the protein potential.

## **How efficient is this closer focus on the side-streams?**

**Kaisa Poutanen:** So far, these residues are totally underused. In the cereal brans we find 15–20% protein, which generally is used as cattle feed, whereas it also could provide food for human use directly. The mining for proteins also in other wheat and rice processing streams can be done with physico-chemical and enzymatic engineering and novel fractionation technologies.

## **How much of the protein demand could be covered through the re-processed cereals?**

**Kaisa Poutanen:** Take the annual production of 250 million tonnes of wheat and rice bran – their protein content could meet the protein demand of hundreds of millions of people, so we are speaking of large raw material reservoirs. In practice, one single

plant protein source cannot meet our need of various amino acids. The minimum daily protein need of humans is about 50 grams per day, and protein digestibility and amino acid composition also are important.

## **So, people will have to change their diets and shift to a variety of green proteins?**

**Gerard Klein Essink:** This should indeed happen, if we want to ensure food and nutrition security in 2050. There is also another reason for the research in protein-rich cereals: they will allow Europe to develop a more self-sufficient protein supply and to become more autonomous.

## **The question of food autonomy is high on the EU agenda. Is there any political support for these green protein developments?**

**Gerard Klein Essink:** We have organized the 10th Protein Summit in France end of September 2017. Top managers from 400 firms attended the Summit, where they learnt from the new protein strategies pursued by different countries. Germany, for example, has started a big programme for new pulse plantations. The Netherlands is proposing a hybrid diet composed of animal- and plant-based proteins on a 50–50 basis.

**Will consumers follow the new taste proposals?**

**Kaisa Poutanen:** People don't sacrifice eating quality for a new product. We therefore have to look for interesting products coming out of the bran valorisation. The new products need to be tasty, soluble, and generally satisfy the sensory qualities that people demand from food. In my institute, we are working on enzymatic and physical functionalization of the extracted proteins to deliver good mouthfeel and taste in food.

**What products will come out of the PROMINENT project?**

**Kaisa Poutanen:** Our end-user partners will develop new baked goods, pasta and beverages from the new ingredients.. The new ingredients could, for example, replace eggs in cakes and also deliver protein-enriched foods, while saving animal proteins and offering a favourable environmental footprint. We also expect new hybrid fibre and new protein ingredients improving overall food healthiness. The main project achievements will be three new product applications and three new ingredients.

**What benefits do the industry partners in the consortium reap?**

**Gerard Klein Essink:** My task as entrepreneur and dissemination manager is to guide the industry partners to the next level. The industry will do the market introduction and the marketing. This requires the research to be translated for those intending to work on the model products. Companies may also be interested in labels with validated nutritional claims such as 'Source of Protein'.

**How can the public be better informed on the more sustainable consumption opportunities ?**

**Gerard Klein-Essink:** We currently see a shift in diets towards a more plant-based nutrition. Here, the plant-proteins will complement and contribute to healthy hybrid-diets with a favourable mix of nutrients. Here, our dissemination platform in the PROMINENT project offers a wealth of first-hand information.

**When will we see the first plant protein food compositions on the market?**

**Kaisa Poutanen:** The first demonstration models containing new protein ingredients will be available in 2018. We will hurry up, the plant protein market overall is expanding rapidly.

Thank you very much for this interview!

# BIO EXPRESS

**Kaisa Poutanen**, Research Professor DSc (Tech) in food technology and biochemical engineering, leads the focus area "Food Economy 4.0" at VTT Technical Research Centre of Finland. She is invited honorary doctor in food sciences at University of Helsinki, and has an extensive experience in connecting food technology and nutrition sciences. Kaisa Poutanen is PROMINENT coordinator

**Gerard Klein Essink**, Food Chemist and PROMINENT communicator with the Bridge-2Food network, has worked in the international food industry for 30 years. His experience covers both business-to-consumer as well as business-to-business markets. He has fulfilled management roles for a FMCG company, at a food ingredient company, and as a researcher at Wageningen University.



# A FULL FOOD PHARMACY THAT CAN BE FOUND IN THE OLIVES

**GENOSA** — exploiting of anti-inflammatory compounds in olive fruits

Olive aficionados will like this news: the fruit of the olive tree is not only made up of the rich monounsaturated fatty acids that make the oil so valuable and tasty — the European Food Safety Authority (EFSA) has also earmarked the thousands-of-years-old Mediterranean staple as being specifically healthy because it also contains an anti-inflammatory ingredient, hydroxytyrosol. This is a free radical scavenger or, more scientifically said, an antioxidative polyphenol that, not only identifies the free radicals in human tissue and blood and prevents them from doing harm, but also enhances our internal antioxidant defenses, for the skin and bones for example.

The substance caught the attention of Carlos Peña, a chemist and entrepreneur from Malaga in Spain. He saw it in the olive-fruit as a by-product that could be converted into an ingredient for food, dietary supplements, cosmetics and pharmaceuticals.

## **The ingredient is sold to food manufacturers and in health shops**

Since 2002, his company Genosa has extracted natural hydroxytyrosol from olives to offer it to food manufacturers and health consumer departments from pharmaceutical companies and directly to consumers in health shops as a powder or a syrup. The healthy olive compound is mixed into drinks, and added to bakery, dairy products or dietary supplements.

Many of Genosa's customers come from Asia, among them an Indonesian dairy company that mixes the ingredient into its milk powder, upgrading it to a value-added product. The global market where the natural olive additive can already be found spans more than 100 products. GENOSA operates these markets with only five collaborators, together with sub-contractors and a network of distributors.

Now, in 2017, Genosa's innovations have won a CommBeBiz Award. Genosa's CEO described his motivation in applying for the prize: 'We expect to attract new contacts for funding and partners through the award. I hope to meet interesting people, especially at the Business Incubation Centres (BICs).'

At the company's innovative core lies a specific patented technology that allows the olive residues — left over from pressing in the oil mills — to be naturally treated. Carlos Peña's company separates

the fruit fibre in the pulpy residues from the compound in a chromatographic column and extracts a red liquid bearing the targeted substance: the naturally processed, antioxidant hydroxytyrosol.

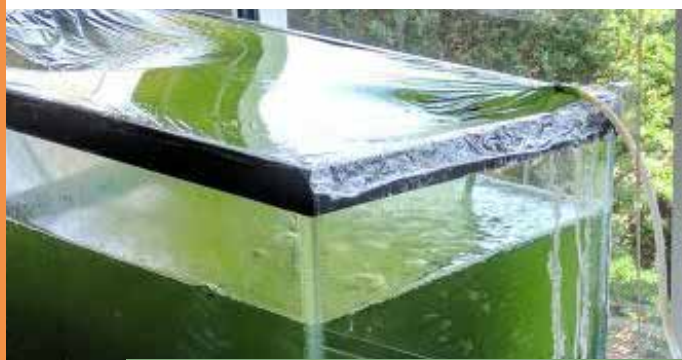
Although it was essentially waste to the oil producing industry, the farmers were initially reluctant to sell their residue to the Genosa people. 'We were running up against a wall,' remembers Carlos Peña. The olive agricultural sector still is very traditional, and suspicious: 'The farmers suspected that we were looking for gold in their oily waste.' Eventually the company successfully demonstrated the real purpose to those supplying the raw material, which allowed Genosa to set up a supply chain of several hundred tonnes of olive residue per year.

Where did the original idea to look for the antioxidant in the pulp come from? It was Carlos' uncle, a chemist, who worked in the olive oil industry for many years. He connected a theory with research and innovation and, as a result, provided the basic technology to Genosa. To receive 1 kg of the powder product, 2000 kg of olives need to be processed. The EFSA regards, and recommends, five mg of hydroxytyrosol as a healthy daily intake — the goal is to protect the blood lipids from oxidative stress. Together with the cholesterol-suppressing effects of omega fatty acids, the olive polyphenol prevents the cholesterol from oxidation — generating unwanted inflammation in the vessels. According to Carlos Peña, half a liter of olive oil or 10 olives per day can show the same health effects, 'but then you add too much fat or salt to your diet.'

## **It's essential to find the "unique selling point"**

Competition is high, however, in the functional food sector in general, and with olive bioactive compounds in particular, ever since the EFSA permitted the health claims to be used for hydroxytyrosol from olives. But patent-holder Carlos Peña is also proud to have with his natural food ingredient a 'unique selling point' in several areas, such as: the experience of a well-established company; clean tech; natural processes (no chemical solvents); proven product safety; patents and certificates. Together with a team of their strategic partner 'Solvitae Medical', Genosa has won a prestigious "Nutra Ingredients award 2017" for their supplement Alyvium in the category "Food Supplement of the Year." The food chemist is sure that there are still, 'plenty more healthy ingredients to be tapped in the olives.' His company's future lies in the discovery of these new applications.





**SPIRA** or how protein-rich algae can be grown anywhere

# DO-IT-YOURSELF GREEN HEALTH DRINKS

'Prosumers' are a new species in the world of economic science. The term merges the words 'producers' and 'consumers', describing a trend seen nowadays when customers and buyers take over activities originally performed by the suppliers of a product or when consumers become involved with designing or customizing products for their own needs. Online banking, with no support from any bank staff, is one example of prosuming. Fixing one's own computer with the help of a YouTube video instead of using a technician's support is another. Another prosumer trend has been identified in growing your own food. Prepared kits of vegetables that can be easily grown on the balcony or in an urban garden are on the rise. This is the market where "Spira" will succeed.

Spira is a company founded by Elliot Roth, a 23-year-old biomedical engineer working in Richmond, Virginia, with collaborators in Ireland. Eliot Roth sees food production, nutrition and consumption from a totally unusual perspective: 'I was interested in solving different human needs, on Maslow's Hierarchy, and finding solutions that enable people to be self-reliant.' This is how he describes his starting point; searching for food sources that can be tapped indefinitely. He lays claim to a simple motivation: "I started Spira for myself; I ran out of money and wanted to grow the most amount of nutrition in the smallest amount of space for the lowest cost." The young researcher soon found his ideal object: algae.

Inspired by the European Space Agency (ESA), who grows spirulina algae for astronauts during missions to outer space, Elliot Roth decided to base his own nutrition on the same organism. He started a small farm for algae cultivation in a laboratory he built in a garage. 'My lack of resources focused me,' he says.

Soon he was growing his own strain of spirulina, *Arthrospira platensis*, a microscopic

seaweed, with novel properties that could fit consumers' needs: rich in protein ('more than two times as much as beef', he claims), rich in bio-available iron ('10x as much as spinach'), and full of the healthy compound phycocyanin, the spirulina algae is a superfood that doubles exponentially and can be harvested daily.

But it is not just an easy-to-grow food that Elliot Roth is interested in, he also believes in a new business model that can be spread all over the planet. In his garage-community, called 'Indie Lab' — not-for-profit and science based — his pilot plant is working beside many other different science businesses, from extracting valuable metals from circuit boards to a group that grows microbes to recycle plastics. When a nearby university was throwing away its equipment, he took the chance to fix it and use it for free. With his low-budget pilot plant, this entrepreneur is about to start two product lines.

One is an algae kit meant to grow spirulina at



**Elliot Roth**

Our unique selling point is taste, bio-availability and convenience



home. He has just started to ship the kits. The second product is a live-culture drink which will be sold as a subscription starting locally. Food safety tests still need to be done, but the market research is there. The main target group will be female consumers in the 24–35 age range. 'Our unique selling point is taste, bio-availability and convenience,' Elliot Roth explains. According to the spirulina grower, a full range of health and well-being problems

such as anemia, fatigue, and heart issues could be solved. But further research needs to be done.

