

Position Paper on the European Commission's Farm to Fork Strategy 2020



Trondheim, 13 July 2020

Position paper on *A Farm to Fork Strategy*

The Norwegian University of Science and Technology (NTNU), is ready to contribute to the ambitious but necessary work of achieving sustainable food systems in Europe and globally.

NTNU is convinced that an innovative, systemic and multidisciplinary approach is necessary for addressing one of the biggest challenges facing Europe: transforming food systems to mitigate climate change, ensure food security, health and social justice.

With a view to effectively contribute to the European efforts in this important thematic area, the University have created the *NTNU Food Forum*¹. The forum mobilizes scientific staff from 8 faculties and 18 departments working with food research, innovation and education guaranteeing a wide multidisciplinary approach. The NTNU Food Forum joins social science and humanities expertise with technological, medical and natural science expertise to create collaborative arenas and reach out to industry and civic sectors addressing grand challenges around food. Through this, NTNU expects also maximize the contribution in knowledge and research capabilities that the biggest Norwegian University can provide to the European System in this important area.

This document represents an NTNU position paper prepared by the NTNU Food Forum on the communication document "*A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system*" from the European Commission dated 20 May 2020.

General comments on the Farm to Fork Strategy

"A Farm to Fork Strategy" is at the heart of the European Green Deal, which in turn aims to make Europe the first climate-neutral continent by 2050.

NTNU finds this strategy timely, ambitious and inspiring and expects it to contribute to reaching more sustainable food systems. However, the needed transformations are highly complex, and more detail is needed to articulate pathways for reaching these objectives through an open and inclusive dialogue between industry, stakeholders and users, scientists, citizens and policy makers. To that end, mechanisms for facilitating these conversations and for taking coordinated actions are key. NTNU supports the creation of innovative modes to promote systemic and multidisciplinary approaches joining expertise from the social and natural sciences, the humanities, and the applied sciences to ensure that food is considered not only as nutrients and chemicals, but also as living culture, involving moral beings, everyday practices and traditions. Our main comments to the Farm to Fork strategy mirror the structure of the original document. At the same time, we would like to start by highlighting three general reflections: (1) Seafood, (2) Multi- and transdisciplinary approach, and (3) New tools.

¹ NTNU Food Forum: <https://www.ntnu.edu/nv/ntnu-food-forum>

(1) Seafood

NTNU supports that seafood is included and highlighted as a natural part of this strategy. Aquaculture, an improved utilization of marine resources and increased knowledge about new marine resources for food and feed are important for the overall success in facilitating a systems transition towards environmentally sustainable food. That is particularly true for food security and consumer health. An excessive amount of valuable potential food and feed resources are lost along the value chains. Through the application of new technologies, these can be upgraded to proteins and lipids for our growing population. The many high-value components in seafood with health promoting effects makes these processes particularly important in fisheries and animal-based aquaculture.

Enabling the recovery of seafood by-products and use as feed products requires a change of the regulatory framework. Processing side streams from the aquatic food processing and sludge from RAS (recirculated aquaculture systems) sites can be used as substrate for new protein sources e.g. seaweed and meat replacers.

NTNU have particular high expectations for plant-based aquaculture e.g. seaweed production and its role in delivering alternative and sustainable protein sources.

(2) Multi- and transdisciplinary approach

The strategy highlights the need for a shift to socially and environmentally sustainable food systems. One way to make headway is to consider and formulate indicators that can describe how such a goal is to be achieved. Some examples are suggested in Table 1.

Table 1. Some suggested indicators that NTNU Food Forum finds important for sustainable food from farm to fork.

