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Innovation and

research agenda for the

food sector 2020

- The sustainable growth industry of the future

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Summary

The food strategy adopted by the Swedish parliament in 2017 states that the Swedish food supply chain will become globally competitive, innovative, sustainable, and attractive to operate within. Total food production must increase in order to create growth and jobs and to contribute to sustainable development throughout the country. One of the three strategic areas for achieving this goal comprises knowledge and innovation. This innovation and research agenda is the food sector's response to how we can take on the challenges that exist in said area.

The agenda is based on the food sector's need for increased competitiveness, growth, and environmentally, economically, and socially sustainable development. Achieving sustainable and competitive food production requires new knowledge and innovation. In a ranking of 20 comparable countries, Swedish innovation capacity ranks in the top in industries like steel, forestry, and automotive, while the food sector ranks 14th. Therefore, in order to meet the challenges facing the food sector, we need a collective commitment to research and innovation – which also includes a strengthened innovation system.

Food production in Sweden will increase by gaining market shares, both domestically and through increased exports. This allows the sector to build food security and gain increased confidence among Swedish consumers.

FIVE MISSIONS

The Agenda has been developed by Sweden Food Arena through an established process, where stakeholders from across the chain have identified vision, goals, and commitments – missions – as well as areas of focus and proposals for measures.

The five missions are:

- Mission 1: The world's most attractive food and drink. In 2030, conscious consumers worldwide are choosing Swedish food and drink thanks to our unique added values.
- Mission 2: Competitive food innovation. In 2030, there are 50 new Swedish food innovations generating a total turnover of 1 billion euros.
- Mission 3: Food and drink for a healthy life. In 2030, thanks to an attractive offering of healthy and flavourful products, Swedish consumers have better eating habits.
- Mission 4: A resource-efficient food sector. In 2030, the profitability and resilience of the Swedish food sector have strengthened thanks to increased resource efficiency and sustainable production methods.
- Mission 5: Climate-neutral food production. In 2045, Swedish food production has a net zero carbon footprint.

COLLABORATION FOR GROWTH

The food sector is one of the country's largest sectors, which should be reflected in the size of public funds allocated through research councils and growth and innovation funders. The industry is prepared to invest SEK 150-200 million per year, with an incremental increase to SEK 400 million, if public funders are willing to invest the corresponding amounts.



With these five missions, the food sector has assumed a leadership role in meeting the challenges facing all of society – a commitment that cannot be fulfilled without close collaboration with other stakeholders.

This requires improving the long-term perspective and the conditions for industry planning. We thus call for a ten-year perspective or more. The regulations need to be updated to be more coordinated and to facilitate innovation and growth.

This Agenda is an invitation for collaboration on common overall issues, such as research funding, growth, sustainability, and infrastructure. Given that, the Swedish food sector would have every prerequisite to become Sweden's new growth industry.



Great potential for the food sector in Sweden

As Sweden's third largest industry, we are now a core sector of the Swedish economy. The food supply chain employs over 300,000 people throughout Sweden. However, competitiveness and innovation capacity need strengthening, and greater collaboration between the various stakeholders is required.

Noting the industry's needs, the government allocated resources within the framework of the food strategy to help establish a collaboration arena. The work commenced in 2017, and the economic association, Sweden Food Arena, was started in 2019. It is a national arena where companies and industry organisations from across the entire food supply chain collaborate on research and innovation for an innovative, competitive, sustainable, and growing food sector.

In the 2019 autumn budget bill, the government states that "Sweden Food Arena [is] in place as a coordinated needs-formulating actor".

In order to contribute to the food strategy, achieve our vision and the four goals we aspire to, as well as to carry out the five missions we have assigned ourselves, a joint innovation and research initiative based on the needs of the industry is required. We need new knowledge and expertise that will benefit the companies, and increased collaboration between the businesses, government agencies, academia, and politics. With our agenda, we want to be a source of inspiration for thinking new, thinking big, and thinking together.

Stockholm, 2 June 2020

Marie Gidlund, Director, Sweden Food Arena

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The Swedish food sector – the sustainable industry of the future

FOOD STRATEGY

Swedish consumers spend over SEK 280 billion on food and drink in stores each year. Add to that the public procurement of about SEK 12 billion as well as spending in restaurants and cafés. That makes the food sector one of the largest in the country; when it comes to consumption, only housing accounts for a larger share of consumer spending. In total, the food supply chain employs nearly 300,000 people, from farming and food processing to restaurants, catering, and fast-moving consumer goods.

Since the turn of the millennium, the economic value of food sales has more than doubled, and food exports have almost tripled. However, despite the positive trend, the competitiveness of Swedish foods has declined. This applies to both primary production and the food industry. Imports make up an increasingly large proportion of foods consumed in Sweden. For some categories, such as beef, cheese, and most fruits and vegetables, the proportion that is Swedish-produced is about or under 50 percent.

In 2017, in order to reverse the negative trend and strengthen the competitiveness of Swedish food production, the Swedish Parliament adopted a food strategy with the vision that, by 2030, the Swedish food supply chain will be globally competitive, innovative, sustainable, and a sector that is attractive to operate in. This document, Sweden Food Arena's Innovation and Research Agenda, is supported by the entire Swedish food sector and is an important step in achieving the food strategy vision.



In 2030, the Swedish food supply chain is globally competitive, innovative, sustainable, and attractive to operate within.



The food strategy vision for 2030.



