Netherlands

Farming the Future: partnering up for food security

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Food is life. Food is energy, health, and happiness. With the global population now over 8 billion people, we need to work together to make sure everyone has access to nutritious, high-quality, tasty food. By 2050, the world will need to grow around 60%[1] more food to feed nearly 10 billion people. In the Netherlands, with its 18 million residents, innovative farming helps meet these demands, but the challenge remains. Right now, almost 3 billion people around the world don't get enough essential vitamins and minerals, showing just how crucial it is to find better ways to produce and distribute healthy food for everyone.

Food systems around the world are under increased pressure. Population growth, climate change, biodiversity loss, dietary patterns, new trade realities, and food loss and waste all play a role in keeping the system in balance. The Netherlands is working towards a sustainable food system that benefits people, nature, and climate. Our approach centres around creating and facilitating nutritious, safe, accessible, available, and affordable food for everyone. By leveraging advanced technologies and sustainable practices, the Dutch agriculture and horticulture sectors are paving the way for a more resilient, efficient, and fair global food system. From the farmers planting seeds and the animals reared, to the scientists and private sector developing new technologies and retailers bringing food to our tables.

1. The Dutch approach

In the Netherlands, we contribute our centuries old knowledge and expertise to the achievement of the Sustainable Development Goals. We are keen to support our international partners in exploring how we can fight hunger, mitigate the impact of climate change and prevent biodiversity loss, all at the same time. This includes working with, among others, international organisations, governments, and businesses. How can we boost economic prosperity and maintain people and planetary health?

How can we create jobs in the countryside and feed the rising population in urban areas? How to make a sector attractive and prosperous for future generations of workers? Alongside demand for higher quantities and varieties of food, consumers are becoming increasingly critical of the impact of our food on health and wellbeing. Food safety is also of great importance to consumers and for international and regional trade. Questions also arise about where and how our food is grown, produced, processed and distributed.

[1] World Resources Institute (2020)

Farming the Future

Our food system is a great example of efficiency and innovation, characterised by a blend of agricultural tradition and modern technology. Overtime, we have united our knowledge and experiences to find innovative solutions to our challenges. The Netherlands is densely populated, and land and resources have at times been scarce. This means we have had to think on our feet and out of the box. Innovation and research have been critical to meet ongoing needs, and have overtime facilitated the Dutch food and flower sector with growth opportunities worldwide. With our strategic location, the Netherlands acts as a gateway to Europe, importing fruits, flowers, and other commodities. As a result, we rank high among the world's top food exporters, with some 124 billion euros worth[2] of agricultural goods exported annually. This counts for a staggering 17.5% of total Dutch exports. With varieties like Gouda and Edam finding their ways to dinner tables across the globe, it's no surprise we're also the second largest exporters[3] of cheese worldwide.

The Netherlands uses a unique framework that fuels economic growth while advancing sustainable practices at the same time. This is born from our aim for a future where innovation serves as a catalyst for societal benefit. It's often referred to as the Dutch Diamond, but more formally known as the Dutch Quadruple Helix approach. This framework embodies a collaborative synergy between knowledge institutes, NGOs, governments, and the private sector. Consumers and society are also not forgotten in this approach. The model fosters innovation by leveraging the strengths of each sector, facilitating partnerships that transcend traditional boundaries. By integrating research expertise with governmental support and entrepreneurial drive, the Quadruple Helix approach accelerates the development and scaling of solutions.

2. Nutritious and safe food for all

The Dutch agrifood, horticulture, and fisheries sectors are at the forefront of producing healthy food. Our advanced technologies and sustainable practices enhance the nutritional value and safety of our produce. Practices include precision farming, climate-controlled greenhouses, and high-quality seed production that is resilient to pests and diseases. Seed Valley, a region in the northwest of the Netherlands, is the world's leading centre of plant breeding and seed technology. In fact, 50% of vegetables have their origin in the Seed Valley. Developing a high diversity in seeds facilitates the production of crops with optimal nutrient profiles for farmers everywhere. Knowledge transfer through training programmes and collaborative research ensures that local farmers can effectively implement and benefit from these innovations.