	Indicators
Resource utilization, technology and health	<ul style="list-style-type: none"> • Maximum bioresource utilization along the food value chain to generate valuable products for food and health • Minimum food loss and waste • Green technologies and preventive measures to minimize the use of harmful substances (processing aids) and secure gentle production without formation of harmful substances during food processing (e.g. technologies that secure gentle temperatures, pH etc.) • Minimal nutrient loss and retention of valuable components in the food value chain • Enhancing human dietary health by cost-effective food innovations • Intervening on people's choices by use of taxes, subsidies or direct regulation
Environment, biodiversity and safety	<ul style="list-style-type: none"> • Minimal use of scarce and unsustainable bioresources • Optimal energy and water efficiency • Minimal CO₂ emissions • Minimal environmental footprints and other environmental impacts that are usually not included in the models e.g. biodiversity • Minimal content of harmful substances and efforts to gain non-toxic food circular systems

Policies and food supply	<ul style="list-style-type: none"> • Optimal labor availability for a sustainable food supply • Creating synergies across EU agricultural, health, environmental and economic policy: creating incentives or subsidies that are in alignments across these areas e.g. scaling economic subsidies to reward environmentally friendly, cruelty-free and healthy foods more than not; scaling subsidies to match dietary recommendations, etc.
Food culture and animal welfare	<ul style="list-style-type: none"> • Enhancing human and animal welfare • Recognizing and promoting indigenous food practices and animal husbandry • Phasing out painful procedures executed on farm animals (e.g. neutering, dehorning, etc.) • Enriching built environments in animal and fish farms, to ensure the expression of species-specific behaviors (e.g. digging, finding food, etc.) • Limit disease and mortalities of food producing animals

Note that multidisciplinary reflection is needed here. A challenge with ideas of ‘optimization’ and ‘efficiency’ is that indicators often already assume who a measure is optimal or effective for. For example, what has been considered optimal in meat production is raising animals with more flesh for eating, who grow faster. However, growing a lot of meat is not optimal for the animal, as it creates health problems and behavioral issues, and it is often also not optimal for the environment, e.g. in the case of intensive grain-based animal feeds produced on deforested, impoverished soils, creating fertilizer runoffs and water pollution instead of grass-feeding animals on local grasslands [Weis 2007, 2013]. This shift to consider what optimizes sustainable food systems requires innovative approaches developing new value chains, processing equipment, logistic solutions and food products, in coordination with new ways to deliberate on and govern the social and moral impacts of these solutions. Particularly, the greener technologies need more knowledge to secure environmentally friendly and functional products.

Working with the Green Deal and the UN’s Sustainability Goals will always pose the challenge of finding ways to balance optimal solutions, since there are different perspectives to take and usually synergies, conflicts and trade-offs to deal with. Therefore, a multi-actor, multi-sector and multi-discipline approach will highlight the different values at stake, so they are included in the dialogue and further decisions. The humanistic, economic and social sciences can contribute with important new perspectives e.g. covering the understanding of citizens and food culture to develop and shape food practices (eating, shopping, cooking, wasting) and values (animal welfare, health, local or national identities and traditions, economic, and environmental values). In all these R&I work it is

MEATigation - project: Towards sustainable meat-use in Norwegian food practices for climate mitigation (2020-2024).

A reduction in Western meat consumption is critical for global food security, respecting planetary boundaries and improving global health. However, even when positive to climate action, Europeans are reluctant to reduce their meat consumption, especially in the Nordic regions. This is because meat is not just calories: It is culture. Meat is deeply embedded in social practices that weave together meanings, identities and values; competences, skills and professions; materials, animals and landscapes that all go into making meat. MEATigation works with Norwegian households and industry partners in food provision (farms, restaurants and retailers) to explore the possibilities for reducing meat use in Norway via (1) recognizing humans and animals working to make meat, (2) replacing animal-based proteins with plant-based, insect-based or in-vitro proteins, and (3) refining meat-use to reduce waste and malnutrition (obesity). <https://prosjektbanken.forskingsradet.no/#/project/NFR/303698>

important to find a balance between the purely rational and a fact-based approach.