THE OVERALL FOOD STRATEGY OBJECTIVE FOR 2030

The overall objective of the food strategy is a competitive food supply chain, where total food production increases while reaching relevant national environmental goals, aiming to create growth and jobs and contribute to sustainable development throughout the country. The increase in production – conventional as well as organic – should correspond to consumer demand. An increase in production could contribute to increased self-sufficiency. Vulnerability of the food supply chain will be reduced.

The food strategy highlights three strategic areas:

- Rules and regulations
- Consumer and markets
- Knowledge and innovation

ENVIRONMENTALLY, ECONOMICALLY, AND SOCIALLY SUSTAINABLE FOODS

The food sector is under severe pressure to change. While environmental and climate impact must be reduced, a growing global population is demanding more food. By the middle of this century, there will be another estimated two billion people in the world. We must be able to meet the increased demand for food in an environmentally, economically, and socially sustainable manner and within the scope of the areas available to us, the fishing waters we dispose of, and the absolute system limits set by our planet. This requires continued development of rational and efficient production methods, as well as technological innovations to design systems with both small-scale and large-scale solutions.

In 2015, in support of long-term sustainability efforts, and as an expression of the world's demands on politicians and policy-makers, the UN set out its 17 global sustainable development goals for 2030. The food sector is working, directly and indirectly, to achieve these goals, as shown in Figure 1 below.



Figure 1: The UN Global Sustainable Development Goals.



As early as 1999, Sweden adopted 15 national environmental goals, which, five years later, became 16 goals. Several of those primarily concern agriculture. The industry is affected by the national environmental goals mainly when it comes to emissions in various forms. The overall objective, the so-called generational goal, was added to prevent the fulfilment of the other 16 goals from resulting in environmental problems being exported, either in time to future generations or geographically to other countries.

In 2017, the Swedish Parliament adopted a climate act, which, in accordance with the Paris Agreement, states that Sweden shall be climate neutral by 2045. As a contribution to long-term climate efforts, and within the Academy of Engineering Sciences project "Climate Crossroads", agriculture and the industrial sector have produced a roadmap for how the sectors will reach the climate goals.

One of the global sustainability goals is good health and well-being. Food and dietary patterns play a major role in both physical and perceived health, and food that supports our health has gone from being a trend to becoming a prerequisite. Food and eating habits are often included as part of a lifestyle and can be difficult to change for people who otherwise feel healthy. This means that although modified eating habits would be the solution, the development of more health-promoting foods is an important aspect in preventing ill-health.

Today, our eating habits are ranked as one of the main risk factors of lifestyle diseases, such as high blood pressure, type 2 diabetes, cardiovascular disease, and cancer. The biggest risks linked to eating habits are that we do not eat enough whole grains, fruits, or vegetables, and that we eat too much salt. Better compliance with dietary guidelines would, in addition to contribute to improved health, contribute to reduced environmental and climate impact. According to the dietary guidelines of the Swedish Food Agency, we should eat more fruits and greens, fish and shellfish, and whole grains and unsaturated fats, while, in addition to reducing our consumption of red meats and processed meat products, we should reduce our intake of sugar and salt.

A STRONG RESEARCH AND INNOVATION SYSTEM

In an international comparison, Swedish food production is far ahead when it comes to resource efficiency and low impact on the environment and climate. This has been achieved through a policy of size rationalisation and environmental legislation that defines agriculture as an environmentally hazardous activity. Since the end of the 1990's, productivity per hour worked has doubled in milk production and tripled in plant production.

The consumption of foods has also changed. Since Sweden joined the EU in 1995, the supply of both Swedish and imported foods has increased substantially. All one must do is compare the vegetable or dairy section in a Swedish grocery store today with what it looked like 25 years ago. In addition to a widened demand, the market has also become more volatile. Swedish consumers have been described in various comparisons as being especially trend-conscious and open to new products. International food actors have often used the Swedish market as a test market when introducing new products and concepts.

NEW KNOWLEDGE AND INNOVATION

The challenge for the Swedish food sector is to produce more in order to increase both supply and exports and to meet a changing demand – and to do so in an environmentally, economically, and socially sustainable way. To some extent, this can be done with continued application of known technology, but to



achieve a food production that both increases competitiveness and stays within the limits of the planet, new knowledge and innovation are needed.

While Swedish innovation capacity ranks at the top in sectors like steel, forestry, and automotive, the food sector comes in at 14th out of 20 in Bloomberg's 2018 innovation ranking of European countries. In part, this is explained by a fragmented corporate structure with many smaller companies, a national production focus, and lack of perseverance in past initiatives. The countries that rank high, such as Denmark, Ireland, and the Netherlands, also have high net exports.

The weaknesses in the Swedish research and innovation system for foods mean that we are not competitive compared to other countries and that Swedish foods lose market shares. Therefore, in order to meet the challenges facing the food sector, we need a collective commitment to research and innovation – one that also includes a strengthened innovation system.

DRIVING FORCES THAT CREATE SYNERGY

To achieve this, we must advance our view on food innovations. For a period in the late 1990's and early 2000's, new products and services in the foods market were characterised by high potential based on unique processes and proximity to consumers. Then followed a period of new products and concepts characterised by more gradual improvements. This can be explained, in part, by the rapid increase in the launch of new products resulting in a smaller window and less patience for introducing new, more radical innovations. At the same time, the market was being subjected to severe price pressure. In addition, when the EU Nutrition and Health Claims Regulation fully came into force, making it more or less impossible to market foods using health arguments, the food sector became less attractive to venture capital. Recently, however, agriculture and foods have attracted new interest from investors and entrepreneurs, for example in what is usually referred to as AgTech and FoodTech.