The vivid research community plays a pivotal role in the Dutch agriculture and horticulture sectors. World-renowned knowledge institutions like Wageningen University & Research continuously develop innovative techniques and crop varieties that are both nutritious and sustainable. Such innovation is carried out alongside a vibrant ecosystem of agricultural technology startups and experimental farms in the country's Food Valley. Monitoring, certification, and information transparency are equally important factors in the Dutch food system. For example, the Netherlands Food and Consumer Product Safety Authority (NVWA) is an independent agency in the Netherlands that monitors animal and plant health, animal welfare, and the safety of food and consumer products. Rigorous food safety standards and quality control measures guarantee that our agricultural products are safe and healthy for consumers.

By combining efficient production methods with a robust export network, the Netherlands supplies high-quality, nutritious food, technology, and knowledge to global markets in a variety of different consumer segments. Not only via direct production, but also through knowledge and technology exchange. This information exchange is imperative to support global populations in adopting new techniques that fit into local social, economic, and environmental contexts. Together, we can improve the production, processing, sustainability, and quality of food by merging local contexts with Dutch knowledge.

While the Netherlands often opts for cutting-edge technology and new approaches, we also understand the differencing circumstances some countries face and the variety of solutions that are needed. We know it's equally important to blend low- and mid-tech practices in our farming. Not everything has to be high-tech to have impact on food systems. That's why knowledge sharing and international partnerships are at the core of our agriculture and horticulture sectors. The international platform Dutch Greenhouse Delta (DGD) is a gateway for foreign investors, governments, and growers to create a local, future-proof ecosystem for the production of flowers, plants, and vegetables. Organisations like DGD facilitate international collaboration and innovation.

[2] Central Bureau Statistics (2024)
[3] OEC, Cheese (2022)

Through collaborative initiatives like Partners for International Business (PIB) and Private Sector Development (PSD), Dutch companies collaborate in clusters to share technology, knowledge, and expertise with local farmers, producers, and other professionals in the sector. This cooperative strategy enhances sustainable food production, improves supply chains, and fosters innovation across the global food sector, under different local conditions. In India for example, HortiRoad2India is an initiative aimed at fostering collaboration between the Dutch horticultural sector and Indian stakeholders. By working together and adapting solutions to local circumstances, HortiRoad2India can support India's horticulture sector to produce better quality products. And in turn, food producers can provide hotels, restaurants, and supermarkets with products that not only last longer, but are also fresher, healthier, cleaner and produced using less resources.

Likewise, Soil Improvement Poland aims to nurture collaboration between Dutch and Polish businesses and knowledge institutes. Earlier projects between both countries took place in 2020 and 2021 to improve soil conditions for agriculture and horticulture with positive results. The next step includes building an online knowledge platform in collaboration with Polish universities. Meanwhile, in Senegal, Dutch companies help local farmers reduce post-harvest losses and improve the quality of onions, and other vegetables, leading to higher incomes for farmers and traders.

In the Middle East, we're actively promoting sustainable food systems by introducing circular protein sources such as insect and poultry byproducts, particularly in Egypt and Jordan. This approach aims to enhance food security while reducing dependency on imported soy and fishmeal. Across the globe in Kentucky, the Netherlands is working with local businesses and government to build an AgTech ecosystem aimed at enhancing food security and job creation. Through the "Let's Grow Together" initiative, Dutch technology and expertise are being used to develop high-tech greenhouses, promote sustainable farming practices, and provide year-round jobs in Kentucky. This collaboration also focuses on training programs, supporting local growers, and increasing access to fresh, healthy food.

3. Sustainable protein production

Proteins are the building blocks of life on Earth. In order to meet environmental and societal, and animal welfare needs, alternative (plant-based)protein sources need to be developed alongside sustainable animal-based meat, dairy, fish, and eggs. The International Panel on Climate Change (IPCC)[4] report strongly underlines the importance of exploring alternative proteins to stay within planetary boundaries and deal with resource scarcity. The Netherlands also looks for new ways to reduce the environmental impact of the animal protein sector. We stand at the forefront of developing diverse and environmentally-friendly protein sources, promoting the transformation of how we feed a growing global population. The Topsector Agri & Food helps stimulate new knowledge and innovations around this shift, first and foremost by creating and financing research and innovation projects.