(3) New tools

This brings us to the new tools that must be developed to facilitate translating transdisciplinary reflections into policy. NTNU highlights the need of new methodologies for this food transformation to take place, especially cross-disciplinary methodologies. Relevant technologies such as Life Cycle Assessments, material flow analysis and value chain analysis are used and useful for some purposes. However, these are not always adapted to the applications in question. In order to assess if a food system is moving towards sustainability, this "toolbox" needs to be functional and suitable to the variety and complexity of the issues at stake.

Below are our comments under each of the headlines focusing on chapter 2 of the strategy "Building the food chain that works for consumers, producers, climate and the environment".

Ensuring sustainable food production

NTNU supports the shared responsibility and involvement among actors in the work towards ensuring sustainable food production in the strategy.

Food safety becomes a bigger challenge when going towards more circular food systems and higher resource utilization. Harmful microbes and chemicals should be avoided or removed from the circular food chain. It is important to focus on how to (1) get unwanted chemicals out of our food circles, and (2) prevent them from reaching the food. NTNU has some good clean-up strategies related to oceans that can be models for other businesses. In the work of reducing potentially harmful constituents, engagement by industrial actors are particularly important. Food industries use processing aids, packaging materials, food additives and food ingredients that, without efficient alternatives, might be harmful. NTNU also recognizes that a significant reduction of antibiotics has already taken place, which might be used as a best practice example, as long as animal health and welfare are not compromised in the process. Checks should be in place to ensure that antibiotic reduction is achieved by raising healthier animals who do not need them, versus withholding antibiotics from animals who do. Anticipatory measures in food production, such as vaccines and sanitation, can prevent adverse health conditions, thus limiting the need for antibiotics and other chemicals.

***Need for new antibiotics** NTNU researchers are exploring new antibiotics with promising results [Nedal et al. 2020]. This is a response to the urgent need of global action to prevent a global crisis due to antimicrobial resistance [IACG, 2019]*

In the context of climate change, soil degradation and a growing global population, we need to increase the knowledge and availability of new sources of proteins and lipids, and of underused bioresources. These might be new ocean resources for food, dietary supplements, feeds for aqua- and agriculture, or substrates for meat replacers.

This chapter highlights important strategic areas. However, in some places only agriculture is mentioned even though the same strategies are relevant for aquaculture; “Sustainable and innovative feed critical feed materials”, “organic farming” and “eco-schemes”. During the early COVID-19 period the primary producers of food in Europe experienced an increased appreciation and respect (from dialogues in the European Food Forum²). In that situation also fishers and aquaculture farmers delivered important and particularly healthy food but were not a part of the communication. In many situations, seafood is not included in the communication when food is being discussed even though many of the challenges and opportunities are similar.

Aquaculture should be generally recognized as a critical contributor to a sustainable food production, as seafood has a far smaller carbon footprint compared to other animal proteins.

*The NTNU lead project **Brohode Havbruk 2050** is a good example of strategic work to involve students in the food transition needed. The project is educating future enablers of sustainable aquaculture production through an efficient and mutual exchange of theoretical and practical knowledge. The vision is to enhance innovation capacity and readiness to support the transition towards a research-based aquaculture sector. Companies that provide technology and services are important drivers of innovation. Enabling technologies have provided the seafood sector with new windows of opportunities, using high-tech solutions as stepping stones towards the needed transition. Brohode Havbruk 2050 delivers candidates with blue skills who can contribute to the capacity of the aquaculture businesses to apply new technologies, whilst setting animal welfare and the marine ecosystem in the center. This helps working towards smarter, greener and more efficient processes.*

<https://www.ntnu.no/brohode-havbruk>

NTNU welcomes the strategic aim and measures for improving animal welfare in the strategy. Animal welfare is a key element in sustainable farming, important for following EU and Norwegian law protecting animal welfare, as well as for a positive public perception and for consumers’ confidence in food products. Therefore, high animal welfare standards should be promoted. This can be achieved through less interventional modes of animal husbandry (e.g. grass-feeding, avoiding overcrowding, allowing animals to feed their young), by phasing out painful medical procedures (e.g. neutering), and by enriching farm environments with soil, toys or structures that animals can use to perform species-typical behaviors. Technological solutions such as physiological biosensors, better tools for behavioral monitoring or high-precision breeding are also important to explore and discuss. An improved understanding of multivariate factors affecting livestock health and welfare is critical, and an important site for multidisciplinary and transdisciplinary work. It is crucial, when concerning animal husbandry and food practices, to attend to indigenous practices.