The beverages are made from pressed produce. His spirulina farm can currently provide a maximum of 10 kg of green mass each day. Mixed with water, the producer can offer 1000 live-culture beverages daily. The idea is to vertically integrate his algae company to control the growth process, bottling and delivery to the consumer: 'As an agricultural company, this concept can be quickly deployed anywhere,' assures Roth, 'spirulina algae only need light, water and salt to grow and to double each day.'

Meanwhile, the striking and simple concept of co-creating protein-rich food sources has drawn the interest of global Development Organisations such as the World Food Programme Accelerator, who selected Spira for their bootcamp to develop a project in Chad where women farmers can grow on their own nutrition. Many other conferences in Europe, such as an appearance at RebelBio in Ireland and Thought for Food in Amsterdam, will follow, though Spira's starter market will lie in the USA.

Roth's next steps are 'to raise money to start a pilot production of 10.000 kg, which would allow to us to offer more drinks and expand our product line, each containing home-grown algae.' From the CommBeBiz Award, the young entrepreneur expects 'to meet experts in the bioeconomy who can help guide me.'

He is not afraid of seeking out new opportunities: 'There are millions of other algae species still untapped. Estimates show the market will grow to 44-billion by 2023.' The fast-multiplying spirulina strains could lay the nutritional ground for the fast-growing group of do-it-yourself producers-consumers, a new species of "algae prosumers" that own their nutrition.

# FOOD - an URBAN issue

## In Europe and in the Global South THE SUPURBFOOD PROJECT

Cities and metropolitan regions are becoming more aware of their responsibility to ensure access to healthy food for citizens after experiencing disruptions in transport, climate related impacts on food production, rising food prices and water and food waste management issues. At the same time, among consumers a paradigm shift seems to be underway with a growing interest in locally grown produce as well as to participate in urban food governance. The EU -funded project SUPURBFOOD (2012-2015) took a holistic look to the question “how to feed the city”. Seven case studies in city regions from Rotterdam and Ghent to Zürich and to Rome, from Bristol and the Riga Region to the Spanish Vigo have provided insights on the importance of agriculture, short chain delivery, biodiversity and the environment in urban policies and resilient city planning. Also included in SUPURBFOOD: The International Network of Resource Centres on Urban Agriculture and Food Security (RUAF), focusing on urban and peri-urban settings in Asia, Africa and Latin America. Our photo shows the Urban Agriculture Initiative: “Eetbar Rotterdam”.



Credit: David Rozing / plainpicture





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# CLIMATE/ CIRCULARITY

“ Climate-smart and  
Environmentally  
Sustainable Food  
Systems / Circularity and  
Resource Efficiency of  
Food Systems

”



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# FISH AND TOMATO

## FLOATING IN THE GLASSHOUSES

There's something in the water: the INAPRO marriage of aquacultures and hydroponics

The researchers nicknamed their invention 'tomatofish'. And there is real substance behind the funny word: catfish or carp are raised in water that, at the same time, irrigates and fertilises the tomatoes in a greenhouse next door. The leafy plants are not produced in soil, instead their roots float in hydroponic water solutions, their evaporation water condensing on the glass walls being collected. While the growth containers of fish and tomatoes are separated, the water is pumped within two recirculation systems and finally fishwater is released from the aquaculture into the hydroponics cycle, with no energy or nutrient losses, enabling both sorts of species to flourish, and be cultivated.

INAPRO, an EU-funded research project, is the matchmaker. 'We see here a technology that has the potential to feed the world by saving energy, water, soils and nutrients,' says the man behind the tomatofish discovery, Professor Werner Kloas, a biologist and an ecotoxicologist at Berlin's Leibniz Institute of Freshwater Ecology and Inland Fisheries.

“ **Werner Kloas**

The system shows that, in semi-arid areas, the water footprint can be decreased”

Ancient Chinese rice fields offered an early model. There, carp, in their paddy-field water habitats, ate mosquitos and larvae; and their excrement provided the nutritious compounds needed by the floating rice plants. 'These were the first hydroponic cultivations, a perfect circular economy,' adds Professor Kloas, who also identified early hydroponic circular systems in North

America where fish-water was used as fertiliser for crops planted in water-tube systems. Quite recently, hydroponics have been flourishing globally, for example as indoor kits for urban apartments, producing tomatoes or strawberries on the windowsill. INAPRO will scale the systems up 'to professional sizes,' Professor Kloas explains, talking about the need for tomato greenhouses covering at least 10 hectares for intensive primary crop production, and fish pools of 1.5 hectares and above needed in order to be competitive.

Tomatoes are not the only plant to be grown hydroponically. Leafy salads, cucumbers, peppers, herbs, strawberries and rice are fit for a soil-free cultivation, too, with the floating roots soaking up liquids and nutrients from water solutions and absorbing UV rays for photosynthesis from the sunlight shining through the greenhouse glass. The water

economy in the system operates a nearly closed circulation scheme as the plant's leaves and stems re-evaporate the water they have absorbed, which is then condensed on the cooled greenhouse glass ceilings and pumped back into the aquaria. The experts say that, to keep the system running, only one percent of fresh water needs to be added daily.

It's a patented technology, which is as advanced as it is simple while combining fish-farming techniques with greenhouse gardening. An electronic smart water management process enhances the technique, pumping water from one area to another under controlled conditions, using valves, sedimenters, and bio filters to balance the different pH levels of the water and purify the liquids in the containers.

'When we began to combine fish farming with gardening, we had to understand the symbioses first,' Professor Kloas recalls. 'The fish can be fed with insect meals, but they prefer a higher pH value than tomatoes. The tomatoes need slightly different nutrients to those provided by the fish. This means we have to balance the water qualities and to add some minerals, such as potassium and phosphoric acids for example,' the inventor says, 'but in principle the scheme is self-sustainable and can be set up anywhere on the planet to ensure food security.'

As a result of its huge potential in terms of sustaining food systems and its environmental benefits, the tomatofish research crew was invited to exhibit at the world-renowned Milan Expo in 2015. This new farming system is also adaptable to urban environments, for example on brownfield sites or even on top of robust buildings such as airports. It can work equally well in peri-urban environments, using long-distance water pipes to supply urban areas with remote hydroponic plants.

The combined farming and fish cultivation system could be applied in agricultural production processes that already work with large-scale greenhouses, such as the tomato plantations in the Netherlands. Professor Kloas says: 'The tomato is such an exigent plant. Once you succeed with a tomato, you will manage the system with any other plant.'

To the north of the Leibniz Institute of Freshwater Ecology and Inland Fisheries where the system was invented, by Lake Müritz, in the little



town of Waren, a shop known as the 'Fishermen's Garden' works as a demonstration site for the technology. Here, African catfish and the research tomatoes are sold to customers. The tomatofish have proved to be a magnet for tourists and the tomatoes are traded at a cost of between EUR 5 and 6 per kilogram. Some supermarkets - on search for exciting business opportunities - have started to market the produce from the research plant at competitive prices. Professor Kloas and his team have calculated that production starts to become economically sustainable in large installations of 1 hectares and above for plants, and as of 0.15 hectares for aquaculture surfaces.

In China, Spain and in Belgium, INAPRO has established more demonstrations to prove that the system is adaptable and economically viable under different climatic conditions and in different rural settings. Together with Egyptian engineers, the German professor is currently tailoring tomatofish to more traditional environments in emerging countries, where vast amounts of water used for crop irrigation are still dumped in the rivers.

Aquaculture systems with a potential to flourish in Egypt, because insects are ubiquitous and can easily serve as fish feed. However, 'the systems need to be simplified and made robust,' says Kloas. The system also shows that, in semi-arid areas, the water footprint can be decreased substantially and soils can be kept desalinated through the re-use of water and nutrients (which normally nitrify and damage resources in the intense soil-based production systems of water-scarce environments).

Enthusiastic about his further ambitions, Kloas waxes lyrical about the many and various potential developments, focusing on high-tech variations of the system, with low-energy greenhouse installations powered by solar panels and steered by mobile computing systems equipped with sophisticated sensors and the Internet of things. He also lionises the research into new fish varieties using different feeds and different protein profiles to complete human diets and to reduce red meat consumption. Omnivore freshwater fish, such as tilapia and carp, but also African catfish, seem to be serious contenders, as the experts have learnt that they are among the best feed utilizers. With one cubic metre of recirculated water the installations can produce 10–100 kg of fish. In addition, using algae instead of hydroponic plants could open the way to farming marine fish.

However, there are still many hurdles to jump. Traditional horticulture and traditional inland fisheries are two separate sectors that have no relationship. The project coordinator has observed 'a certain anxiety' among these practitioners around working with the other sector and employing two different water cycles.

Yet, the younger professionals seem to be more open to experiment, and courses at a Master's level have been already introduced in Fishery Sciences, Aquacultures and Hydroponic Horticulture. Professor Kloas is convinced that, with warming climates and pressing concerns about food security and meat production, the proteins, fibres and vitamins sustainably provided by tomatofish will make their way to our tables, 'in the next 10 to 20 years.'

## RUMINOMICS and BEHENT: Nutrition and stress drivers of cows' GHG emissions

Methane emission from ruminant livestock is an important source of greenhouse gas. The EU-funded RUMINOMICS initiative used latest technologies to study the microbiological and genetic causes and drivers of high methane production in cows. The project also explored ways to decrease the environmental impact of farming ruminant animals – cows in particular. To achieve this, the researchers scrutinised data from 1 000 cows on farms across Europe. A surprising finding was that genetically selecting dairy cows that emit less methane also selects for animals that are less efficient at producing milk. Thus, these lower emitters produce more methane per unit of milk. RUMINOMICS main finding: Nutrition, rather than microorganisms, is the main driver of emissions.

Feeding efficiency and animal behavior was investigated in the BEHENT project, a Marie Skłodowska Curie Action. The project's main findings point to dominance and stress in herds leading to different levels methane emissions. "The characteristic feeding patterns of dominant animals are associated with lower methane emissions", says Marie Curie Fellow Pol Llonch, Rural College Edinburgh, "because the bosses access feeders more often and spend more time." BEHENT's main finding: Decreased competition and stress may lower the methane emissions of ruminants – pointing to more animal welfare in cattle breeding. ([www.ruminomics.eu](http://www.ruminomics.eu))



# OCEAN CHANGES

## WITH KNOCK-ON EFFECTS THROUGHOUT THE FOOD WEBS

**ATLAS:** J. Murray Roberts, *Professor of Marine Biology, Edinburgh University,*  
about the Blue Ecology and the FNS

**Could you outline, in a few sentences, the ATLAS project, please?**

**Murray Roberts:** Global change and human activities have major impacts on the distribution and sustainability of living marine resources. This is a challenge to the business and policy communities seeking Blue Growth balanced against long-term sustainability. At its core ATLAS aims to enhance our understanding of deep-sea ecosystems, integrating measurements of ocean circulation, with new data on ecosystem functioning, biological diversity, genetic connectivity and socio-economic values.

**Why is this understanding of our blue ecosystems so important?**

**Murray Roberts:** Healthy oceans and seas are central to our well-being and the economic security of the EU and other nations that border the Atlantic, but we don't even understand 10% fraction of the processes taking place in the deep sea. Compare this to a computer operating system, nothing on your screen would work without a good operating system deep inside your computer.

**Could you give some examples of the blue essentials, please?**

**Murray Roberts:** One example would be the Atlantic Meridional Overturning Circulation (AMOC), which is characterized by a northward flow of warm, salty water in the upper layers of the Atlantic, and a southward flow of colder water in the deep Atlantic. It is a key ocean current feature, that helps to regulate the European climate. Deep-sea habitats and species are connected by the AMOC. One part of our work in ATLAS is trying to unravel this story by studying where the tiny larvae released by corals and other animals might disperse across the Atlantic.