Innovations and product launches need to be viewed more from a system perspective. Compared to other sectors, the food sector is highly complex, not only because of the consumer's demands on foods, such as them being safe, tasty, healthy, sustainable, and ethically produced, but also because of the food system as a whole. The food industry is not a uniform industry but consists of different sub-industries, including dairies, bakeries, and frozen meals production, that come together in a common logistics chain. In addition, foods are strongly tied to politics through food preparedness, employment, and the link to food and health.

At the same time, the complexity holds great potential if the industry can agree on a common vision and agenda, finding the conditions and values that unite and enable linking the various parts together. These include health and sustainability, as well as access to a unique raw ingredients base and unique technology, not least biotechnology.

AN ATTRACTIVE FOOD SECTOR

The beauty is always in the eye of the beholder, and regardless of what the industry itself believes, it is the perceptions and values of the outside world that justify the food sector. It is therefore a shared responsibility to not only do the right things but also to communicate and build relationships to make the industry more attractive. It is about attracting a workforce equipped with the knowledge and skills required to advance the industry. It is also about being able to attract private and public investors willing to invest in research, innovation, and new technology.



The basis for this is that there is sufficient and long-term profitability and competitiveness in all parts of the value chain. This is created through predictability in economic policy and a well-functioning public infrastructure for innovation and research, including government agencies and regulatory frameworks that promote innovation.

Especially important is the long-term aspect of research and innovation, where experience shows that very few processes achieve their goals within the timeframes set by funders. Research and innovation take time, and companies need a long-term perspective – at least ten years. The great complexity of projects and programmes often requires collaboration on several levels, which makes them slow to take off and results in build-up of costs before notification of funding can be announced. If food research and innovation are to attract researchers and co-financiers, funding must correspond to the food sector's size and importance. This applies to funding through both research councils and the government agencies funding innovation and growth.

FOOD SECURITY

The food strategy also highlights the importance of good supply capacity. Food security that citizens can rely on is a primary measure to create preparedness in the event of a crisis. This has become clear not least during the crisis caused by the Covid-19 pandemic during the spring of 2020. Further development of food production using innovation and research is necessary to ensure food security.

Increased Swedish food production also creates a platform for increased exports, which must take place parallel to the share of Swedish foods in the domestic market increasing. This can be achieved without restrictions on trade by promoting exports in various forms, thus making it more attractive to invest in the Swedish food industry. Today, 30 percent of Swedish food production is exported at a value of just over SEK 50 billion, excluding fish. The average value for Swedish industry is 70 percent. The goal is to export the equivalent of 50 percent of the value of Swedish food production by 2030.

It is also important to secure a logistics and distribution chain that enables the prevention of sudden hoarding in the event of a crisis. Since the distribution chain, at any given time, only includes a few days' need of mainly foods with short expiration dates, sudden purchase stops without any real rational reason quickly cause unnecessary strain on the system. This, in turn, leads to false signals in the supplier chain and unnecessary costs for quickly replenishing the system. Therefore, both trade and industries need to rebuild trust and resilient systems that can handle sudden but predictable peaks in consumer purchasing patterns.



Vision and goals

SUSTAINABLE FOOD INNOVATION FOR MORE JOBS IN SWEDEN AND CULINARY PLEASURE THROUGHOUT THE WORLD

Achieving the goals in our food strategy and taking the Swedish food sector all the way to the top require extensive efforts and major investments in innovation and research. In addition, we need consensus and a common plan so that we all pull in the same direction and use our resources efficiently and effectively.

Sweden Food Arena has formulated the following vision: "Sustainable food innovation for more jobs in Sweden and culinary pleasure throughout the world". In order to achieve our vision, we have set four goals to be reached by 2030 and defined five clear missions for ourselves. During each mission, we have conducted a comprehensive survey of the innovation and research needs of food supply chain stakeholders in order to achieve the set goals. Please see Figure 2 below for an illustration of how vision, goals, and missions are interrelated.



Figure 2: Sweden Food Arena's vision for the Swedish food sector, and the goals and missions established to achieve it.

FOUR GOALS AND FIVE MISSIONS

By 2030:

- Sweden is among the top 3 in innovation rankings for the food sector in Europe;
- there are 50 new food innovations with a combined turnover of at least one billion euros;
- the food sector has created at least 50,000 new jobs in Sweden; and
- the food sector's export share has increased to 50 percent.



The goals are central to achieving the vision, and are set to be challenging, but doable.

The five missions are based on defined needs and challenges identified by the food sector to contribute to social development. The missions are clear, and essential to give proper focus to the innovation and research efforts required to achieve the set goals. These are the five missions:

- The world's most attractive food and drink
- Competitive food innovation
- Food and drink for a healthier life
- A resource-efficient food sector
- Climate-neutral food production

Within the scope of each mission are several focus areas specifying what must be accomplished at a superior level to achieve what is stated under each mission.

Several sub-areas have been prepared for each area of focus. They specify what must be done from an innovation and research point of view to achieve what is stated within each area of focus.

READING GUIDELINES

Sweden Food Arena's innovation and research agenda is the agenda of the food sector, and has been developed through a broad and well-established process involving stakeholders from the entire food supply chain – from suppliers of consumables, entrepreneurs in the primary production and processing industries to retailers and restaurants, and their subcontractors.

Throughout the process, emphasis has been on competitiveness, sustainability, on creating systems to better meet the needs of a rapidly changing, complex, and multifaceted market, and on maintaining a perspective that considers every aspect of the chain.

These perspectives form the foundation on which the Agenda is built and, although not always mentioned within each individual area of focus, they permeate every goal and challenge presented.