Ensuring food security

NTNU welcomes the systemic approach in the work towards ensuring food security also including the logistical challenges such as disruptions of supply chains, outbreaks of plant and animal pathogens, labor shortages and the importance of protecting professions that are crucial for food security and food supply. It is important to support drivers for the needed transitions towards sustainable food

² European Food Forum: <https://europeanfoodforum.eu/>

systems. More attention can be devoted to developing educational and participatory approaches, that can take advantage of the existing mobilization and active roles that younger people are taking in climate activism globally. This would enhance the potential of students to become innovators and gamechangers in food transitions. With the knowledge, tools, skills, networks and motivation, our young generation will be the professionals and citizens that make a significant contribution towards sustainable food systems.

Equipping students with a combination of strong expertise and capabilities to collaborate cross-disciplinary and with an open mind can result in game-changing innovations and the needed paradigm shifts. In addition, educating the work force and providing life-long learning should have a clearer role in this strategy.

Stimulating sustainable food processing, wholesale, retail, hospitality and food services practices

NTNU supports the focus and role given to the food industry and food actors in the strategy. For European citizens to have healthy food alternatives available the industry needs to be capable to invest in product development and reformulations into products with e.g. less sugar, salt, energy and saturated fat and products with more fibers. Even though non processed food may be the golden standard in many dietary recommendations, processing is in many cases necessary for food supply of safe, nutritious and palatable food with an acceptable shelf-life and quality. As an example, can we cite that the COVID19 crisis resulted in an increase in frozen food, which might be more sustainable in a climate and food waste context. Consumer insights is a key in succeeding in healthy and sustainable food choices.

To facilitate the shift to a healthier diet and stimulate product reformulations, the Commission seeks opportunities to set up nutrient profiles to restrict the promotion of food high in fat sugar and salt. Some Scandinavian countries (Sweden and Norway) have for several years used two successful labeling systems. One of them is the “Keyhole” used on food that are categorized as healthy concerning salt, sugar, fat and fibers. The other one is the “Bread scale” that categorize food by its fiber contents. They are both making it easier for the consumers to take healthy food choices and these labeling systems might be good examples also for other European countries.

Further, special focus within the food industry can go to support plant-based diets, through supporting the opening of vegan cafés and restaurants, and the education of chefs and professionals within these fields. One parameter to promote meat-reduction is making available plant-based protein choices as part of daily meals offered at publicly funded institutions (schools, hospitals, prisons) or through creating or supporting initiatives such as Meatless Monday, or Veganuary campaigns.

Promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets

NTNU supports the strategy to empower the consumers to make informed, healthy and sustainable food choices and would like to include information related to animal welfare in the messages to the consumers. The emphasis placed on moving towards meat-reduced, plant-based diets in Europe is something we agree with.

In Europe more than half of the European adult population have overweight or obesity, and among children the condition affects one in three [WHO, 2017]. This is partly due to food overconsumption, and an unbalanced diet macronutrient composition, but affected by social and economic parameters, such as the affordability of healthy foods and the extensive utilization of prize reduction when buying more (“three-for-two”). Many consumers are generally not following the diet recommendation. This is an area that needs more multidisciplinary research to understand the drivers and mechanisms for these unhealthy food choices and to determine strategies that might work to reduce obesity and prevent life-style diseases while ensuring environmental sustainability and animal welfare. NTNU agrees that consumers need to be empowered in order to make healthy choices and that food labelling is a powerful tool here. This could be made even more powerful were animal welfare information and indicators developed and included in the packaging. But also pricing tools (taxes or subsidies) can be used to promote foods that are found to lower climate impact and enhance health such as vegetables, seafood and to dissuade consumers from nutrient poor and calorie rich processed foods.