**So, the common understanding of the Gulf Stream serving as a big 'central heating'**

**system for Europe and America is not sufficient?**

**Murray Roberts:** The Gulf Stream is one aspect of the Atlantic's surface ocean circulation. In ATLAS we are particularly interested in the deep ocean currents. We are working with precise instruments which can measure, for example, the pH value of the oceans or the nutrients found at different depths. We already know that our seas are becoming significantly more acidic: 25% of anthropogenic CO<sub>2</sub> emissions have dissolved into the ocean. This is having significantly negative and cumulative impacts on cold-water corals and these impacts will worsen when coupled with changing food supply and increased sea temperature associated with climate change. The ocean also suffers from vast over-exploitation by fisheries and industrial inputs.

**How does ocean acidification affect sea life?**

**Murray Roberts:** The acidification and warming of seawater around the world is changing marine ecosystems and habitats at an ever increasing rate. This will dramatically reduce the abundance of calcifiers like the shallow and deep coral reefs and marine molluscs in the next century. Studies also suggest fish larval behavior will be changed so there seem likely to be significant knock-on implications throughout the food web.

**Are there talks between scientists and fishery organisations?**

**Murray Roberts:** We are careful to keep the Atlantic regional fishery management organisations informed of our work and our ATLAS partners have a lot of direct engagement with feeding research results directly to policy, including through roles at the International Council for the Exploration of the Sea (ICES).

**How about the policy involvement in your research?**

**Murray Roberts:** We see a huge interest in our work. At a UN level ATLAS has held side events as part of the preparatory process for a new international legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS). This instrument will seek to conserve and enhance the sustainable use of marine biological diversity in areas beyond national jurisdiction i.e. where no single country has control of the waters. In March 2017, ATLAS held its first Science Policy Panel at the European Parliament, we are looking to capitalise on this further with a similar panel in Canada 2018.

**How could the ATLAS project benefit from a better engagement with businesses?**

**Murray Roberts:** We've partnered with some of the largest enterprises operating in the Atlantic Ocean including companies like BP, Woodside, Statoil and Total. The cooperations include case studies for economic blue growth opportunities, and ATLAS researchers receive additional access to gathering data. For example, the Lofoten-Vesterålen Ocean Observatory is open to us through our Advisory member Statoil, the Norwegian oil company.

**Out of the many actions underway, what is the priority agenda to your mind?**

**Murray Roberts:** In a project as large and interdisciplinary as ATLAS it would be wrong to single out any one aspect. ATLAS spans physics, chemistry, biology, ecology and the social sciences. We are operating at sea from the southeastern USA to the Canadian Arctic and across the mid-Atlantic Ridge to Europe. We'll only achieve our objectives if all aspects of the ATLAS team come together and we can go get our results out there – to other scientists, managers, policy makers and kids in school.

Thank you very much for this interview!



# PIG AND MAN

— reviving an ancient co-existence

Saving biodiversity and food diversity: Researchers in the TREASURE project tap local pig breeds and develop quality labels

The role models comes from the Wild West, or to be more precise, from the Spanish Wild West. Here, along both sides of the southern Portuguese border, and in the Andalusian hills, the famous Ibérico pigs range free and eat acorns. They don't only represent one of the world's finest hams, but also demonstrate that traditional pig breeding can offer a rich future to regional farming chains. 'The Ibérico pig has real market power,' explains Dr. Meta Candek-Potokar, a researcher at the Agricultural Institute of Slovenia in Ljubljana, pointing to the three million high-value Spanish pigs creating a EUR 1 billion revenue every year. To her mind, the Ibérico and other successful pork food chains based on traditional breeding and feeding in the EU should multiply soon. Many other local breeds in countries like Italy, Portugal, Spain, France, Germany, Croatia, Slovenia, Lithuania and Serbia have the potential to become famous meat brands for the consumer in search of better quality. Dr. Meta Candek-Potokar says that the slogan 'Eat less, but better' should be a driver for future traditional pork meat markets.

## Many varieties have more to offer than industrial meat chains

Agro-scientists and breeding associations have known for a long time that Europe has much more treasure and variety to offer; other than the meat marketed through "industrial" mass-production chains. If only the scientific knowledge of local pig breeds, and the specific knowledge regarding their suitability for the reation of sustainable production chains, from breeding and growing to slaughtering and marketing — the pork food chains — was better. A network of scientists in agriculture and meat production saw the need for more research in order to establish high-value market developments in this sector. Starting in the Mediterranean regions that bear a wealth of variety in terms of local breeds, they enlarged their network to other EU countries , pursuing the goal of creating more sustainable pork chains and a better market penetration of these high-value pork products.

This was how the idea for the TREASURE project was born. Until 2019 the EU will fund the investigation with EUR 3.4 million, while promoting a reassessment of traditional genetic animal resources in order to find a future perspective for SMEs, farmers and meat consumers. 'To have an umbrella trademark for new local pork chains would be a big leap forward,' explains TREASURE coordinator Dr. Meta Candek-Potokar. It is one of the prime goals of the measures to maximize the impacts of the project.

## The most promising breeds are widely unknown

Twenty-five partners are cooperating with the project, ranging from geneticists, nutritionists, meat scientists, and agro-economists, to consumer and marketing researchers and farmers' associations. To create sustainable value chains based on local pig breeds, knowledge gains, characterisation of genotypes and phenotypes, analyses of their products and their market potentials will be achieved; this will eventually inspire the development of innovative traditional product lines, such as 'traditional' burgers, low-nitrate salami sausages and reduced-smoke bacon.

The most promising breeds are widely unknown, but they attracted the attention of the TREASURE researchers nevertheless, they include names such as: Mangulica, Gascon, Krškopolje, Black Slavonian, Cinta Senese etc. (the complete list available at project web site [www.treasure.kis.si](http://www.treasure.kis.si)).

They all are candidates with full potential. The scientists started characterizing not only their genotypes and phenotypes, but also studying their growth performance, body composition in terms of fat, muscle and bones, their feeding and environmental impact and the quality of their products. To finally make it to the market with a new pork food chain, 'It's not enough to only save biodiversity,' says the Dr. Meta Candek-Potokar, 'it's also necessary to ensure the development of a full production chain, with the involvement of many players, from breeding to feeding, from slaughter to points of sale in butcher shops, su permarkets or in top gastronomic locations.' Not only that, but because each breed



is different, successful developments that can compete with industrial markets depend on a full range of factors, such as eco-systems, feeding conditions, meat processing environments, consumer preferences and markets that vary in culture, geography and traditions. One hurdle might also be encountered due to the bad reputation meat has gained in recent years in general, but specifically pork— not least due to concern about its healthiness, but also welfare and environmental aspects of pig production and the big price decline in long-distance mass markets, Dr. Meta Candek-Potokar, who graduated as animal and food scientist is Head of the Sustainable Agriculture programme at the Agricultural Institute of Slovenia, says.

The researcher does not advocate stopping meat-eating in general: ‘Men and pigs have a long history together.’ She believes, looking back at the beginning of wild-boar domestication ten thousands of years ago, that ‘it delivered the protein sources for the growth and development of human being.’ Rather than avoiding meat, she encourages discussions on quality, and the prices that consumers are ready to pay for high-quality products. Different consumer attitudes are also studied in the project, which indicate the viability of traditional pig breeding whose extensive free-range systems make it more welfare friendly. Traditionally raised animals usually live longer, referring to specific feeding and slow growth of these pigs breeds which ensures better product quality and renders them more resilient.

Dr. Candek-Potokar summarised the first 18 months of the four-year project by saying, ‘The machine gains speed.’ As well as conducting scientific analysis, TREASURE also

promotes sustainable start-ups, where farmers and breeding associations in the consortium will be able to play a role. The CommBeBiz Award that

### TREASURE has the ambition to develop a new trademark

TREASURE has won includes a coaching package to set up an action schedule and a business plan. Besides the visibility that comes with the award, the prizewinners are looking forward to the mentoring offered by the CommBeBiz partner, ebn innovation network, at its Business Innovation Centres (BICs), where they can elaborate the development of a trademark that should reach a wide audience by excelling as a European brand for the best meat and products quality from traditionally raised pigs. ‘Resulting in an umbrella brand would be the greatest milestone for the project partners,’ says the coordinator. Akin to certified eco-labels, the pork label

would guarantee consumers the regional identity, traditional way of production and sustainably produced high-value meat products treasured in European local pig breeds.

Local pig breeds will be fed and managed on local resources. Consumer thoughts on specific traditional pork products from these breeds will be investigated, with the aim of selling high quality foods with unique branding in regional markets, restaurants and hotels, to locals or visitors interested in tasting superior local meats. Quality of the pork products and sustainability of their production system will be critical to attract consumers and sell profitably for the farmer.

“ Meta Candek-Potokar  
The pig for ages has  
delivered the protein sources  
for the development  
of human being ”

### What the project is for

- By making it economically profitable for farmers to keep local pig breeds and sell their products, the diversity of farmed pigs will be maintained in Europe
- Alternative pork products with distinctive regional qualities will be available to consumers, following existing successful examples, such as Iberian ham
- To innovate on traditional pork products, by making changes such as decreasing salt or smoking to boost their healthful qualities and fulfill consumer expectations
- Food diversity will be strengthened, as regions around Europe will keep valuable local traditions and breeds of pig and so continue to produce pork, rather than rely solely on imports
- Traditional pig breeds will be studied using modern genetics and population genomic approaches



**TREASURE in brief:** The Bio Diversity and the Food Diversity will be maintained



# HARVESTING MORE SUN TO

## FILL THE FRUIT AND VEGETABLE

PLATES BETTER



The French light technology firm CASCADE supports a better photosynthesis to save soil and energy

Light is the primary signal for plants to grow through photosynthesis. However, our fruits and vegetables do not naturally fully exploit the entire growth potential offered by the sun's rays. CASCADE, an innovative French firm, is there to change this — with an exciting greenhouse technology for agriculture and horticulture. The green technology is poised to improve crop yields in times of scarce resources and depleted soils. And, the resulting quicker and improved development of leafy vegetables and fruits promises to save on pesticides.



**Frédéric Peilleron**

**The Nature is not always perfect**



Frédéric Peilleron, an aerospace engineer and the CEO of the company, has more than 20 years' experience as an entrepreneur working in business development. The private French lab LPRL has researched lighting and photovoltaics for more than 30 years. Backed by a team of technologists and agriculture researchers, Frédéric Peilleron, now runs the spin-out CASCADE.

The core idea behind CASCADE is as follows: Embedding a light-sensitive photonic into a host material such as polyethylene film, which covers greenhouse tunnels and tubes on crop field. The luminescent doped plastic, a complex product, modifies the light quality provided to the plants — leading to a boost in photosynthesis and, as a result, an increase in crop yields. 'Nature is not always perfect,' the light engineers of CASCADE say while explaining that the plants' physiology of chlorophyll-rich crops foremost exploits the blue and red spectra of the sunlight,

whereas for example leafy plants such as lettuce, prefer more blue light while fruits such as melons or berries would need more red light to grow faster and better. "Our technology gives them what they want" says Frédéric Peilleron.

The light-booster, an additive, helps the crops to harvest the sun more efficiently, with an estimated increase in the yields measured in 2016 field trials from 15 to 50% depending on the plant, the variety and the particular environment.