The following ten pages contain descriptions of our missions, areas of focus, and sub-areas. For a schematic description, please refer to Appendix 1.

In the work on upcoming innovation and research projects, we want to encourage combining sub-areas, ideally from multiple areas of focus and from different missions.



Mission 1

THE WORLD'S MOST ATTRACTIVE FOOD AND DRINK

In 2030, conscious consumers worldwide are choosing Swedish food and drink thanks to our unique added values.

The food we put on our plates and the drink with which we fill up our glasses have reached this position via an advanced value chain and through the final choice of the consumers. The work is extensive – from qualifying to enter a market to building a relationship where the consumer feels that your product is the one that best fulfils the requests and functional requirements of each meal situation. In order for Swedish foods to really attract consumers worldwide, they must offer added values that are perceived as the most relevant right here and right now.

DEEP UNDERSTANDING OF CONSUMERS

To achieve this requires a *deep understanding of consumers, drivers, and trends in our selected markets.* It involves increasing knowledge and understanding of how consumers think and act and of which social factors are linked to food and eating by mapping food systems, markets, and behaviour. New methods and tools are therefore required to identify future societal challenges.

Data and digital aids can be better utilised to capture trends and consumption patterns and thus create future-proof offers. This means better understanding and utilisation of publicly available data from open sources, but also stakeholders along the value chain being more open with sharing data that can help build relationships and create relevant added values.

COMPETITIVE ADDED VALUES

Deeper insight also enables *defining and developing the unique added values that create Swedish competitiveness in a global foods market*. This includes Swedish strengths and competencies in areas such as product safety, infectious disease control, animal welfare, antibiotic use, or production conditions which our geography can offer. All this can be transformed into unique added values for different consumer categories. Through a clearly attractive message and brand for Swedish food production and Swedish products, a deeper understanding is created of the unique added values and of when, where, and how they can create business opportunities in both a Swedish and global market.

ATTRACTIVE OFFERS

Sweden has incredible raw ingredients, great technical know-how, and a world-class gastronomy. This enables us to develop attractive offers for both the domestic market and the export market based on our unique added values. Included here are the development of new products and offers, such as alternative proteins based on Swedish raw ingredients, sustainably produced animal products, plantbased products, and seafood.

New technologies, production methods, and services are needed in order to combine different raw ingredients and develop new products and production methods, thereby enabling the development of attractive offers that could not be identified in a traditional way.

Sensory testing is central and needs to be developed as a tool to ensure foods of high eating quality. Sweden will also build on its long tradition of developing innovative packaging systems with smart and sustainable packaging and packaging materials.

GLOBAL VALUE CHAIN

The Swedish food sector needs an *efficient global chain of production, distribution, marketing, and sales to capitalise on our unique added values.* This involves developing innovative methods for marketing and sales in international markets, but also a better understanding of local production and how it is balanced against more centralised large-scale production. Distribution and flow of goods need to be streamlined using modern technology and organisation. In addition, traceability and labelling systems must be developed to fully gain the benefits of Swedish

added values in the market.

GASTRONOMIC DRIVING FORCE

As a measure of value in Swedish food attractiveness, we will consciously work to achieve *global Swedish food success with gastronomy as a strong driving force*. This means that the understanding and development of attractive food environments and meal experiences must increase. We can achieve this by, among other things, mapping and developing new knowledge and increased understanding of terroir and merroir, as well as more advanced knowledge of culinary tourism. In addition, Swedish gastronomy will evolve into a worldclass source of inspiration.

CASE: TEX MEX THE SWEDISH WAY

The typical Swedish Friday evening meal of tacos and toppings is a great example of how we Swedes can adopt food trends and styles from other places and make them our own – and then put them back out on the international market.

Tex Mex the Swedish way has its roots in the developmentally optimistic 1980's, when the American brand Old El Paso was introduced in Sweden. The American trend inspired the Swedish spice company Nordfalks. The concept was perfect for a flavouring company. In 1991, the first Swedish products were launched under the traditional spice brand Santa Maria.

Sales were slow at first, but with a substantial investment in marketing and from competition between the brands, the segment grew from a few million to a SEK billion market. The concept grew and came to include spice mixes, salsa, taco shells for tortilla bread, tortilla chips, and finally the golden Swedish hybrid: the tortilla pizza.

From main focus being on flavour and spices, taco shapes, chips, and tortilla bread came to play an increasingly important role. In 2008, the company opened a new tortilla bakery in the city of Landskrona, where state-of-the-art technology was used to make bread with long shelf-life completely without preservatives.

For Nordfalks, now Paulig, more exotic flavour concepts, like Asian and Indian, came together under the Santa Maria brand. They also became new examples of how Swedish consumers brought culinary experiences with them home and how we then put our own spin on that culinary experience.

The Swedish variant of dishes from the border between Mexico and the United States also reached other markets, especially in Europe with the Baltic States, Belgium, the Netherlands, Luxembourg, and the United Kingdom. In 2018, the Paulig snack division, comprising tortillas, taco chips, taco shells, and meal kits, had sales of 273 million euros.

Mission 2

COMPETITIVE FOOD INNOVATION.

In 2030, there are 50 new Swedish food innovations generating a total turnover of 1 billion euros.

Swedish food innovation was given a boost during the 1990's, when the combination of food and health and the hope of being able to market foods using health arguments attracted both creativity and capital. Innovations such as Oatly, ProViva, oat fibre concentrate, and cholesterol-lowering margarine were born. In a market characterised by tradition and gradual change, it takes courage to develop foods and concepts that are both innovative and have great market potential. Because competition is fierce – four out of five new products do not survive their first year on the market.