The Netherlands is a frontrunner in sustainable meat production, focusing on animal welfare, health, environmental impact, and working conditions. Companies work individually and in collaboration with other parts of the supply chain to further enhance sustainability and maintain and strengthen this position. We are increasingly focusing on higher-quality animal products that improve animal welfare, while also having lower environmental impact, and contributing positively to biodiversity. By setting and adhering to standards that exceed EU legal requirements, the Netherlands ensures that animal welfare is highly prioritised. Our market development initiatives show extra-statutory performance for sustainable and animal-friendly chain concepts, making the Netherlands a market leader in the export of organic pork meat in North-West Europe.

Our strategy also includes the exploration of alternative proteins that meet the increased demand for protein sources. For example, through the development of ocean-based and plant proteins for consumers, as well as using insects for animal feed. Reducing the need for traditional livestock farming can significantly lower greenhouse gas emissions and lessen the pressure on natural resources. This shift helps mitigate climate change by decreasing the environmental impact of food production. For example, seaweed farming not only provides a nutritious food source but also helps absorb carbon dioxide, mitigating the effects of climate change.

[4] IPCC (2021)

Alternative protein sources typically require fewer resources and generate less waste than conventional livestock farming. The Netherlands is a pioneer in developing and producing alternative protein food products with companies like Vivera, De Vegetarische Slager (Vegetarian Butcher), and ENOUGH all focusing on sustainable alternatives. By promoting these practices, the Netherlands contributes to global food security and environmental sustainability. Through supporting standards such as RTRS for soy and RSPO for palm oil, we promote responsible commodities, including deforestation- and conversion-free production, good working conditions, and responsible use of crop protection. Another example of our dedication to a circular good system includes making animal feed more sustainable. By sharing our knowledge and practices globally, we strive to lead the way in sustainable protein development, ensuring a healthier planet for the future.

4. Climate change and adaptable technologies

Modern agricultural practices have a significant impact on climate change. The IPCC stated in 2019 that one-third of greenhouse gas emissions are produced from our global food system. At the same time, climate change can disrupt agricultural productivity through rising temperatures and erratic weather patterns. Collaborative efforts between governments, researchers, and the private sector are essential for developing and disseminating climate-smart practices that are also biodiversity-friendly. By adapting agricultural practices to the changing climate, we can safeguard food security and ensure sustainable rural livelihoods.

The Netherlands promotes food security through resilient food systems that contribute to climate change mitigation. By optimising the balance between the nutritional value of products and minimising greenhouse gas emissions, we're working towards minimising the negative impacts on the climate. This includes the development of drought-resistant seeds, improved irrigation techniques, and the integration of agroforestry and conservation agriculture methods to enhance soil health and biodiversity. The country's strong focus on circular, climate-smart systems are characterised by robust farming on –healthy soils, minimal inputs, and efficient water use. The national policy "Water and Soil Guiding" emphasises the urgency of an integrated approach to address the challenges around water and soil management. This means water and soil systems have a critical role in how the Netherlands is designed, relieving pressure on biodiversity and promoting an economy where people and nature can flourish. To take a step even further, we also promote strong due diligence policies to ensure the environmentally- and socially-responsible import of food and feed products.

Artificial Intelligence, robotics, and digitalisation are all technologies the sector uses to enhance sustainability and adapt to climate change. Dutch precision farming tools like GPS, drones, and advance sensor technology enable farmers across the world to monitor crop health, soil conditions, animal health, and weather patterns. As a result, farmers can optimise water management, yield predictions, and crop production. For example, eLEAF, a Dutch company founded in 2000, provides satellite-derived data to help farmers make the right decisions for their practice. This technology can be of huge assistance in irrigation planning and yield prediction, ultimately improving input use and yields in changing climates.