The benefits of the CASCADE discovery should be vast — for farmers and consumers alike — with estimated savings in energy, pesticides, fertilisers and land. However, as field trials have not yet been finalised, the launch impact can only be estimated at the moment. 'We promise farmers a 10 to 15% increase in the yield, but they want to see the proof in real field conditions before they pay for our product,' says the general manager.

Though the product is ready and has been proven stable, nature is not. Current field trials are taking place in France, Italy, Spain, Belgium and the UK. Performances have varied from region to region, and for 2017 alone field trials have amounted to costs of EUR 120.000. Each crop needs to be analyzed on its light sensitivity first, the technology then has to be adopted. Most promising for the moment are leafy plants and melons.

Moreover, the sustainability challenges that have emerged are different in each country. The plastic

films have different life-cycles depending on the sunlight input. In Spain the polyethylene foils do not last as long as in Belgium, or the UK, due to the much stronger UV light intensity. Complex doping lasting for three to four years is in the development pipeline.

‘This, of course, affects our business model,’ states Frédéric Peilleron, who recognises that the high-tech plastic doping will not merely increase the yields, but also their prices. The company is considering expanding its portfolio to other crops such as tomatoes and roses. Alongside European markets, those in Africa and at a later stage America and Asia are also interesting.

**“Currently, there is no bio-plastic available on the markets that combines long duration with full biodegradability”**

The engineers refuse to ignore the issues of bio-plastics and bio-degradable plastic films in the agri sectors. ‘We need full transparency — our tech is not toxic and the plastic needs to be recycled.’ Frédéric Peilleron relates that, ‘There’s been a lot of discussion on bio-plastics but, to-date, nothing is ready.’ In 2016, CASCADE has already successfully tested biosourced plastic compatibility. Life Cycle Assessments of the product are envisaged, in order to support the marketing and communication.

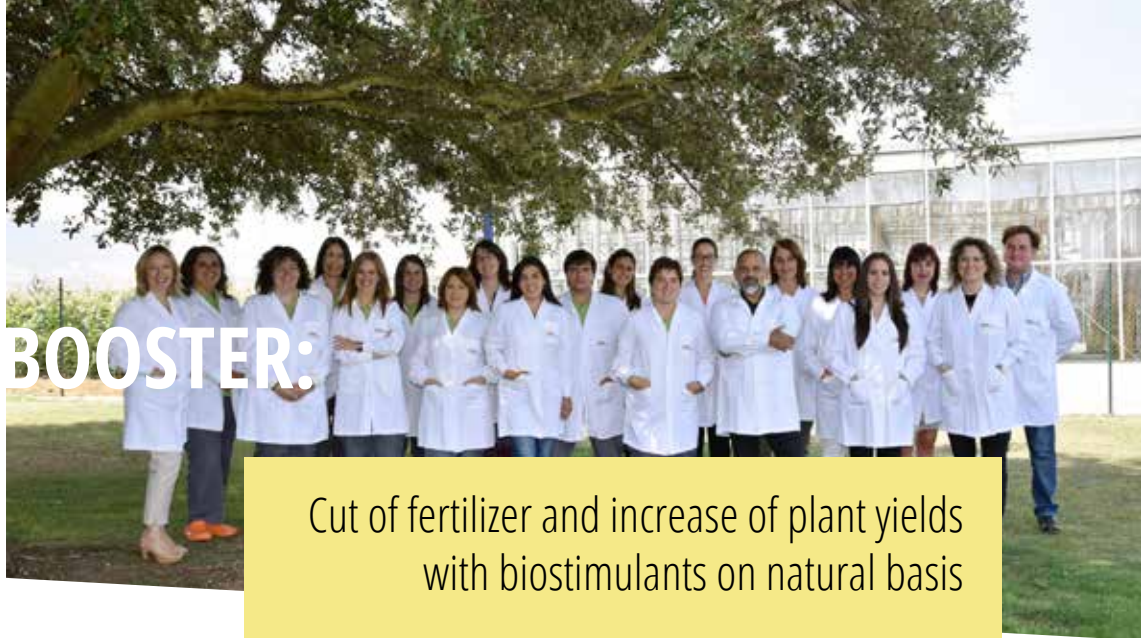
New contacts on agri platforms are most welcome to the photosynthesis engineers

The photosynthesis engineers now are also expecting to make new contacts on agriculture platforms and to pitch at relevant events, once the field tests have been finalised and are offering robust results. Funding partners and international industry are also welcome to the young company as well as partners to apply for the HORIZON 2020 Programme’s SME Instrument — still a full cascade of necessary development steps to be done before plant and fruit breeders will reap the full benefits of the novelties from CASCADE.





# BIOAGRIBOOSTER:



Cut of fertilizer and increase of plant yields  
with biostimulants on natural basis

'This will be our first marketed product,' says Xana Belastegui, Chief Business Developer at IDEN biotechnology, an agri-biotech company with fresh ideas from Navarra in Spain. As product development is underway, the only thing she can reveal right now is that the new product will stimulate plant growth on a natural basis originating from a novel microbial source. The innovation to boost the growth of agrifood-plants promises to cut the use of fertilizers by 25% while increasing plant yield up to 20%.

At the moment, only prototypes of the growth booster exist. Many trials, up-scaling, and practical application tests still need to be made. The EU is poised to open a window for the innovation when issuing a new EU Fertilizer Regulation in 2018.

A new, 'biostimulants' product category will be presented for the first time under this regulation. 'The sector is waiting for a new generation of growth and quality promoters and a disruptive technology,' explains the Business Developer, one of the many female entrepreneurs employed by the innovative company.

Behind this story lies a specific complex mixture of bio-substances. The mixture is fermented from a novel fungi strain and applied as seed treatment or as a liquid during irrigation, at different stages of plant growth. The biological has already been successfully tested on tomatoes, peppers and corn with a considerably boosted yield and improved quality parameters. Next steps are focused on the validation of an increased nutrient uptake.

Nevertheless, the details on the species of fungi in question that provide the bioactive elements, as well as other production process details need to be kept secret until the registration product process is launched. According to the firm, this should happen until end of 2018. Xana Belastegui, a biologist, who is working on the exploitation of research results towards commercialization, is convinced that the biostimulant — named BIOAGRIBOOSTER — will rock the market for crop growth promoters and pest controls: 'The main selling points are the new product properties, for example the final product that is applied as an extract which will facilitate its handle against products based on living cells and low application rates.' These characteristics positively impact the shelf life and stability of the product. As BIOAGRIBOOSTER is not harmful to the environment and poses no health risks, both consumers and industry are eagerly awaiting this type of biostimulant, she finds.

Some facts: The biostimulants' world market was worth 1,4 billion dollars in 2014, and is expected to grow up to 2,5 billion dollars in 2019. Europe is the number one in the sales of biostimulants, ranking highest with a 40 % share in the overall use. IDEN, the company to develop the biological, depends on a promising innovation model appropriate for smaller companies: working in regional and international cluster networks and with collaborative research labs. This allows the company to access many microbial strain platforms. IDEN will develop the commercial product with them, and it will subsequently license it to bigger market players in the agro-chemical industry once the product is ready.

The action plan offered by the CommBeBiz Award, will give the company a chance to collaborate with the coaches on benchmark data. Almudena Gomez, Agrifood Researcher and R&D Financing Manager at IDEN working with BIOAGRIBOOSTER, even expects the unusual from the business coaches: 'The decisive view of an outsider evaluator not coming from the agribiotech but with a business sense and understanding what's necessary to advance.'



# Climate & Circularity in the EU

## EU foodsystems stand for



**30%** of water used



**50%** of all land used for foodsystems



**70 %** of nitrous oxide emissions  
(fertilizer, animals)



**1/3** of produced food in EU wasted > **7 %** EU-GHG

**26 %** of the EU`s energy for farm-to-table food  
production

**173 kg** food waste per European per year -

**40%** of organic waste still to EU landfills

Source: Europarl, JRC

# EU`s plastic waste



## Consumer plastic waste in EU:

incinerated with energy recovery (39 %), landfilled (31 %) or recycled (30%).



**EU-demand** for plastics: **49 mio** tons in 2015,  
almost 40 % used in packaging



**4.8mio - 12.7 mio ts** of **EU plastic-waste** annually  
0,25 mio – 0,6 mio ts entered the Oceans

## Estimates for EU (2017):

**Microplastics – directly released (primary sources): 31 %**

**Of which biggest shares:**

**laundrying** of synthetic textiles (35 %),

**tyres abrasion** (28 %),

**personal care** products ( 2 % )



## NOWA: WHAT TO DO WITH VINEMAKING LEFTOVERS?

Bioplastics should come neither from fossil, nor from food resources — but from agricultural waste, finds **Nathalie Gontard**, INRA Montpellier

Talking to Nathalie Gontard, one is immediately aware of a strong ambition, and enthusiasm for plastic recycling. 'My life's mission is the eradication of plastic waste,' the French professor repeats like a mantra during an interview on Skype. Well aware of the magnitude and the complexity of this mission, she has dedicated great parts of her life as a researcher to finding eco-friendly and safe solutions for plastic and plastic waste, using biological residues.

When the food engineer started her research 30 years ago, she was dealing with vegetable leaves as a basis for food packaging material. Now, Nathalie Gontard has become Research Director at the INRA Research Centre in Montpellier, and is currently leading on the international NoAW project ([www.noaw2020.eu](http://www.noaw2020.eu)), which looks at global plastic chains from very different angles, aiming at the avoidance or degradation of plastic waste. 'We want to work towards becoming a zero-waste society,' she says. To reach this goal, the project partners also cooperate with China.

The NoAW project approaches the entire biomass and plastic waste chain from a holistic viewpoint. It aims at finding strategic answers to deal with agri-waste and to reduce it towards zero by applying the principles of a circular economy. The project also intends to develop eco-guidance tools for an eco-efficient design of biomaterials and biogas solutions.

Following this path, trials are being run to transform bio-waste into low-cost polymers using anaerobic digestion, the methanisation of straw and manure, or using the leftovers from vinemaking to produce new bioactive molecules. To develop early concepts into viable solutions, the project has set up a business platform to carry out the mission, handling develop-

ments under a fast-track strategy and liaising with industry partners.

But the NoAW mission will not stop there. The long-term management strategy continually assesses the eco-efficiency and safety of the entire waste value chains, including the potentially emerging applications. For the coordinator, Nathalie Gontard — who, as an expert in food packaging, is advising the European Food Safety Authority (EFSA) on safety aspects relating to plastics, including nano-tech solutions — both the leakage of plastic gadgets into the environment but also a leakage of non-biodegradable plastic, are no-gos: 'We need to invest in bio-degradable plastics and recycling, aiming at correctly and efficiently collecting, sorting and decontaminating. We do not need more bad Life Cycle Assessments.'

### Recycling Credibility and Early Eco-Design Guidance

The jargon among experts includes words like 'recycling credibility' and 'early eco-design guidance'. For the consumer, as Nathalie Gontard knows, the buzzwords should be 'safety' and 'ecology'. Food packaging safety is, for example, a crucial issue for the project, because the material needs to be anti-toxic and its residues must not diffuse into the environment: 'Nano-packaging materials can diffuse everywhere while degrading,' she explains, referring to one of the EFSA's concerns. Food packages in general are another issue in terms of material efficiency, because they are generally only used in the short-term and, as a result of their ubiquitous use, are very difficult to control and have myriad entry points into nature.



Avoiding packaging and promoting bio-degradability are the priorities for the coming decades, the same applies for the raw materials of the packaging, which should come 'neither from fossil, nor from food resources,' the project's researchers emphasise.