LEADING INNOVATION SYSTEM

To meet this challenge, **the value chain requires a world-leading system for innovation**. The system must include new innovation models that shorten the path from identified need to finished product. The best conditions for this are created in strong innovation clusters that, through crossborder collaboration, provide conditions for growing companies throughout the value chain. Access is needed to both testing and pilot facilities and especially small companies and start-ups need access to small-scale production facilities and test markets.

The Swedish collaboration model, which links research, businesses, the public sector, and the non-profit sector can continue to be developed and utilised effectively to create the necessary transformation of the food system. Part of this is public procurement of innovation.

INCENTIVES FOR DEVELOPMENT

One way to achieve this is to create strong incentives for the development of products and production systems with a more positive impact on health and the environment. This includes identifying and managing regulatory frameworks that inhibit innovation and developing and applying new knowledge and insights as well as new methods for managing systems that promote innovation.

NEW BUSINESS MODELS

An important aspect of the innovation process is also to **develop new business models** in order to realise the real potential of the innovations. This involves developing new value chains and meeting consumer needs with new service-based models that also offer new value-based payment models. The goal is to develop sustainable business models that ensure the preservation of relevant values created throughout the value chain.

ATTRACTIVE INVESTMENTS

Through *increased external interest in the industry*, we will also attract more investments and venture capital. Traditionally, established food companies account for the absolute largest share of the venture capital that goes to innovation and upscaling. By creating and highlighting the success of Swedish food innovations, the Swedish food industry will also be made into an attractive sector in which to invest.

PRIDE AND ATTRACTIVENESS

A crucial aspect of the innovation system is to be able to attract the best talent. It is about increasing pride and attractiveness within the industry by communicating that we are an industry of the future. An essential part is communicating the added values and success of Swedish foods and thereby creating pride in the industry, where success breeds success.

CASE: OATS AS A SUCCESS FACTOR

The 1980's medical discovery that oat beta-glucans could lower cholesterol levels in people with elevated levels, along with the Japanese innovation of FOSHU (Food for Special Health Uses or Functional Foods), focused the interest of both researchers and product developers on food and health. With plenty of oats in Sweden, several ideas and innovations emerged around this raw ingredient.

In the university town of Lund, Professor Richard Öste had been studying lactose intolerance, and with the increased knowledge of oats, he came up with the idea of developing a Swedish oat drink that, in addition to being a Nordic alternative to soy drink, also turned out to have a documented effect on cholesterol. Together with three research colleagues and the foundation SL-Stiftelsen, he developed an oat base, and the researchers and Skånska Lantmännen formed a joint development company called Ceba AB.

The first product was a weight loss product in soup form, Complätt, which was developed together with Friggs, then part of Procordia Food. After a successful clinical study, the product was launched in 1994. Simultaneously, the company also developed a lactose-free drink called Ica Solhavre for the food retailer Ica, which, like Complätt, was produced under licence for many years. Ceba's first own product was Mill Milk, which was launched in the UK market in 1995.

In the late 1990's, Oatly was launched in Sweden – a venture that became so successful that the company ended up adopting the product name as its own. But it would be another ten years before the real success came through a shift to lifestyle marketing well in line with an increased interest in vegetable products. In 2019, the company's sales reached almost SEK 2 billion.

Mission 3

FOOD AND DRINK FOR A HEALTHY LIFE

In 2030, thanks to an attractive offering of healthy and flavourful products, Swedish consumers have better eating habits.

We have never lived longer, and, from an international perspective, we have good public health. Despite this, many people suffer from chronic diseases linked to lifestyle, where food and eating habits play a major role. The problems involve aspects like overweight and obesity, high blood pressure, type 2 diabetes, and cardiovascular disease. Access to healthy foods and meals can help prevent many of the diet-related conditions and even contribute to improved perceived health in people who are well.

KNOWLEDGE OF CONSUMER CHOICES

The importance of lifestyle and meal situation when it comes to what and how we choose to eat makes it necessary to gain access to **deep understanding of consumer behaviour and expectations regarding healthy food**. We must advance our understanding of how consumers think in terms of food, health, and sustainability in a changing society, and strengthen the food supply chain's knowledge of consumer behaviour and the link between food and health. Doing so requires new tools for data collection and consumer behaviour analysis.

FACILITATE CONSUMER CHOICES

In a free market, the final decision lies with the consumer. Therefore, we should *make it easier for the consumer to make informed and healthy choices in harmony with the Swedish dietary guidelines*. This involves developing tools that make it easier for the individual consumer to choose right. The various obstacles standing in the way of targeting dietary advice adapted to different audiences must be identified and addressed.

How packaging design, colours, choice of images and other aspects of communication can support the consumer's choice of healthier foods needs to be investigated.

Consumers, health care professionals, and others must be able to assess the health effects of foods and meals as well. This requires developing digital tools and communication channels.

HEALTH BENEFITS

Offering a wide selection of foods that help the consumer to good eating habits is an important responsibility for the food industry. A key aspect here is *access to new food products with health benefits*. To achieve this, it is important to develop models, methods, and technologies, as well as databases for identifying, measuring, and understanding health effects – at both individual and group level – from individual raw ingredients, foods, and entire dietary patterns. This applies to already developed products as well as new ones.

For producers, it is important that new processes and technologies are developed for best possible nutritional content and taste. Products adapted to various audiences must be developed and we also need better understanding of how modified lifestyles affect the health effects of food.