Controlled Environment Agriculture (CEA) is an excellent method for adapting to changing conditions. You can control factors that are crucial for optimal growth: light, temperature, and water, for example. While growing plants indoors isn't news to anyone, the practice of Controlled Environment Agriculture (CEA) is enabling farmers to grow more food in less space, with fewer resources. A solution that is widely welcomed in densely-populated areas. CEA in the Netherlands, equipped with sophisticated climate control, hydroponics, and energy and water-efficient systems, can be tailored to different environmental conditions, including arid regions and urban settings. Integrated pest management (IPM), sustainable energy sources like geothermal and waste-to-energy, and high-quality seeds are also key components of our CEA approach.

From breeding to growing, processing, distribution, and global trade, the Dutch horticulture sector is well-organised, internationally focused, and constantly innovating. With an organised body, also known as the Topsector Horticulture & Starting Materials, the sector's goal is to be world leader in successful solutions for global challenges in the areas of food, horticulture, and green environment. Dutch companies in this sector invest nearly 1 billion euros annually in research and development, a significant 5% of our country's total R&D[5] spending. This investment highlights the commitment to advancing horticultural practices worldwide.

[5] Horticulture Figures, Central Bureau of Statistics, 2023

5. Towards a robust, future-proof food sector

Farming is more than just a profession; it is a practice rich in identity and history. We want farmers, growers, and fishermen to feel proud of their crucial role in society, and ensure that food systems allow them to earn a decent wage and enjoy their livelihoods. The Netherlands is dedicated to inspiring the next generation by showcasing farming as a profitable business that can adapt to the future.

To sustain the worldwide reputation of the Dutch agriculture, horticulture, and fisheries sectors, the Netherlands invests in innovation and policy that drives a sustainable and future-proof food system. Agriculture and horticulture entrepreneurs play a pivotal role in this mission. And they should be able to earn a profitable income, while also producing in a sustainable way and investing in a sustainable future. Fostering a level playing field and ensuring a fair price for products is essential in a future-proof food system. These are principles we advocate for within the World Trade Organisation and the European Union.

Education and training are also high on our agenda in sustaining a future-proof food system. Through educational programs, internships, and technology-driven projects, we offer dynamic career prospects that resonate with young talent worldwide. The Fund for Youth Employment Institutions, a 7-year initiative funded by the Netherlands Ministry of Foreign Affairs, aims to address the issue of youth unemployment by providing financial resources and support to initiatives that create job opportunities for young people. Farming and agriculture are one of the core sectors the fund addresses. Wageningen University & Research integrate digital technologies and sustainability practices into their curriculum, equipping future agri-tech innovators with the necessary skills. Our Universities of Applied Sciences (Hogescholen) and schools for Secondary Vocational Education (MBO) also dive into the challenges of the sector, with a practice-oriented approach to education. To feed everyone on our planet and create the farm of the future, we need all hands on deck.

6. Working with nature, not against it

The rapid decline of biodiversity, caused by changes in land and sea use, pollution, invasive species, overexploitation of resources, and climate change, is threatening the stability of the ecosystems and ecosystem services underpinning our society. This loss affects both people and the economy. Protecting biodiversity is crucial for keeping our ecosystems healthy and ensuring they provide essential services like pollination, water purification, and climate regulation. It also has a significant impact on achieving food security.

The Netherlands has actively contributed to the creation of an ambitious UN biodiversity treaty, the Kunming-Montreal Global Biodiversity Framework, agreed in December 2022. The goal is to reverse biodiversity loss no later than 2030 and to live in harmony with nature by 2050. We are working on the implementation of this treaty, for instance through Agenda Nature-Inclusive 2.0. This agenda aims to connect public and private parties to ensure nature is considered in new plans. It outlines current initiatives and sets priorities for 2024-2026 across ten domains, with specific strategies and actions. The goal is to create a nature-inclusive society for the preservation of our natural environment. We move from “do no harm” to “do good”.