NoAW is collaborating with its allied projects, Resurbis (dealing with urban waste streams) and AgroCycle (studying approaches to agri waste streams). Together they can capitalise on earlier research co-operations such as the project EcoBioCAP, which developed early showcase products from agriculture and forestry waste.

The seasonal availability of agri waste for supply chains and conversion streams, and its sustainability, is assessed under the NoAW schemes. Case studies are conducted in rural areas of France, Italy, Germany, Denmark and Serbia. Swedish researchers from the RISE Research Institutes are elaborating on modified Life Cycle Assessments with a better consideration of the environmental impacts and the eco-efficiency of recycled products, in order to inform future eco-design guidelines. Consumer safety aspects, such as undesired pesticides in agro-residue recycling materials, are also under investigation.

And the biz-development platform under the heading 'cross-chain valorisation' is there to integrate all stakeholders, from farmers and biomaterial suppliers, to product development engineers and industry partners.

For a long time, Nathalie Gontard has been drawing inspiration from outside Europe. In the early years of

her career she worked in Africa and Asia for CIRAD, the French agricultural research and international co-operation organisation. In the present project, Chinese partners are collaborating, with a mirror-platform, and Nathalie Gontard is currently planning a big event on China in 2018. Though still coping with different priorities between Europe and Asia, she recalls that her enthusiasm points to global

thinking. When facing the challenge of total plastic waste eradication the French Research Director emphatically stresses the fact that, 'It makes no sense to create a circular economy solely in little Europe, we need to have the other continents on board!'

*Photo credit: Emile Guilbert, INRA Montpellier, Naturally biodegradable tray*

**Nathalie Gontard**  
“Consumer safety aspects, such as undesired pesticides in agro-residue recycling materials, are also under investigation”

## BIO EXPRESS

**Nathalie Gontard** is Research Director at INRA (National Institute for Agronomical Research) formerly Professor at the University of Montpellier. She is co-author of more than 150 A level papers (h-index 31). She is the leader of a team working on food packaging and food waste reduction with a focus on modeling and decision support tools, active and intelligent bio-materials, nano-technologies and agro-food wastes reduction and conversion. She is involved in numerous international, national and industrial projects. She is the coordinator of the H2020 NoAW ([www.nowa.eu](http://www.nowa.eu)), EcoBioCAP FP7 ([www.ecobiocap.eu](http://www.ecobiocap.eu)) and NextGenPack ([www.nextgenpack.eu](http://www.nextgenpack.eu)) projects, European expert for the EC and the EFSA, promoter and editor in chief of the journal "Packaging Research" ([degruyter.com/view/j/pacres](http://degruyter.com/view/j/pacres)).





# "TEACH WASTE-SAVING AS LIFESTYLE TO THE YOUNGSTERS"

Interview with **Shane Ward**,  
*Professor at University College Dublin*,  
on waste reduction with farmers,  
retailers, buyers and young people-  
**Agro Cycle**

**The EU Waste Framework Directive demands a food waste reduction of 50% by 2030. Will we get there?**

**Shane Ward:** I have some doubts about that. We need to drastically minimise food waste because we produce far too much of it at the moment.

**What is at the root of the problem?**

**Shane Ward:** It's too complex for an easy answer. It's like a jigsaw puzzle. Within the AgroCycle project, we look at the entire chain in modern societies, from the agrofood producer, and the retailers and markets, to the waste collecting systems and the end consumers, including all the loops and loopholes. At every link of the chain, we need to change our attitude and systems in order to treat food waste as a valuable by-product.

**Are there good examples out there already?**

**Shane Ward:** We conduct demonstrator trials. One, for example, is being showcased in poultry farms in Ireland where we are producing biogas from the anaerobic digestion of slurry mixed with waste straw as a supplement. Chemists are working on the extraction of fine chemicals from food waste to exploit the potential for high-tech materials. Not to forget our cooperation with Chinese universities and an SME from Hong Kong. We can learn a lot from them, as they are tackling the challenges and loops on a very large scale to make eco-efficient impacts.

**How can the AgroCycle project contribute?**

**Shane Ward:** The project consists of 26 partners from across Europe, China and Hong Kong. We are establishing the theoretic fundamentals, but also investigating and elaborating on practical solutions. All these results will be wrapped up in a protocol to cover the entire chain, and to inform EU, China and national governments on where to initiate their actions.

**Where should a start be made?**

**Shane Ward:** It might not be in our hands, if we keep on with such a slow pace of change. Food shortages, population growth and environmental impact may be the key drivers to push us towards a shift in lifestyle patterns globally.

**Do changing lifestyle patterns engender different forms of consumption and production?**

**Shane Ward:** The whole outreach of our results and the solutions from our research will be crucial for the general public. We need to teach future consumers about waste-saving behaviour. Therefore, within our project pilot, our partner, Maynooth University (Ireland) is developing a bespoke AgriLoop programme for inclusion in curricula for primary school education. For better health and sustainable environments, the key is to involve the younger generation in the lifestyle shift. Not to forget encouraging differences in cultures around meal preparation and consumption in order to reach improvements in waste avoidance.

**Are consumers the only ones responsible?**

**Shane Ward:** Not at all. At the same time we need to work more with farmers. They ought to start to better control inputs and system losses, reducing waste particularly through the use of 'precision agriculture' information technology systems. Retailers also have a major impact on consumers and in some instances tend to unload their waste responsibilities onto consumers.

**How does this work?**

**Shane Ward:** Look at the plastic pack chains. In many cases, consumers and waste collectors end up with unsustainable packaging to cope with at the end of the chain. The marketing of 'buy two, get three' is another example, consumers are incited to buy more than they may need and then they discard the spoiled products.

**How can this be changed?**

**Shane Ward:** Before we work with bans, we should work with the well-educated youngsters who are aware of the issues and adapt their lifestyle accordingly. They will soon start asking painful questions of their parents about our wasteful lifestyles. This is where the Maynooth University youth education initiative comes in.

Thank you very much for this interview!



# “WHEN USERS WERE ENGAGED, WASTE VOLUMES WERE REDUCED”

DECISIVE : Urban food waste can have a second life – **decentralized solutions**

Does every citizen know how much biowaste they create each year? The figures may vary from country to country, but, on average, organic food residues that end up in the bin amount to 80 kilograms per year for each inhabitant in an urban European household. A canteen providing 500 meals a day generates over 10–20 tonnes of biowaste each year. This, says engineer Anne Tremier, is a clear call for action! As a researcher in the Irstea centre of Rennes in France, Tremier and her colleagues have found that, by better collecting and managing them, we could add much more value to the non preventable biowaste, particularly in urban areas.

## The DECISIVE project tries to identify eco-innovative solutions for urban areas

Under the EU's DECISIVE project, Tremier and the consortium (13 partners involved in the H2020 project) are working to identify eco-innovate solutions for in urban areas. 'Our goal is to set up decentralised management schemes for an innovative valorisation of urban biowaste', she says. The establishment of different treatment points in wider urban areas is central to this goal. According to the DECISIVE team, smaller scale, more localised waste treatment systems could affect the way we consume and fundamentally alter our attitude to bio-organic matter.

Today, ordinary urban waste treatment plants use a centralised system to process several thousand tonnes of biowaste annually. This waste has to be collected and transported first. According to the DECISIVE team, there are considerable sustainability gains to be made by scaling back to smaller treatment plants that process only 50–200 tonnes of biowaste a year. Not only would this cut out long transport chains, but it would involve consumers in the process, encouraging them to consider biowaste as a valuable product that can be reused in a variety of ways.

Tremier's previous studies showed that, 'when users were locally engaged, waste volumes were reduced.' The proximity of management and valorisation of biowaste, and increased citizen awareness, could lead to lower waste creation. This decrease in waste production, added to transport and energy savings, could result in significant ecological gains and improve the sustainability of cities. With the emergence of new sustainable food circuits, cities could become

more autonomous through the use and reuse of organic matter in different production streams. Turning residues into soil-improving products, for example, would give nutrients back to the food system.

Home or proximity composting has already be disseminated as a local management way for biowaste. Nevertheless other technical solutions as micro anaerobic digestion and solid state fermentation may result in improved local valorisation by producing energy, bio-enzymes or even bio-pesticides.

However, according to Tremier, some obstacles to these new small-scale treatments remain: 'The acceptability of such installations close to urban dwellings has to be tested and verified first.' Various groups express some reticence about urban biogas plants, and Tremier comes up against fears that they may emit odours or negatively impact the environment.

Some performance tests and demonstrations, including lifecycle assessments relating to a circular economy, will be engaged in the greater areas of Lyon and Barcelona from September 2018. DECISIVE is also conducting case studies and surveys to contribute to the new picture of biowaste valorisation. These studies go far beyond mere technological solutions.

## DECISIVE will provide policymakers with clues

Because decentralised systems will require new governance models, consumer education and awareness raising among policy-makers will need to be put on the agenda. Since existing regulations in Europe are mainly conceived for big waste installations, new regulatory proposals should be designed soon. DECISIVE will provide policy-makers with 'some clues,' through the policy recommendations that should come out of the project. 'Nevertheless, the greatest impact can be attained through tailor-made communications on the benefits of the new techno-social solutions provided by decentralised biowaste treatment systems. These benefits should be disseminated to a wide range of stakeholder groups, among them consumer groups, eco-associations, teachers, retailers, waste managers, city managers, local and regional governors and law makers,' explains Anne Tremier.



# VALORIZATION NETWORKS TAKE WASTE FROM FOOD AND WOOD BACK TO LIFE



## Interview with the AGRIFORVALOR coordinator **Hartmut Welck**

### What's the basic goal of the AGRIFORVALOR networks?

**Hartmut Welck:** The project's name is self-explanatory. Our technology-transfer experts are working with the agricultural and forestry sectors to identify new valorisation pathways for primary and secondary biomass sidestreams. Our project wants to build bridges between researchers and practitioners by demonstrating new opportunities how farmers and agro-forestry could convert the biomass residues into valorized products while using e.g. biotechnology and recycling technologies. The principle is simple: one man's waste is another man's treasure.

### Where do the members of the network come from?

**Hartmut Welck:** AGRIFORVALOR works with knowledge-transfer hubs in three countries: Ireland, Spain and Hungary. Researchers and engineers from Germany and other countries are also involved, and showing great interest in the research results — for example in the processing of biomass.

### Could you please describe the working methods in the hubs?

**Hartmut Welck:** The hub managers maintain the networks with the practitioners from the primary agricultural and agroforestry sectors as well as with partners from industry and research. Together with a hub steering committee they offer workshops for the transfer of knowledge and know-how about the most recent technologies and biomass valorization. In Spain for example, we work with waste compounds that come from the olive-oil industry: the bio-active nutritional compounds in the olive residues can be offered to pharma firms or to the food industry. Also, olive wood waste can be used for heating or power-heat pumping, and bio-refineries could be interested in producing bio-polymers.

### What is of specific added-value for the practitioners attending the events?

**Hartmut Welck:** It's the unique interaction with specialists and the transfer of knowledge to which the practitioners do not have easy access yet. Together they identify new markets, generate new business ideas, or exchange details about sources and new technologies in the region. The hub managers from the training sessions also develop new modules for webinars.

### Is there a European added-value, too?

**Hartmut Welck:** Definitely, yes. Bioenergy from grass, for example, is currently a hot topic in Ireland. There are already plants in Germany with several years' experience in the field. Therefore, Irish partners can benefit from the practical and socioeconomic experiences of others through the AGRIFORVALOR networks, which are in very high demand in the agricultural and forestry sectors.