POSITIVE TASTE SENSATIONS

In order for *healthy foods to have the desired effects, they must provide a positive taste sensation and improved perceived well-being.* Developing foods with good sensory properties is very important to increase acceptance and availability when the food product is introduced to the market. This means that we need to develop methods that predict and measure taste sensations based on a multi-sensory perspective. We also need methods that enable predicting the sensory quality based on the product's properties and the meal situation.

CASE: REDUSALT

Sweden is one of the countries in the western world where daily intake of salt is too high. On average, we consume between 10 and 20 grams of salt per day compared to the recommended intake of 6 grams. A high intake is associated with an increased risk of high blood pressure and thus an increased risk of heart attack, stroke, and kidney damage.

The fact that we eat too much salt is partly linked to a food culture where salt is traditionally used to preserve foods like fish, meats, and dairy products. In cooking, salt is often used to enhance other flavours. A large part of our intake comes from processed meats, bread, cooking fat, cheese, and ready-made foods.

In other countries, like the United Kingdom and Finland, government agencies and food companies have successfully worked together to reduce salt intake. In Sweden, through the Redusalt Project, with 18 partners from the food industry, government agencies, and consumer organisations, and under the management of RISE, we have worked for three years to develop methods that enable reducing the salt content of products and meal solutions while retaining flavour and maintaining safety.

The project shows that it is possible to reduce the salt content in the type products studied without negative consequences. This is an important contribution to reducing the intake of salt to 6 grams per day. Such a reduction would in turn lead to significantly improved public health, with reduced costs for health care by SEK 3 billion per year and a reduced number of deaths due to the effects of excessive salt intake by 2,000 people per year.

Mission 4

A RESOURCE-EFFICIENT FOOD SECTOR

In 2030, the profitability and resilience of the Swedish food sector have been strengthened thanks to increased resource efficiency and sustainable production methods.

By the middle of this century, it is estimated that the global food system needs to feed another two billion people. This corresponds to the same increase that occurred between 1990 and 2015 and which led to a system that has exceeded the limits considered sustainable over time. This applies primarily to biodiversity, plant nutrient flows, and land use. If we are to meet the challenge from a Swedish perspective, we must develop our national food system to become more environmentally, economically, and socially sustainable.

RESOURCE-EFFICIENT AGRICULTURE

Swedish agriculture has comparatively high productivity but needs to be developed to become **even more resource-efficient and profitable based on our Swedish added values.** This means being able to take advantage of soil production capacity and ecosystem services by developing knowledge and solutions in soil biology, plant protecttion, and plant nutrient cycles. Sustainable use of water needs improving. The production of plantbased raw ingredients must be streamlined and made more sustainable through, for example, modern plant breeding and variety testing.

The production of animal products must be streamlined throughout the value chain while retaining high quality and maintaining proper animal welfare. The emerging aquaculture has a unique opportunity to combine high efficiency with sustainability through new technologies. There is also great potential for the fishing industry by combining good stewardship with better utilisation of bycatches and underutilised species.

New technology with focus on automation, digitalisation, and electrification plays an essential role in sustainable efficiency.

RESOURCE-EFFICIENT PROCESSING Food processing based on Swedish added values

is done more resource-efficiently and profitably. This is achieved through more efficient utilisation of industrial production capacity as a whole and through increased use of new technology with focus on automation and digitalisation in the Swedish food industry. It also includes more efficient utilisation of energy, water, and other inputs, and through optimised design of production processes and alternative techniques. We need development of resource-efficient packaging solutions with reduced use of plastics, an increased proportion of renewable raw materials, and use of alternative techniques. In addition, new technologies for more resourceefficient small-scale food production must be developed, as well as increased flexibility in the food supply chain to be able to quickly adapt in a crisis.

RESOURCE-EFFICIENT MEALS

Resource efficiency and profitability need to increase in restaurants and catering. The meal sector is growing rapidly and needs to increase its use of new technology, including automation and digitalisation. Processes and logistics in the meal sector value chain – purchasing, preparing, serving, and food wastage control – must be optimised. This includes more efficient use of energy, water, and other inputs. The meal sector is labour intensive and labour planning and organisation therefore need to be optimised.

REDUCED FOOD WASTAGE

Food wastage costs huge amounts of money and has a very negative impact on the environment. **Reduced food wastage at all stages of the chain** is thus required. The time between production and disposal with retained quality must be extended. This involves designing strategies to manage variation in ingredients and developing smart and efficient logistics chains. Production must become more demand-driven while increasing awareness of the needs for reduced food wastage at all stages of the food chain. The food wastage that still occurs must be handled with care to utilise the resources required in the process.

MORE PLUS, LESS MINUS

Increasing resource efficiency requires both reduced negative and increased positive environmental impact. This involves viewing environmental impact from a system point-of-view to avoid suboptimisation of individual aspects and establishing a common target image of the food supply chain's environmental impact and what characterises a sustainable food system. Biodiversity must be ensured, and environmentally hazardous emissions must decrease while production increases. It must become easier for consumers to choose sustainable food.

INCREASED CIRCULARITY

Reduced food wastage and improved resource householding gives *increased circularity across the food sector*. This means better utilisation of by- and residual products to create value. This applies especially to primary production – fruits and greens – and to packaging, where today's recycling system is approaching its maximum level. Householding with important plant nutri-ents must be improved. This is done by developing fully or partially closed circular systems for food production. A regulatory framework that enables increased circularity is also important.

INCREASED RESILIENCE

An important aspect of a sustainable food system is trust in the system even in a time of crisis. Resilience therefore needs to increase through a well-functioning system even in a crisis. Supply capacity in the event of a crisis must be ensured through secure supply of raw ingredients, production capacity, and logistics. Climate change also makes it necessary to advance and adapt primary production. Adapting includes the development of diverse farming that creates conditions for resilience. For good supply capacity in the event of a crisis, the entire food system must be developed into a flexible and robust value chain.

