Universiteit Utrecht

Future Food Utrecht

Vision document

Sustainable Innovation

Healthy Food

Smart Decisions

Vision document
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Mission

The focus area Future Food unites fundamental research of all faculties of Utrecht University related to innovations for future food in terms of production, behavior, and health. By connecting our knowledge we aim to provide sustainable and healthy food solutions for the next generations.
It is our aim to:

- Connect leading academics in Utrecht University that perform research related to food
- Perform groundbreaking fundamental research related to food
- Stimulate the recognition of Utrecht University as an excellent place for innovative food-related research
- Contribute to solutions for grand societal challenges relating to food
- Train and teach new generations of academics

Three interacting pillars characterize Future Food Utrecht: (1) sustainable innovations, (2) healthy food and (3) smart decisions. These pillars represent multidisciplinary research that is competitive on a national and international level and form a clear focus in the Utrecht food research. We aim to further develop these typical Utrecht research areas and to initiate collaborations with external institutions and companies on a provincial, national and international level. A good example is our contribution to the preparation of a European Food KIC bid that will be submitted in 2016.

Below we describe the ambitions and the unique selling points in the three pillars with respect to research for the period 2016-2020.

1 Sustainable innovations

In the pillar "Sustainable Innovation" Future Food Utrecht scientists focus on sustainable innovations for future food production. The ever-increasing demands of the growing human population requires next-generation crops, livestock and fish that can be sustainably produced, yield more with less input, has improved nutritional value, and supports human health. Inspiration for these challenges is found in nature itself.

The increasing demand of animal proteins urges for system changes in animal husbandry and fishery. Top priorities are sustainable control of diseases, some of which increasingly become a threat for human health (one health), improve animal welfare and reduce animal stress in the production chain, and improve reproductive performance and physiology of livestock and fish. Fundamental research on the animal immune system, pathogen dynamics, and stress and reproductive physiology of animals will be the basis to identify key ingredients for these system changes. The increasing demand for sustainably produced food also calls for next-generation crops that can produce more with less input of chemicals and under harsh environmental conditions as a consequence of climate change. Important are sustainably control

plant diseases and pests, improve plant stress resilience under a broad range of environmental conditions, and development of plant systems as dedicated nutrition factories (e.g. Azolla).
The overall strategy of Sustainable Innovations for future food is to investigate in detail how organisms in nature evolved sophisticated adaptive life processes and utilize this knowledge to develop sustainable strategies and concepts that can be implemented in next-generation crops, livestock and fish that meets the demands of our future society (learning from nature approach). The major research questions within the Sustainable Innovations research of Future Food Utrecht are bundled in three interdisciplinary subthemes that involve both plant and animal sciences:

- *Agricultural Immunity:* How do the immune systems of plants and animals function, how do microbiomes influence it, and how can we utilize this knowledge to prevent plant and animal disease in a sustainable manner?
- *Stress and Welfare:* How do plants and animals cope with environmental stress and how can we improve their genetic make-up or manage the conditions in which they are raised to sustainably improve their production?
- *Bioinspired Technology*: How can we learn from nature to design next-generation foods (crops, livestock, fish, or fungi) that stimulate human health or can be produced in a more sustainable manner?

2 Healthy Food

Future Food Utrecht contributes to health by getting more out of food. The increasing life expectancy in combination with the growing number of patients with wealth-related diseases asks for a different role for nutrition. By unraveling the health aspects of food from the level of molecules to population, new possibilities for prevention and treatment of diseases with diet, medical nutrition and foods come to light.

Food plays an important role in both beneficial and harmful health aspects. Many of these effects are still unknown or unexplained. With the broad spectrum of disciplines in Future Food Utrecht we aim to find novel connections and mechanisms that determine the relation between food, health and disease. Top priority within Healthy Food is to identify dietary leads for:

- optimal *early life nutrition* enabling the development of a robust neuro-immune system
- *prevention and treatment of food-related diseases* such as chronic (low-grade) inflammation, the underpinning of cardiovascular diseases, autoimmune diseases, neurodegenerative diseases, behavioral disorders and type II diabetes
- prevention of *food allergy* also with respect to novel dietary protein sources.