### In light of global food security issues, is food waste a hot topic, too?

**Hartmut Welck:** In the sense of a primary or secondary sidestream, yes. The hub in Hungary, for example, is very busy with food waste themes. One of their topics is how to better exploit whey from dairy residues and straw from agri waste in new

value chains. There are pathways in place to convert these raw materials into biogas or biofuels, but also to process them for use as soil improvers and fertilisers. New partnerships for knowledge exchange have now been formed, all aiming at further research or new business plans. We are also offering feasibility studies and business canvassing through our hubs and partnership networks.

### Will the AGRIFORVALOR partnerships continue after the end of the project?

**Hartmut Welck:** One of our goals is also to publish the knowledge we amass and make it available e.g. for the European Innovation Platform, EIP AGRI. We aim at establishing 'sidestream' tools comprising a database of available research and technology. The tool includes market repositories, which are composed of company profiles, developer firms or research institutes. Until now we gathered 110 profiles. The network has already identified 32 novel products which can emerge from the primary sectors belonging to our networks. You can have a closer look at our sidestream value tool: [www.agriforvalor.eu/sidestreams](http://www.agriforvalor.eu/sidestreams)

### Is the research AGRIFORVALOR is dealing with already mature enough to be proposed to the practitioners?

**Hartmut Welck:** More than one third of the research projects demonstrated to our networks have a Technology Readiness Level between 7 and 9. This means there are successful demonstrators of prototypes under real conditions up to their industrial validations in their specific environments available and, as a result, they are ready to exploit and to use. Furthermore, each of our hubs will identify new business models around biomass sidestreams by putting together new consortia. The best three business models will be awarded and accompanied by each hub leading hopefully to operational groups under EIP AGRI. And last, but not least, our exploitation workshops are there to continue with the AGRIFORVALOR results.

**Thank you very much for the interview!**



## INCOVER: Bio-Tech and Eco-Tech for better waste water management

Since 2016, INCOVER, the HORIZON2020 funded collaborative project with 18 partners, is searching for innovative ways to reduce the cost of waste water treatment in urban, agricultural and industrial environments. INCOVER's concept aims at moving wastewater treatment from being primarily a sanitation technology towards a bio-product recovery industry and a recycled water supplier. By using bio-production technologies, i.e. with algae and yeast, and chemical recovery as well as energetic bio-digestion, new bioplastics, energy, fertilizer and organic acids are recovered from the waste water.

The project works with three added-value demonstration plants where wastewater from municipalities, farms and the food and beverages industry is treated, aiming at the development of sustainable added-value technologies for a resource recovery-based water management by also using smart operation monitoring and control methodologies. The INCOVER plants are implemented at demonstration scale in order to achieve Technology Readiness Level (TRL) of 7-8 ensuring straightforward up scaling to 100,000 population equivalents (PE). Strategic studies to facilitate market uptake of the innovative solutions are complementing case studies. INCOVER's main goal: to reduce operation and maintenance cost of waste water treatment by 50 % and GHG emissions by 80 % including added-value products from waste - striving towards a circular economy.

([www.incover-project.eu](http://www.incover-project.eu))





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## **WHAT NEXT WITH FOOD2030**

A BRIEF SUMMARY OF FUTURE ACTIONS TO HELP SHAPE THE FOOD 2030 FRAMEWORK

# Food Systems Innovation (EU)



**75 % of EU`s bioeconomy-turnover from agriculture, food, fisheries and aquaculture**

= **20%** of EU`s workforce active in these sectors  
= **6 %** of EU`s GDP / 7 % of value added

## Out of 210 bioeconomy regions



**>50 %** of EU bioeconomy regions with **agrifood as a priority**

**28%** of EU bioeconomy regions with **energy as a priority**



## Low Private R&I Investment in EU-Food & Drink

**Japan:** 0,73 % of turnover  
**US:** 0,57 % of turnover  
**Korea:** 0,36 % of turnover  
**EU:** 0,27% of turnover



**Most food innovations are incremental-  
Only 3% of new food products are truly innovative**

# Empowered Communities: First Level Food-Democracy

Milan Urban Food Policy Pact (2015) to develop sustainable food systems for cities  
71 EU-28 cities signed

**45 cities surveyed :**



## Does your city have a food strategy ?

**Yes 63,1 %**

Of cities with some programs or with comprehensive food policy strategy

**No 31, 6 %**

**Not Yet 5,3 %**

## Is there a city food policy body ?

**No 56,8 %**

**Yes 43,2 %**

Source: Milan Urban Food Policy Pact



## BUYERS TO HARVEST THEIR **LETTUCE AND BERRIES** IN THE **SHOPS**

Urban farming concepts from **INFARM**, a Berlin start-up, with the potential to change agriculture

Lettuce sprouts from buckets on walls, grass covers the floors, spinach grown in light tubes decorates a window. It smells of the garden and the soil. What do these unusual plant installations have in common? They all belong to the INFARM concept, a creative Berlin start-up that has chosen 'urban indoor farming' as its business model. The text in the INFARM presskit describes it as 'the urban farming (r)evolution.' The basic idea is that modern irrigation and lighting technologies will allow indoor plant farms to take root in urban living settings. Taking inspiration and knowledge from nature's most elegant techniques and combining them with proprietary cutting-edge technologies, the company's modular farming units recreate the natural ecosystem that plants need to flourish. The system's design allows for a perpetual daily harvest and a significantly higher output than comparable technologies. Each individual farming unit (2 m<sup>2</sup>) is connected to the company's central cloud farming platform that allows the team to coordinate, manage, optimise the entire network's performance, and serve their clients' needs on demand.

Arranged upright, the farming devices can cover the walls of a canteen, or form a living garden panel in the foyer of a big inter-

national hotel chain. However, the farming units are not mere decoration, they bear real crops for harvesting — while shortening supply chains in an amazing way; cut from the wall they can go straight to the table.

“ **Osnat Michaeli**  
We want to transform Berlin  
into a city-farming network.”

“We believe in de-centralizing food production and farming directly where food is consumed”, explains Osnat Michaeli, the CMO and co-founder of INFARM. Together with brothers Guy and Erez Galonska, Osnat Michaeli, a former filmmaker and editor, started the INFARM company in the Berlin hipster district Kreuzberg three years ago. A couple of months ago, the first vertical farm-to-table restaurant, Good Bank, opened in Berlin. Behind the restaurant's bar, lighted, chilled indoor-greenhouse elements with glass windows are hung up on the walls, the customers choose what mix of lettuce and herbs they want on their plates — then the fresh salad is harvested on the spot and served.

Modern in-house farming is a complex interplay of seeds, energy, nutrients, lighting, watering and space. The growth matter is based on soil or on fibre pads, but water can also be used — with hydroponic plants feeding from nutritive liquids. The farming



units can be deployed anywhere, and, the team calculates that it takes 1 day to install a farm and 30 days or so for the first harvest . The complete design was patented by the young team (which has grown from three founders a couple of years ago to 40 current employees today), among them biologists , data engineers, architects, ,assembly technicians, plant researchers designers and business.

In 2017 alone, INFARM will equip dozens of new urban farming locations across Berlin. Osnat Michaeli explains one of the company's ambitions: 'We want to transform Berlin into a city-farming network.' The order books are filling fast, and among them is Edeka, Germany's largest supermarkets chain.

According the company's spokesperson, 'the breakthrough' was with the retailer chain METRO GROUP. In search of shorter and quicker supply chains for fresh-cut produce in their retail outlets, METRO's management made contact with the urban farming experts to order a complete set of the farming units .

Since 2015, two Metro locations (Berlin and Antwerp) have been equipped with the in-store farming technology, supplying their customers with the INFARM crops. The novelty sparked some media-hype for indoor farming, with TV and radio stations reporting on the phenomenon. This brought the start-up visibility, a reputation, and bigger clients. Restaurants, shopping malls, and hotel chains are ordering farms to be installed in their canteens and offices. INFARM is already exploring opportunities to expand into markets in Europe and the US.

The young firm is also conducting new research and developments in their 'Farm Lab'. Adapting the concept to different plant sizes, and new crops such as berries and tomatoes, are being

explored, as well as new technologies, from automation and digitisation to climate control. Here, the EU's HORIZON 2020 SME Instrument was of help. INFARM's guide came from a large agricultural corporation, and together they explored the challenges involved in scaling up. 'He asked the right questions,' says Osnat Michaeli, pointing out the valuable advice the company received from their coach in terms of the demands of new cost structures and the operational management issues involved with expansion.

The firm's focus is on thematic expansion, and they intend to double their staff, bringing the number of employees to 80 until the end of the year . The creative urban farmers' new ideas are circling in on a warehouse concept, supplying larger facilities such as retail farms or logistical centres. Osnat revealed a most exciting project at the end of the interview: in-store growing to allow the creation of self-sufficient supermarkets, with no delivery problems taking up time and energy — and with buyers harvesting their fresh greens and vegetables on their way to their jobs in the city.



# Less meat waste: labels can act as



## smart traffic lights for freshness

How the ink specialists at **FRESHCODE** developed intelligent food indicators

The colored indicator - a label made of intelligent ink - shows a light grey on the pack of a chicken: This means, the meat in the tray is fresh and “okay” for eating. When the colour in the indicator takes on a darker grey, it's time to think about cooking the meat soon. If, after some more time, the label has turned black, which is darker than the reference colour, the consumer knows what to do: discard the product. A dark colour on the indicator means that the meat is spoiled or no longer fresh.

It's a colourful exhibition taking place on the labels of the packages in the fridge. Still under investigation, it could soon become a reality for fresh, packed meat and fish in Europe. Under the FRESHCODE banner a consumer-friendly and intelligent freshness indicator will be issued as a marker for sensitive products such as packed chicken. The indicator consists of a printed label with intelligent ink inside the transparent packaging. Its changes in colour are activated by reactions with the gases evaporating from the meat, and are based on the real chemo-physical processes involved in maturation. As a result, the labels inform buyers about the real freshness on the basis of the physical quality of their meat — instead of just the rough and rigid ‘use by’ or ‘best before’ dates. The ink-indicator will also signal any breaks in the chains of cooling systems.

As the meat may still be good beyond the simple printed dates, retailers and customers will be able to manage supply and consumption much more precisely, and food waste will be avoided. Consumer studies suggest that vast quantities of food are discarded because of imprecise freshness information. “This code has the potential to reduce packed fresh chicken waste by about 20%,” says Sergio Segui, FRESHCODE's Business Development Manager.

The label was invented by the Spanish company Chimigraf, specializing in smart printing solutions such as printing inks for food packaging, paper and corrugated. A Japanese investor bought the innovative Spanish firm in 2016 re-identified as Kao Chimigraf and is willing to continue developing this project. With headquarters in Rubí-Barcelona and factories in France and Italy, it has 170 employees.

The secret inside the chameleon indicator is a chemical composition that reacts, on a molecular level, to the gases produced by the meat. Along maturation the evaporated gases change their composition. While adapting to these different gas compositions, the colour of the

ink progresses on a gradual spectrum from white to black, passing by different kinds of greys. According to these ‘traffic lights’, the retailer and the consumer may decide whether the product is still fit for use.

The main clients will come from the poultry industry selling packed chicken meat. These producers will stick the smart freshness label inside the transparent films of the chicken trays. It might become a widespread practice ‘within five years,’ says Sergio Segui, an international sales specialist who presents the FRESHCODE innovation at food industry exhibitions and trade fairs. His company holds the world patent for the innovative tool. There are still, however, many stages ahead: from the suitable consumer instruction guide, and the attractive design of the indicator, to the appropriate positioning on the markets and many tests with producers, retailers and clients.