CASE: ABSOLUT RESURSKOLL

All the wheat used to make Absolut Vodka is grown in Skåne with careful documentation and monitoring of cultivation efforts and measures. Among other things, Pernod Ricard Sweden works with the Swedish University of Agricultural Sciences to design a resource-efficient farming technique that involves, for example, crop sequencing and soil health. By-products from the process in the form of gluten, water-soluble proteins and distiller grains are utilised. Gluten is used in the baking industry and other proteins are used in feed or, in smaller quantities, in foods. The distiller grains go back into farming as feed and although they do not go to the exact farms that grew the crop, it is still a regional cycle.

Today, 90 percent of the energy used in production comes from green energy, heat recovery, or district heating. Over the past ten years, carbon dioxide emissions have been reduced by 80 percent.

Last year, in order to inspire the company's customers to recycle the well-known – iconic – bottle, a limited edition was launched in bottles that consisted of at least 41 percent recycled glass.

Mission 5

CLIMATE NEUTRAL FOOD PRODUCTION BY 2045

In 2045, Swedish food production has a net zero carbon footprint..

Of greenhouse gas emissions, Swedish food production accounts for about 14 percent, of which agriculture accounts for 12–13 percent and the food industry for about one percent. Add to this the emissions caused by imported foods in other countries. Under the Swedish 2017 Climate Act, Sweden shall be climate neutral by 2045. All human processes generate greenhouse gases, especially the fossil-based ones but also the biological ones, although they also bind carbon dioxide. Even though it is assessed that agriculture will have difficulties achieving zero emissions by 2045, the ambition is to work with significantly reduced climate impact with a zero vision for Swedish food production by 2045.

REDUCED FOOTPRINT OF AGRICULTURE

Agriculture accounts for the absolute largest share of the food system's climate impact and it is therefore essential to **reduce carbon footprint in agriculture**. This means that the emissions of nitrous oxide, methane, and plant nutriment must decrease in both plant cultivation and animal husbandry while production must increase further. Sustainable production of plant-based raw ingredients and feed with reduced carbon footprint must increase. Agriculture must switch to fossilfree inputs. Digitalisation must increase and the utilisation of data must improve for enhanced precision in both plant and livestock production.

REDUCED FOOTPRINT OF SEAFOOD

Raw ingredients from lakes and seas are expected to gain a larger role as the base for foods and feed, and as this part of the food sector grows, it is important to **reduce the carbon footprint of fishing and aquaculture**. We will achieve this by establishing technology for climate neutral cooling and replacing fossil fuels. The circulation of plant nutrients and feed utilisation must be improved in the various breeding systems. We must increase sustainability in the management of by-products and by-catches.

REDUCED FOOTPRINT OF PROCESSING

Even if the **processing share of the carbon footprint of foods** is comparatively small, it must still be reduced. As for other stages of the food supply chain, the replacement of fossil fuels is a key aspect, as is reducing food wastage and increasing the sector's utilisation of by-products. Increased resource efficiency and reduced environmental impact in previous stages also have positive effects on the climate impact of processing.

REDUCED FOOTPRINT OF DISTRIBUTION

Reduced carbon footprint in distribution, trade, restaurants, and catering is necessary and something that will be accomplished by establishing fossil-free distribution and developing a climate neutral cooling chain. It also involves resourceefficient, safe, and sustainable production methods in catering. In addition, emissions will be reduced through optimised logistics chains and transport.

CLIMATE-SMART PROTEINS

There is great market interest in replacing animal protein with plant-based ones for climate reasons. It is therefore important to develop **new proteins with reduced carbon footprint.** This involves designing systems to better utilise various by-products, but also to develop production of protein-rich foods based on new raw ingredients.

MORE PLUS, LESS MINUS

A climate neutral food sector will be achieved through **reduced negative emissions and increased positive climate impact**. Different technological solutions must prevent carbon stored in food products and by-products from returning to the atmosphere. An essential tool is to design safe systems for climate compensation that link stakeholders through quality-assured and relevant business models. Interest in the food sector is great, in terms of both compensation and substitution, and it is therefore important to create system perspectives on climate neutrality in collaboration with other stakeholders.

MEASURABLE SUCCESS

Successful work with achieving the goal of climate neutrality is an added value and can be developed into a success factor for the Swedish food sector. It is therefore important to mobilise and measure success to show climate benefits in Swedish-produced food and drink. This will be achieved by developing and standardising system analysis and modern methods for calculating sector-specific climate impact. To do so, we need an industry-wide tool for mapping and measuring at producer level. A national database for carbon footprint of foods in line with other European initiatives must be established. The systems for eco-labelling, including climate benefits, must be further developed to enable comparison of different food products and value chains based on relevant parameters.

CASE: CLIMATE-SMART MEAT

adaptation by designing new breeding concepts and new products. In an effort to replace imported proteins, mainly soy, HKScan developed its own concept, Rapsgrisen (Rapeseed Pork). After careful studies, imported raw ingredients for feed were replaced with rapeseed meal from Swedish rapeseed. The gain became threefold. In addition to feed with reduced carbon footprint, they obtained a meat ingredient with unique sensory properties and higher content of healthy omega-3 fatty acids. In food quality awards, products based on meat from rapeseed pork have received various awards, including Best Product in the Processed Meats Swedish Championship. In the spring of 2020, a line of cured products based on rapeseed pork was launched.

