

Food 4.0

An initiative of the Swiss Academies of Arts and Sciences

Food 4.0 initiative

The aim of the Food 4.0 initiative is to secure the future of the Swiss food system long-term. This is to be achieved through innovative developments across the entire value chain – from primary production to the health system.

This text explains the background and outlines the initial situation at national and international level. It also highlights the need for action and provides an insight into planned activities using a specific case study.

General conditions

The UN's 2030 Agenda lays down a clear marker in relation to a sustainable food system with its 17 Sustainable Development Goals (SDGs). Four of the SDGs address food-relevant aspects directly and a further five indirectly. Sustainable development in Switzerland is guided by this global reference framework. The 2030 Agenda and its SDGs are firmly established in Switzerland. Challenges to overcome in order to attain the SDGs by 2030 have been identified and the relevant areas will be driven forward /1/.

Priorities (EU/global)

In the context of the UN Sustainable Development Goals, the following priorities relating to the global food system have been extracted at European level:

1. Sustainable agriculture
2. Alternative proteins
3. Targeted nutrition
4. Sustainable aquaculture
5. Digital traceability
6. Circular food systems

“Plant proteins” case study

The topic area “Plant protein-based food with added value for Switzerland” is classified as a possible basis for a collaborative project programme between universities, universities of applied sciences and industry. The following levels were configured as components of an overarching, innovative and integrative development programme:

1. Primary production of protein-rich agricultural crops, which generate good yields in Alpine regions and have the advantage of being able to be integrated into the crop rotation (e.g. legume family)
2. Sustainable preparation of protein-rich plants to obtain functional protein and dietary fibre fractions
3. Production of highly nutritive protein- and fibre-rich food products that appeal to the senses, as well as biocompatible packaging materials made from these raw materials using innovative and optimised sustainable processes
4. Creation of new product lines for personalised products or meals, tailored in terms of nutritive content and appeal to the senses
5. Quantification of their nutritive properties, taking into account the microbiome, gut-brain axis and epigenetic potential

Significant synergistic, innovation potential can be generated by coupling industrial technological areas established in Switzerland that appear to be particularly suited to integration in food value chains.

(1) & (3) underline the importance of taking account of the entire food value chain from agricultural primary production of raw materials to the impact of food on human well-being and health. (2) & (4) address areas

Initial situation in Switzerland

Food production in Switzerland is facing increasing competitive pressure which is coming from Switzerland's neighbouring countries (or simply European countries) as well as from the rest of the world. This has led to increasingly cut-throat competition nationally for over 10 years which is seeing SMEs struggle in particular. A Europe-wide trend towards increasingly cheaper food is extremely difficult to contend with in view of the existing level of salary/production costs in Switzerland. Opportunities to generate improved value creation from Swiss food products need to be explored.

Business cases of national importance to the Swiss food industry require a clearly apparent innovative lead in terms of new products and technologies. This should ideally be understood by consumers and then become the preferred option, even if product costs lie above those of non-Swiss competitors.

Perception of consumers

In terms of the relative consumer weighting of criteria for the purchase of food products, taste, food safety and price (all $\geq 40\%$) still rank significantly higher than environmental/sustainability aspects and ethical criteria (approx. 15%) throughout Europe. However, the importance of the latter two categories has been increasing since around 2015. This can be seen as an indication of growing environmental awareness which has been observed in market developments since the emergence of the 'millennials' generation /2/.

In this context, particularly strong and rapidly developing trends emerge when quality, sustainability, ethical and economic aspects interact. A good example of this is the still recent development of meat substitutes based on plant proteins which emerged around 10

to be taken into account to a greater extent for realigned materials and production processes. (5) & (6) highlight the need for the integration of food value chains in relation to material and information flows.

Switzerland offers ideal conditions for innovative developments as well as their trialling and market implementation. This includes (a) the academic and industrial research infrastructure in the food sector and in the complementary disciplines of the natural sciences, technology and health sciences, (b) the world-leading training of scientists and specialists (the Swiss Federal Institutes of Technology in Zurich and Lausanne, traditional universities, universities of applied sciences, research centres and the training of apprentices) in the relevant areas indicated, (c) research and development funding opportunities from institutional (Swiss National Science Foundation SNSF, Innosuisse) and private entities and not least (d) Swiss consumers who, in addition to their financial means, tend to prefer high-quality, healthy food produced sustainably and are willing to pay for it.

years ago and has been classified as the number 1 megatrend in the food industry for around five years. Factors acting in synergy with this development are: (i) the significantly improved sustainability of plant-based protein sources over their animal-based counterparts, (ii) the ethical aspect of animal welfare taken into account and (iii) the benefits of limiting the consumption of red meat, particularly for reasons of nutritional value. The megatrend has been fuelled by new, improved technologies which has led to a steep development curve in terms of sensory product quality. In turn, this has had a positive impact on the flexitarian diet developing in synchrony. The movement now accounts for an estimated 20% of consumers in Switzerland with an annual growth rate of 2% to 3% /3/.

Initiatives for the Swiss food system

Many cantonal activities have been initiated in the Swiss food industry over the past five years and then discarded again. Some initiatives adopting systematic approaches have been developed and have established themselves. The following are worth highlighting:

1. The SATW initiative CHFood2030 has been bringing key industrial and academic figures in management roles together since 2016 to produce a strategic concept for the Swiss food system.
2. Swiss Food Research (SFR) is the largest innovation network in the Swiss agro-food space. As an association with over 160 members from research institutions, companies and start-ups as well as national and international partner networks, SFR effectively

promotes innovation in the agro-food ecosystem through knowledge and technology transfer.

3. The Future Food Initiative of the Swiss Federal Institutes of Technology in Zurich and Lausanne implemented a first step in 2018 in the form of a post-doctoral programme in the context of (1).
4. The Swiss Food & Nutrition Valley (SFNV) is a nationwide initiative and international campaign seeking to develop, strengthen and promote the Swiss food eco-system. By incorporating the strategic discussions from (1) and by involving the companies/universities which support (2), this also aims to turn concentrated interaction in the Swiss food industry into practical implementation.

Study as the basis of the initiative

As a basis for further activities as part of the Food 4.0 initiative, a study is being carried out to identify relevant, future and technological areas of development for the Swiss food system. The study aims to highlight the aforementioned and other areas of development, assess their likelihood of success and to drive forward their implementation. It will focus on areas of interest to the Swiss food system in terms of research expertise, innovation and economic relevance. One potential area of development is plant proteins, as outlined in the case study on page 2.

The Swiss Academies of Arts and Sciences will implement projects aimed at establishing a future-oriented food system in Switzerland in the development areas identified over the next four years. Through this approach, the Swiss Academies of Arts and Sciences can highlight opportunities for the successful development of the Swiss system to political decision-makers and contribute towards ensuring that expert stakeholders are cooperating and pulling in the same direction.

References

/1/ Sustainable development in Switzerland and the 2030 Agenda; <https://sustainabledevelopment.un.org/memberstates/switzerland>

/2/ Meet the 2020 consumers driving change; <https://www.ibm.com/downloads/cas/EXK4XKX8>

/3/ Europeans prioritize taste, food and cost aspects over sustainability concerns when purchasing food; Dec. 17, 2020; <https://www.euroseeds.eu/news/europeans-prioritise-taste-food-safety-and-cost-over-sustainability-concerns-when-purchasing-food/>

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