FRESHCODE has some unique selling points that distinguish the freshness label from other smart products also trying to enter the markets with i.a. sensor technologies. It is the price: the FRESHCODE label comes with a minimum unit-price of EUR 0,01 at a highly competitive amount compared to other indicators. On top of that, the European Food Safety Authority (EFSA), to which the indicator labels were presented, has offered a ‘favorable opinion’, which means that the technology can do what it claims, and that it is suited to contribute to food safety and illness prevention. ‘It works,’ is the Business Development Manager's brief summary — he intends to kick off sales in Spain, France, the UK, the USA and Brazil.

The success story has already begun: an EU regulation is expected, asking for better solutions than the simple ‘use by’ dates. By 2021, world sales of five billion labels are predicted: Kao Chimigraf expects to take in nine-figure revenues. Thanks to funding through the EU HORIZON 2020's SME Instrument, the Spanish product was able to find its market positioning: “The coaches and external advisors from the programme helped us to improve the strategy of the project,” says Sergio Segui, “and we should not forget to mention that the EU funds helped Chimigraf to transform an innovative R&D project from the laboratory into a real product that can add value to the EU society.”



# BETTER IMMUNE WEAPONS: 'WE WILL WIN THE FIGHT'

Poultry is set to become an important part of the new global food chain, but the challenges are huge and ever-growing. The world's population growth will coincide with an increased protein and meat consumption coming along with the globally growing middle classes. Industrial agriculture as well as smallholding farmers in developing countries are preparing for this eventuality with a new focus on poultry. Chickens are easy to raise, and they are widely available even in challenging climatic conditions in the southern hemisphere. This puts poultry to the fore.

However, with the mass breeding of chicken flocks, new enemies have emerged — bacteria, viruses and other parasites are causing serious damage and spreading diseases in the tightly packed coops. Beside the widely known parasite *Eimeria* spp, a disease called coccidiosis is doing wasteful harm to chicken breeds. Coccidia infect every poultry house worldwide. Enteritis (inflammation of the intestine) is present in all coccidia infections and usually accompanied by diarrhoea which may or may not have blood in it. Poor growth and impaired feed conversion is common and mortality can be increased. This animal disease is causing losses estimated at over EUR 300 million globally for breeders every year. Conventionally, chicken breeders fight the disease through the prophylactic use of antibiotics. However, this massive and unreasonable use of antibiotics in animal farming is considered as one of the main causes for antibiotic resistance in humans and animals. The Director General for Health and Food Safety at European Commission - European Commission, Xavier Prats Monné, said of this rapidly growing global challenge: 'Antibiotic resistance is the new climate change'.

The French veterinary pharma company VitamFero in Angers, western France, sees a gap in the market here, and wants to harness the hens' immune systems. VitamFero is developing a solution that is set to innovate the global veterinary pharma market for coccidiosis disease treatment. Under the title PROVICOL, the researchers are working on a treatment that will stabilise and strengthen the immune system of the chickens, a solution with an estimated value of EUR 700 million.

Sophie Barreateau, Research Director of the company, is confident that the new treatment, an 'in ovo' injectable, will lower the preventative antibiotic input while strengthening the hens' own immune weapons to keep harmful microbes down. 'Within VitamFero, we have the weapons to make us able to win this fight' says the French biologist confidently.

With extensive R&D experience in animal health, Sophie Barreateau knows the veterinary pharma market very well. She has already worked with big pharma companies in the Netherlands and in France. It is easy for her to identify the unique selling point of the new VitamFero drug: biotechnologically engineered strains of a parasite will act as a powerful agent to stimulate the innate immune system's defensive functions. They will trigger the body-proliferation of interferon gamma and interleukin 12, two powerful cytokines in the metabolisms resulting in anti-microbial cell stimulants and mechanisms known as immune weapons against viruses and bacteria.

Making use of this principle, the product will not contribute to unwanted resistant microbial strains. Moreover, unlike the current live attenuated vaccines which are, to date, the common anti-coccidiosis therapy, it bears no risk to become infectious and harmful for animals and humans. The novel strains prophylactic potential has already been proven on lab-scale and are at

a Technology Readiness level at Demonstrator stage.

Backed by market studies, VitamFero is convinced that the market will soon take up the new solution. Asia, as well as America and Europe, are the future target markets. The product launch is envisaged for the year 2020.

VitamFero plans to reach the final development stages in 2019, by which time it will have filed the patents and established new industrial partnerships. Cost reduction must be tackled first. Educational efforts including veterinarians and farmers are needed to implement the principles of treating newborn chicks and mother hens alike. Here, the company's CommBeBiz Award could help with publication activities in expert media as well as the promotion of 'One Health' — the concept that both men and animals, should profit from reduced antibiotics and from the improved animal welfare found in healthy and hygienic poultry flocks. Sophie Barreateau offers an optimistic outlook: 'It would be really great for us to see that we contribute to tackle the grand challenges and bring forward the overall 'One Health' concept through our solution'.

**PROVICOL** - Harnessing hens' immune systems, achieving OneHealth for humans and animals



# OPEN SCIENCE DATA FOR FOODSYSTEMS RESEARCHERS - AGRINFRA+

A look at the coordinator's website reveals a 'who's who' of the most relevant food and agricultural science players in the world: the Food and Agriculture Organization of the United Nations, the World Bank, the Chinese Academy of Agricultural Sciences, the French National Institute for Agricultural Research, Wageningen University and Research Centre in the Netherlands, Germany's Federal Institute for Risk Assessment, UK Aid, the Global Food Safety Partnership, the Tropical Agriculture Platform (a G20 initiative) — to name only a few. The AGRINFRA+ Project is there to better connect this entire community by developing an agrifood research data infrastructure on a world-wide scale — and to allow participation through open access.

'Agriculture is a very traditional sector, its research produces an amazing amount of information, models, interpretations and stats. Our project is there to open these data to the world, facilitating interoperability and connections between new infrastructures,' says Nikos Manouselis, the founder of the company Agroknow, leading the EU-funded AGRINFRA+ Project. The project's vision is to facilitate open access, so that all people can participate in this wealth of knowledge. The EU is developing a European Open Science Cloud (EOSC) aimed at opening science to keep pace with what is already going on in Asia and America.

For a long time, the wealth of agriculture and food knowledge has been scattered over the globe in innumerable scientific journals. The internet has fundamentally changed the world of science publishing, while also enhancing a desire for transparency and connectivity. AGRINFRA+ is there to bundle this knowledge, to make it discoverable and interoperable on digital open platforms and, as a result, to lead traditional agrifood research into an Open Science world that is accessible to all interested parties. Nikos Manouselis, a computer engineer and agri informatics expert, sees huge opportunities for Europe arising from these multitudinous undertakings: 'The task is to demonstrate novel scenarios on how to conduct, and publish, future science.'

The core data infrastructure will be built to accommodate the EOSC: a vast storage space, a mega-project under construction. Under this heading, several services are developed within the AGRINFRA+ Project, such as a repository for the main data, an outline of storage protocols and the development of a high-speed communication network. A more far-reaching sub-theme of AGRINFRA+ is how to interconnect laboratories for the direct delivery of data to the open platform. The aim: once completed, all activities will lead to a global catalogue of agricultural and food science. The ambition: the project results will also allow future needs for agricultural and food research to be identified.

The data infrastructure specialists are concentrating on three thematic settings that will influence what scientific agrifood data will look like, and how they will be presented in the future: with French scientists, the data experts develop an infrastructure for plant phenotyping; a risk assessment platform for food microbiology is constructed with the Germans; and through cooperation with Dutch scientists, climate modelling and the relevant data structures will be better demonstrated. All three scenarios will offer approaches on how to combine and integrate the data in the respective fields.

Nevertheless, Open Science, 'terrifies many scientists, because they fear sharing their knowledge means losing control,' the project coordinator explains. He knows that, on the other hand, this opening up offers huge opportunities for access to data that have been locked up, privileging only big players or private industries. A crucial moment will be 'not to give away everything for free once the data are generated.'

Therefore, the AGRINFRA+ experts also develop, as part of their project, information for users on how to work with open platforms, how to protect intellectual property, how to license, and how to use Open Science for cooperation with commercial partners. 'You define the collaborative space by what is public, by what needs to be protected and for how long, and what can be accessible for a fee,' says Manouselis, who insists that the benefits will outweigh the risks. 'Take China for example. They produce huge amounts of agricultural data. The only way to get connected to their germplasm data is through Open Science and agreements related to that.'

One of the goals of the AGRINFRA+ project is also to provide new business models for data management services emerging from Open Science. Data-providing formats, data-governance models, data mining and data processing technologies will need new services, including standards for the control of data and the shaping of new pre-competitive collaboration spaces — all of these are buzzwords and tags in the world of Open Science data infrastructures. 'In the end all those who contribute to the development of such services will benefit,' continues Nikos Manouselis, optimistically. He does not ignore the fact that big tech-players will not rest in their pursuit of controlling the game by offering new technologies and rules. 'It's up to Europe to catch up,' the computer engineer says.

The global race to process  
and connect food knowledge  
worldwide

# WHERE DO MY STEAKS COME FROM?

**DIGITALANIMALS**-Animal Welfare and the Internet-of-Things: smart agri sensors enable the monitoring of animals' lives

Animal welfare and meat quality labels are a hot topic for retailers as well as for consumers. How can they be sure about claims of good rearing? A new sensor technology will soon allow to record over a cow's lifetime its breeding and feeding to be traced back to the origins.

The collar with the green box at the cow's neck is designed to be worn by cows grazing far and wide. The device connects them to a temperature sensor and to an electronic sensor, both stored in the box. Signals detailing the animal's location and condition, based on activity and its body temperature are transmitted to an Internet cloud, which further streams the data, directing information to the farmers' home computers or smartphones. This is how DIGITANIMAL, the smart farming solution from SensoWave, a company based in Madrid, offers a perfect system for the surveillance of animal herds — not just hundreds of kilometres away from the farmer's house, but also in the stables next door. Consumers in future could also benefit from the innovation, because, in a later phase, they might track back where their steaks come from while finding data on the living conditions of the cattle providing their beef. Any potential disturbance or lack of feed — any kind of harm to the animals' welfare — can be detected remotely, and addressed as quickly as possible, by sending a notification to the farmer's terminal. Finally, all the important events of each cow's life, from birth to slaughter, can be recorded. These data can even be edited and could soon be provided to consumers, who take the well-being of the animal more and more into account. It's a reality check on the origins of their steaks.

Carlos Callejero, CEO and co-founding partner of DIGITANIMAL has won a CommBeBiz Award for further business coaching. 'Our colleague Rubin came from a cattle farm and he was once very depressed, because they had lost many animals due to a lack of surveil-

lance,' Carlos Callejero remembers to the team-member who had the initial idea. The physics PhD graduate and MSc in optics, who has been working for several years in the sensor hardware industries and in the optical sector, immediately liked the idea of offering a solution for cattle breeders — deploying a low-power technology with new connectivity standards.

Until recently, the rather complicated energy supply systems for remote areas, using conventional batteries, have made these kinds of applications difficult. Now, more than 150 farms in Spain are already using the novel technology from the young sensor company, and it is set to keep growing: 'We collaborate with experimental farms and institutes in Spain and France, such as IDELE and INRA, in order to develop new features. Commercially we are just in the process of creating a distribution network in Spain, France, Ireland, Germany and Slovakia, and have registered interest from South Africa, Brazil, Mexico, Australia, New Zealand and the Arab countries. One of our last calls even came from Oman with a demand for camel monitors,' reports the CEO smiling.