When introducing the concept, rapeseed pork was marketed with "anatomical responsibility", i.e. that shops wishing to sell certain cuts had to buy a whole range.

HKScan also pioneered hybrid products, where sausages and processed meats were based on a mix of plant-based and animal ingredients. For a few years, they sold under the "ish" concept (like "meatish").

In 2020, in collaboration with individual breeders, Gårdsinitiativet (the Farm Initiative) will be launched, where production of free range animals take place in an integrated concept involving, as far as possible, self-produced feed, renewable energy, reduced water consumption, better householding with plant nutriment and measures for biodiversity.

Together we create the sustainable growth industry of the future

If the food sector in Sweden manages to achieve Sweden Food Arena's vision of sustainable food innovation for more jobs in Sweden and pleasure around the world, and, by 2030, reach the goals of being among the top three in innovation rankings for the food sector in Europe, of having launched at least 50 new Swedish food innovations that generate a total turnover of one billion euros, of having created at least 50,000 new jobs and increased the export share to 50 percent of production – then the Swedish food sector will have become Sweden's new growth industry.

With our five missions, the food sector has taken on clear assignments and a leadership role in meeting the challenges that face not only the industry as an individual sector but the entire society. However, the food sector is merely part of a wider context, and we cannot achieve the vision without close collaboration with other major sectors, government agencies, interdisciplinary research programmes and initiatives, and politicians and public sector decision-makers. We are also closely integrated in a European and international sector, which extends the need for collaboration even outside the country's borders.

We do our part, but we cannot do this on our own. If, together, we are to achieve an environmentally, economically, and socially more sustainable society by 2030, our work also places demands on the outside world.

PUBLIC FUNDING OF RESEARCH AND INNOVATION

The food sector employs 300,000 people with a turnover of SEK hundreds of billions per year. This makes it one of the country's largest sectors, which should be reflected in the size of public funds allocated through research councils and growth and innovation funders. The ambition is to reach an annual public investment of SEK 400 million in innovation and research. A clear public investment would mobilise corresponding investments from the industry in the form of co-financing and projects. The food sector is already prepared to invest SEK 150–200 million, with an incremental increase to SEK 400 million – if public funders are willing to invest the corresponding amounts. This also includes strengthening the ability of the food sector to participate and take on a leadership role in EU joint projects, from both an industrial and academic aspect.

LONG-TERM PLANNING

The ability of the food system to withstand severe disruptions in connection with crises is crucial for the citizens' trust in both the food supply chain and in society's overall preparedness. Therefore, the long-term perspective of and the conditions for industry planning must be improved – something that would benefit investments in innovation and growth that require patience and long-term profitability. We thus call for time perspectives freed from traditional research policy cycles, with longer planning horizon, ideally ten years or more. Examples of such decisions include the food strategy that extends up until 2030 and the Climate Act, which was enacted with a clear goal 25 years into the future.

REGULATORY SYSTEMS THAT PROVIDE INCENTIVES FOR INNOVATION

For us to be able to achieve our goals and implement a major system change, it is important that regulatory frameworks promote innovation. Current regulations need to be further developed to become more



coordinated and facilitate innovation and growth. Coordination between responsible government agencies establishing the rules and the agencies responsible for promoting innovation and growth is important.

COLLABORATION WITH OTHER SECTORS TO ACHIEVE COMMON GOALS

The food sector shares its goals and visions with other sectors. Therefore, collaboration across sectors must increase to create conditions for increased pace of innovation.

In collaboration with other sectors, the Swedish food sector can drive progress and show the world how to competitively produce high-quality food with minimal impact on the environment and climate. We can continue to develop sustainable bioenergy for transport together with the energy sector and contribute to improved public health together with the life science sector. Obviously, as a leading technology nation, Sweden will develop new technological and digital solutions for future sustainable production, distribution, and consumption of good food.



Appendix 1

MISSIONS WITH AREAS OF FOCUS AND SUB-AREAS

Described in the following pages are the five missions and the areas of focus associated with them. In total, we have 28 areas of focus and more than 100 sub-areas specifying how the food supply chain should strive towards the vision, goals, and missions formulated by Sweden Food Arena.

The missions are stated in the yellow boxes, the areas of focus make up the blue boxes, and the sub-areas can be found in the green boxes.

In the work on upcoming innovation and research projects, we want to encourage combining sub-areas, ideally from multiple areas of focus and from different missions.



Develop sensory testing as a tool

Develop innovative and sustainable packaging

| Attract the best talent to the industry Communicate success stories to create pride in the industry, where success breeds success | Increased pride and attractiveness within the industry by communicating that we are an industry of the future | | Aworld-leading | Design new innovation models to shorten the path from identified need to finalised product Develop strong innovation clusters that, through cross-border collaboration, provide conditions for growing companies in the value chain |
|---|---|--|---|---|
| Create and highlight success stories of Swedish food and drink innovations Make Sweden an attractive place to invest in food and drink Develop the value chains of the future | Increased external interest in the industry to attract more investments and venture capital | Competitive food innovation In 2030, there are 50 new Swedish food innovations generating a total turnover of 1 billion Euro | system for innovation in the value chain | Increase access to testing and demo facilities Develop the innovation procurement process Effectively utilise "The Swedish Collaboration Model" to achieve system transformation |
| Design the service-based business models of the future, including payment models of tomorrow Ensure new sustainable business models in the chain from primary producer to consumer | New business models | | Strong incentives for the development of products and production systems with more positive impact on health and the environment | Identify and manage regulatory frameworks that inhibit innovation Develop and implement new knowledge, insights, and methods for governance and regulations to enable innovation |



foods





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