These priorities will be investigated in an approach that combines fundamental research to unravel molecular and cellular mechanisms, big cohort studies, translational research and (pre) clinical research. This multidisciplinary approach is also essential to develop affordable study designs for proof-of-concept or interventions studies with small selected groups and specific well-defined read-outs (biomarkers for health and disease), as well as for complex systems and big data analysis. The fundamental insights obtained by studying health and disease will be utilized to develop future food concepts and personalized nutrition that contribute to prevention and treatment of diseases.

3 Smart decisions

Future Food Utrecht stimulates smart and sensible food consumption. The choices people make while selecting their food play an important role in the changes necessary for a healthier diet and alternative foods. By better understanding the reflective and reflexive processes in decision making about food, new possibilities are uncovered for helping people to adjust their long-term food patterns to their own advantage.

Obesity is one of the greatest public health challenges of the 21st century. Its prevalence has tripled in many countries of the WHO European Region since the 1980s, and the numbers of those affected continue to rise at an alarming rate. Until now, changing unhealthy eating patterns has been approached from an educational perspective, trying to persuade people to change their behaviour , however, with limited success. Therefore, novel approaches are required.

The pillar Smart Decisions aims to do fundamental research on food decisions and intervention processes to promote sustainable change in food-related habits using state-of-the-art techniques and insights. To this end the following sub-aims are formulated:

- *Understanding* the behavioral mechanisms underlying food decisions. To what extent are decisions about food 'mindless' (habitual and/or impulsive) or deliberate and what are the neural underpinnings? Which contextual factors in terms of the physical (e.g., presentation in supermarkets), social environment (e.g., family practices) and cultural environment (e.g., religion) have a profound influence on food decisions? How do people's social and cultural background affect the way they think about food and aspire to have control over the food that is made available in their environment?
- *Intervene* with processes/mechanisms that lead to food decisions: To what extent are deliberate and automatic (habitual and/or impulsive) food decisions amenable to change? To what extent are subtle techniques like nudging or more intrusive interventions such as raising taxes effective, how can we make use of social and contextual features to influence food decisions, can better label information and/or persuasive gaming steer food decisions?
- *Testing* interventions and techniques for helping people to achieve their food-related goals in a way that promotes sustainable (long-lasting) change.

Building a community

The start of Future Food Utrecht resulted in successful collaboration of researchers over the borders of faculties (for examples see next page). It is our aim to build a vivid research community in which all food researchers of our university participate. Within this community researchers will meet frequently and we aim to use the seed money tool to further stimulate collaborations between various faculties.

Teaching

Most of the teaching on food-related topics is currently organized in a monodisciplinary way within the various faculties and departments. Future Food is a typical multidisciplinary field that requires expertise from a wide range of areas in order to develop innovative food concepts. Certain aspects of Future Food are taught within disciplinary courses. We aim to identify these aspects and bring in FFU-researchers from other faculties to introduce the multidisciplinary aspects of the field and describe these. Other more interdisciplinary courses and progammes have to be developed in the near future. Examples are minors, specific Future Food courses per pillar, Master programmes (perhaps in collaboration with our strategical partner Wageningen University), honours programmes and summer schools. To further develop a visible food profile for the Utrecht University we aim to develop Massive Open Online Courses (MOOCs and SPOCs).

Examples of successful interactions:

- Collaboration between Veterinary Medicine and Biology to investigate whether extracellular vesicle associated dietary plant proteins and small RNAs are present in breast milk
- Collaboration between Cultural Anthropology and Humanities about the influence of collective behavior and social-cultural dynamics such as solidarity, culturally appropriate cooking, faith-based prescriptions and preferences dictated by peers, status, income, distinction on food choices and food intake
- Collaboration between Clinical and Health Psychology and Social Geography about the interaction effect of individual and environmental characteristics on eating behaviors. The researchers argue that people's food environment includes how they organize their daily activities in time and space. Moreover, key individual factors (e.g., motivation, affective state, emotions) and implications of the busy lifestyles people lead (e.g., stress, daily hassles, time-pressure).
- Collaboration between Dermatology, Immunology and Theoretical Biology & Bioinformatics about the influence of food derives components on immune responses causing peanut allergy
- Collaboration between Imaging and Experimental Psychology about the relation of Sleep deprivation and food intake and the potential of caffeine in promoting healthy food choices
- Collaboration between Veterinary Medicine, Social and Behavioural Science and UMC Utrecht about the combination of human and pet oriented interventions to reduce obesity, because they are highly likely to affect each other.