The data, which are recorded from the field can be transmitted from Internet clouds to tablets or computers without a classic radio or WiFi connection. Within the EU, the DIGITANIMAL based devices are networked to 'SixgFox' — operators offering antennas for plug and play, and an IOT data connection standard that is able to speed up data flow rates. Low-energy devices enable this technology. 'This new connectivity quality is unique,' highlights Carlos Callejero, whose firm also benefits from the marketing efforts that the antenna network operator is providing.

It's not only farmers who will benefit from the smart innovations in agrotechnology, but also feed suppliers and vets. The agro sector is only one of several pillars on which Carlos Callejero is working with his

11-member team. The low-power sensors that his firm specialises in, can also be used to monitor and to train workers in hazardous industries and in remote places. 'I always have a vision and start to dream, my team is making my dreams true,' the company CEO confesses. Formerly he worked with defence applications: 'But soon we were looking at the civil sector and for niche markets such as health, safety or training systems.'

One of the new fields already identified by him is organic farming. Carlos' company has started to contact organic farms to convince them to try a new eco-system with consumers. The latter could get the QR-code on a product label, allowing them to do a reality check on the conditions the animals were in when they grew up in the fields. Moreover, there are management platforms coming up suited to grazing animals — providing information about where the cattle will find the best feeding conditions. The manager became acquainted with the smart-agri sector through the EU's smart-agri business accelerator. It taught the young entrepreneur how to raise a business and how to set priorities.

Constantly looking towards new opportunities, the inventor recently learnt from the European Space Agency (ESA), that its Copernicus Programme is using satellite images to verify pasture quality. In Carlos' opinion, this approach could easily be adapted to guide the animals to better grazing places. The necessary guidance systems still need to be developed. Will it be sounds, or brushing robots that lure the cattle? 'We will see,' Carlos Callejero says, laughing. The CommBeBiz Award that his agrotech firm has won, will be a 'source of inspiration' to him. The Awards network not only connected the Spanish developer and inventor to new software platforms, but has also led him to potential customers in the fields of smart technology bioeconomy innovations.





# Local food for SCHOOLS, RESTAURANTS AND MARKETERS

Citizens networks testing benefits of quality labels and short food supply chains

‘European farmers serving local markets are rarely the cheapest. But they are very specialised, and typically focus on quality,’ says Matthew Gorton, a Food Marketing and Agroeconomics Professor from Newcastle University in the UK. This focus on quality prepared the ground for the development of a wide array of food quality schemes; ranging from logos for protected geographic locations and designations of origin, to food safety labels. Europe protects its farmers’ agrifood business with these schemes, indicating the special character of selected foods, and offering a distinction for the consumers between certified products and their imitations. The assumption is that consumers are willing to pay a significant price premium for products designated as high quality. But is this still true? Are labels ensuring better incomes for farmers? And is this also the case for farm produce in general, such as fresh, non-branded vegetables?

These are some of the questions that inspired the STRENGTH2FOOD project. Coordinated by Matthew Gorton, it brings together 30 different partners: practitioner stakeholders from academia, SMEs and professional associations. Using 30 case studies the wider economic, social and environmental impacts of food quality schemes are tested against comparable, non-scheme products.

What seems obvious at first glance, may not always stand up to scientific testing. It seems to be common sense, for instance, that local, short supply chains are the most environmentally beneficial. However, a different school of thinking says that fewer, more centralised, large-scale trajectories could be more efficient, and have a lower carbon footprint. So, is local

really better? ‘All the arguments need to be evaluated,’ summarises Matthew Gorton. He deployed the research plan across five different areas.

1) Primary research will be complemented by advanced econometric analysis of existing datasets to determine the impacts of food quality schemes and short supply chain participation on farm performance and survival, as well as to understand price transmission and trade patterns. Currently prices and margins are the indicators used to quantitatively measure the economic benefits of local food supply chains. Their territorial impact may be best expressed by local multiplier effects or wage levels. The environmental impact is measured using carbon footprints and the water consumption of local chains. Data in these categories will be collected in 14 different countries across Europe, as well as in Thailand and Vietnam.

2) For its field experiments, the project focuses largely on less developed and transitioning countries. Supermarket trials in the Balkans generate insights on the impact of local food campaigns aiming at up-scaling sales of local produce. Another case study looks at the quality of school meals, a wide spectrum of quality differences across Europe can be seen: situations, such as in Serbia, with no nutritional or public procurement guidelines for schools, or mainly cost-oriented schemes, co-exist with high-value meals sourced from organic producers in Danish schools or from local farmers, as is the case in Italy.

3) Pilot schools will test quality arrangements using local ingredients, the scientists

will assess these arrangements with regard to the potential opportunities for farmers. The lessons learnt from the pilots may be mainstreamed to other regions and countries alongside the educational materials developed. The aim is that successful public procurements of local produce for school meals will be transferred to other public services and hospitals.

4) In Italy a farmers’ cooperative will test smart phone apps to better promote farmer markets to consumers, aiming at increasing returns for local producers. Another pilot action is focusing on increasing the sales of labelled quality food in non-traditional markets. In North Shields (UK), a fishing port specialising in prawns, the food researchers and marketing experts will try to develop sales into restaurants for fish species caught, which, so far, have been underused and have little market value. The chefs from the restaurants will be invited to a course to teach them to adapt to the local fish species when preparing tasty dishes.

5) Finally, the project’s impact will be demonstrated and maximised through the drafting and diffusion of customised information material: policy briefs, notes, online courses, mass webinars. All stakeholder groups will be invited to a large, final conference in Brussels to discuss the scientifically researched answers to STRENGTH2FOOD’s guiding question: What impact do food quality schemes and local food supply chains really have?





# A BLOG A DAY

How the senior economist Krijn Poppe spreads the word about the bioeconomy

It is hot on this autumn day in Northern Italy. During a phone chat before a group discussion at the new Congress Centre on the campus of the University of Parma, Krijn Poppe moans the heat with over 30 degrees Celsius. Because of the weather conditions, he has decided to skip the tie — he wears jeans, and a jacket over a blue shirt. 'This is my casualwear,' explains Poppe, an influential 62-year-old senior economist who holds several positions in agricultural research and policy-making in Europe. At the recent Parma conference of the European Association of Agricultural Economists (EEAE), he was honoured with the Fellow Award for his lifetime achievements.

The laureate is called a 'futurist author' or the 'chief strategist' for Wageningen University, the outstanding agriculture academic institution in the Netherlands. In collaboration with the President of the University, Louise Fresco, he wrote reform papers for the EU's Common Agricultural Policy (CAP). For many years he has represented his country in EU bodies, such as a strategic working group on Agricultural Knowledge and Innovation Systems of Scientific Committee for Agricultural Research (SCAR). For DG RTD he currently chairs the new expert group on Food and Nutrition Security. He was the Chief Science Officer of the Dutch Ministry of Agriculture, and has worked closely with the European Commission in Brussels. Web visitors will find easy access to his thinking just by clicking through his blog. There, they will discover a most remarkable thing: the scientist policymaker is a great blog writer, releasing (almost) one a day.

His themes focus on issues from global food and agro economic theory, to retail trends, and from new vegan leather, to Max Weber, combining agriculture with non-agricultural topics while offering exciting insights into the whys and wherefores of the world. The reason behind the one-blog-a-day habit is explained by the author: 'It occurred to me because of my mother. When she reached 78, she resolved to take up the internet. This led me to switch on the computer at least once a day in order to communicate with her.' Later on, Poppe found the blog a perfect method for contemporary science communication; a way to log his reading lists and intellectual comments in the cloud.

The eldest son of a farming family in Flevoland, a Dutch region that has been industrially farmed since the 1960s, Poppe showed no interest in taking over the family business. 'I found farming too boring,' he says. He convinced his family to allow him to begin studying business and economics in Amsterdam: 'We thought perhaps I might one day work as an accountant.' He graduated from Erasmus University Rotterdam and took lessons in agricultural economics, taught there in relation to the economics of developing countries. He was hired by a government institute, and was soon sent to Brussels to join the Farm Accountancy Data Network of DG Agri, to replace a first generation staff member who created this policy research infrastructure for the first EU Commissioner for Agriculture, Sicco Mansholt. These were the first steps to a career in agricultural economics and government.

They were the days when the EU Agricultural Policy had to tackle production surpluses; the 'food mountains'. Milk quotas were introduced and new farming subsidy schemes needed to be examined. Environmental issues entered the agenda. Farmers began to protest in Brussels. From these experiences, the young civil servant Poppe learnt that food production and its organisation on relevant scales, 'had nothing to do with "Old MacDonald had a farm" as many people imagine.' It's all about markets, prices and management.

Driven by a desire to let people know and understand how the food business is organised, and how it could be structured in a more sustainable and more responsible way, he wrote papers, reports and books. In their paper on the CAP reforms, Poppe and Fresco outline a new shift of emphasis, to the 'weak parts of the food systems, the farmers and the consumers,' as Poppe explains. They are the groups at each end of the food chains, where the pressures are increasing in economic, and in environmental, terms. The authors conclude that big firms and retailers should take more responsibility for these systems, and that food prices need to better reflect the actual costs of sustainability — the food processors and retailers require not only monetary improvements, but an upgrade in quality and sustainability.

## «There should be a new European consensus»

Poppe believes that, «there should be a new European consensus» on these principles, and we should see regulation from the governments. It's their job to make markets work.' In terms of animal welfare and environmental neglect, market failures can be clearly seen.

Apart from politics, the senior researcher is engaged with many other matters. 'I'm a connector type, drawing people together from many cultures, preferably at kitchen tables and in think tanks, where real decisions are shaped.' Though widely recognised as a liberal economist, he is also active in organic farming organisations. 'I sympathise with the organic movement,' he confesses, 'but I am a realist — it is not a solution to everything.' Acknowledging the innovativeness of organic agriculture, he describes his favourite meal as a vegetarian one: it's beetroot. But Poppe is not above eating a steak every two or three weeks: 'A good piece of meat, that's also a piece of our culture.'



## What next with **FOOD2030**

This publication has brought us up to date with a lot of the current thinking surrounding food system research and innovation. We have presented the thoughts and advice of leading experts in this sector and presented example of current research developments. We outline here a brief summary of some future actions to help shape the FOOD 2030 framework over the coming years.

- » The “Harnessing Research and Innovation for FOOD 2030: A Science Policy Dialogue” a conference to be held in Brussels on world food day 16 October 2017.
- » This event will build on the successful FOOD 2030 High Level Event of October 2016 and acts as an important milestone in the preparation of the second FOOD 2030 High Level event to be held under the Bulgarian Presidency in Plovdiv on 21-22 June 2018.
- » Publication of the societal challenge 2 work programme and the 2018-2019 calls for proposals which contain extensive opportunities to develop the food systems R&I agenda
- » From the SC2 2017 call a FOOD 2030 collaborative support action will be launched before end of 2017 which will offer a platform to coordinate all FOOD 2030 activities and launch supporting actions.
- » Accompanying this action will be a FOOD 2030 expert group which will council the Commission on the way forward to a fully functioning food system.
- » In parallel to the launching of the multiannual financial framework for 2020-2027, and the design of the ninth framework programme, will be a review of the common agricultural policy (CAP) and the possible uptake and official recognition of the role R&I can play in modernising the CAP.
- » The FOOD 2030 research agenda is referred to in the EC 2016 communication on the 2030 sustainable development goals (SDGs) where food is seen as a major pillar to be addressed in realising many of the SDG objectives and targets.
- » Finally FOOD 2030 will play an important role in complementing and fulfilling the objectives the EUs Bioeconomy Strategy as it undergoes its current review process.