NTNU wants to give special attention on the increased prevalence of childhood obesity and in particular how local environments can generate that makes it easy to grow up without developing overweight [Swindburn et al, 2019; WHO, 2017]. This is a complex field characterized by substantial knowledge gaps and needs joint actions from multidisciplinary research fields including social sciences, medicine, technology and economy, a broad specter of stakeholders from public and private sector including food actors and policy makers, and users , particularly children who need to be engaged as co-researcher to bring up their perspectives.

In general, it is important to align health, social, and environmental values when promoting plant-based diets: monoculture plant-based farming can also be an agent of deforestation, air and water pollution, and soil degradation, even if these grains do not feed livestock animals. Scaling up plant-based diets needs to happen in an environmentally and socially sustainable manner, supporting regenerative, organic and biodiverse farming, and considering modes of farming that could include animals, if not always or only as meat sources [Toensmeier 2016].

Reducing food loss and waste

NTNU welcomes the Strategy’s priority of tackling the food loss and waste challenge and the integration into food policies. Utilizing the biomass that are wasted today is very important and a source for valuable products.

Valuable potential food or feed resources are too often lost along the value chain. Through the application of new technologies, these can be upgraded to proteins and lipids for our growing population. This section, and the attached action plan, on “Reduced food loss and waste” seems to be limited to the food waste and therefore not including earlier parts of food value chains. These are areas with knowledge gaps that needs to be filled in order to utilize rest raw materials generated early in the value chain to make available as safe and nutritious products for animal and human nutrition. Particularly marine rest raw materials which comprise health beneficial components e.g. fatty acids and proteins should be upgraded from waste to value. Such upgrading needs an innovative approach

with 1. novel technologies 2. purification of unwanted substances (e.g. environmental pollutants) to get non-toxic food circles and need water and 3. energy efficient process lines. Better utilization of rest raw materials is not possible without including perspectives from consumers and citizens and other stakeholders in the food system. Underused biomass from the food chain may also be possible substrate for new protein sources e.g. meat replacers. To facilitate the optimal utilization of underused bioresources into food and feed, it is important to revise and update the regulatory framework. There is also a need for processing protocols to convert underused bioresources from other bioeconomy sectors into feed or additives ingredients. As an example, we can cite the aquaculture sector, which can become a substantial contributor to the circular economy, and at the same time less dependent upon resources that could be used as human food if better processing protocols are in place. Treatment and reutilization of effluents and sludge from aquaculture recirculation systems can also contribute to a more efficient use of freshwater resources.

Cultural and legal interventions can be used on the challenge of reducing food waste too. For example, supporting restaurant and retail partnerships to supply restaurants or other food-providing institutions with food that would otherwise be wasted. Practices such as dumpster-diving or open 'people' kitchens can also be studied and supported here, as can coordinated ways of composting and utilizing waste for agricultural use.

***Food security projects from aquatic resources.** NTNU researchers are involved in several projects dealing with food security from aquatic resources with quite different strategic approaches; The **SUPREME project** (2019-2024) is an example of a project targeting the underutilized resources generated during the production of cod-fisheries. Handling procedures and green technologies are used to upgrade these resources to proteins and lipids for food and feed and preventing loss of valuable bio-actives such as marine fatty acids. The projects **HoloFood** (EU project 2018-2021) and **HoloFish** (2018-2022) takes another approach when aiming to optimize feeding strategies for a more sustainable salmon farming. NTNU researchers are studying the gut response and matching the gut microbiota with the host genome. The knowledge generated in HoloFood will be used to optimise feed additive administration strategies of already implemented products by tailoring them to the genetic background and developmental stage of the animals, to improve the quantity, quality and safety of the produced food, and the sustainability of food production and animal welfare.*

<https://www.sintef.no/projectweb/supreme/> <https://www.holofood.eu/> <https://www.fhf.no/prosjekter/prosjektbasen/901436/>



Combating food fraud along the food supply chain

NTNU supports the work to fight food fraud and experience that the advanced analytical methods are generally capable of revealing fraud. However, the social and cultural foundations of fraud, how to cultivate trust, ensure competitiveness and inclusion are also important to understand.


In all these suggested research topics above, considering ethics and values, mobilizing and supporting citizen understanding, exploring new collaboration forms, and holistic and multi-actor approaches to the challenges are essential to succeed.

About NTNU

NTNU is the largest university in Norway with more than 7400 employees and 42 000 students. The university covers many areas of expertise and, in the food area, educational and research activities span from sustainability aspects, food production (with particular focus on aquaculture, where NTNU has international leadership), food quality, citizen science, bioethics, sustainable food consumption, healthy diets, innovation, etc. NTNU has considerable expertise in the field of aquaculture and seafood science but have a range of food experts in the social sciences, humanities, economics and logistics, engineering and technology, natural sciences, architecture, medicine and health.

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<https://prosjektbanken.forskingsradet.no/#/project/NFR/303698>

Brohode Havbruk 2050 <https://www.ntnu.no/brohode-havbruk>

SUPREME, Sustainable production of ingredients from whitefish rest raw materials,
<https://www.sintef.no/projectweb/supreme/>

HoloFood – Hologenomics for sustainable food production, <https://www.holofood.eu/>

HoloFish – Use of microbiome-genome co-optimisation to improve gut health and growth in farmed salmon (HoloFish) <https://www.fhf.no/prosjekter/prosjektbasen/901436/>)

Annex 1: Table of food expertise at NTNU

Key area of food expertise	Key words
Food technology and processing	Bioprocessing, heating, drying, refrigeration, productivity, engineering, food factory design, innovative food processing methods, work force, supply chain management
Bioeconomy	Circularity, food loss, food waste, proteins, lipids, food and feed resources, refinement, purification, resource efficiency, energy and water efficiency, population genomics, metagenomics, pathogen tracking/genomics
Food safety	Safe processing, microbiology, environmental pollutants, non-toxic strategies, biofilm, hygienic design
Food quality	Shelf-life, conservation technology, food analysis, functional properties, sensory science
Food and health	Bioactive compounds, marine fatty acids (e.g. omega-3s), obesity, industrial nutrition, consumer science, food-induced metabolic inflammation driving obesity and type 2 diabetes development, health economic evaluation of prevention initiatives
Social sciences and humanities	Consumers and citizen science, food culture, ethics, animal studies, food history, indigenous studies, food psychology, organization studies, environmental humanities, work force, food education, holistic methodology
Aquaculture	Aquaculture technology, cage technology and RAS systems, aquaculture cybernetics and remote monitoring, feed strategies, environmental interactions, IMTA, animal welfare, biology (fish physiology), larval rearing, population genomics, metagenomics, healthy oceans, effect on society
Food infrastructure	Process equipment and analysis tools (national partner in METROFOOD)
Food system analysis	LCA, material flow analysis, value chain analysis, qualitative methods, carbon footprint of products
Food innovation	Innovation methods, design thinking, responsible research and innovation
Education for sustainable food systems	Food study programs, aquaculture study programs, biotechnology study programs, engineering and technology, social sciences study programs, medicine and health study programs, economics study programs, humanities study programs, natural sciences study programs, innovation study programs etc. food system relevant courses. Education models, employability, innovation, industry internships, food policy etc.

Annex 2: Authors list – position paper on EC’s Farm to Fork Strategy

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7. *Faculty of Social and Educational Sciences*
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