Nature and landscape management play a crucial role in our agricultural strategy. Preserving and enhancing natural landscapes ensures that farming activities do not degrade essential resources like soil and water. This balance between production and conservation is essential for maintaining biodiversity, which underpins the resilience and productivity of our ecosystems. The Netherlands works on integrating sustainable agricultural techniques with the preservation of ecosystems, creating a harmonious relationship between farming and nature.

This approach ensures that farming activities support, rather than harm, natural ecosystems. By taking a smart approach to space—choosing between extensive and intensive agriculture on a case-by-case basis—we can optimise land use for both agricultural productivity and nature conservation. We can also determine which type of agriculture is best suited for a specific area: high productivity on fertile clay or extensive farming on poor sandy soils. But we also strive to connect and combine agriculture with nature itself, for instance through agroforestry, aquaculture, organic farming, or regenerative agriculture. For example, Lenteland develops regenerative community farms under the motto "fair for farmers, healthy for us, good for nature". In doing so, they connect farmers, society, land, and food. The local community benefits from locally grown fresh food while also becoming co-owners of the farm, thereby increasing their involvement with both the farmer and nature.

7. The economic value of biodiversity

Protecting biodiversity is crucial for maintaining the health of our ecosystems and the services they provide, such as pollination, water purification, and climate regulation. The Netherlands is committed to fostering a healthy natural environment as a strategic pillar for achieving food security and optimising agricultural yields in the long term. By valuing biodiversity financially and promoting its conservation, we ensure the stability and resilience of our agricultural systems. Recognising the financial value of biodiversity underscores its importance and promotes sustainable practices. Through public and private financial initiatives, the Netherlands enables nature-inclusive farming. For example, Dutch bank Rabobank partnered with Canadian multinational McCain to support growers in transitioning to regenerative farming practices[6]. The project is aimed at potato farmers implementing practices such as extensive crop rotation and improved soil health. As a result, farmers benefit from higher potato prices and discounted interest rates, positively impacting both their business and nature. “Agrarisch Natuurlijk" is a national project funded by the Dutch government and run by BoerenNatuur and ZuivelNL. Its purpose is to reward dairy farmers for taking care of nature and the landscape. The project aims to measure and clearly show the farmers' efforts in nature and landscape management so they can be recognised and rewarded. The ultimate goal is to create a business model that helps preserve and improve biodiversity and the landscape.

Labels like “Beter Leven” and “On the way to PlanetProof” require farmers to adopt higher standards for sustainability and animal welfare, which often involves extra costs. The market takes on this responsibility to provide consumers access to products with these higher standards. By using these labels, the market also provides transparency around production methods and covers the extra expenses, together with consumers. This higher price is then passed on to the farmers. This system makes it financially viable for farmers to implement better practices, as the increased revenue offsets the additional costs. It also helps farmers attract consumers who prioritize environmental and animal welfare, creating a market for more sustainable and humane farming.

Another objective in our approach of working in tune with nature is to minimise resource exploitation. By using resources efficiently and reducing food loss and waste, we can produce more with less. This not only conserves natural resources but also reduces the environmental footprint of our agricultural activities. The equation we follow—production - waste = consumption—highlights the importance of understanding and managing these factors to reduce food waste. Knowing how much is produced and lost allows us to implement measures that ensure more food reaches consumers, thereby enhancing food security. Efforts are focused on preventing food waste throughout the supply chain and maximising the utilization of by-products and residual streams. For example, Orbisk is a startup from the Netherlands on a mission to help professional kitchens get a grip on their food waste. Their technology measures and automatically recognises what kind of food is thrown away, in what quantity, and at what time of the day. This is a major breakthrough in the hospitality sector to reduce food waste and better understand their market and demand.

8. Join us in Farming the Future

Ensuring there is enough healthy food, while also making it affordable and reducing waste is a demanding task. But it can also significantly help us work in turn with nature, protecting the environment by creating less pollution and using fewer resources. Sustainable and efficient food systems are imperative if we want to reach our goal of Zero Hunger (SDG 2) by 2050. Through partnerships and knowledge sharing, Dutch farmers, growers, and food (technology) producers can contribute to global food security and sustainability.

Modern agriculture and horticulture practices have had negative effects on our environment, nature, and the welfare of our animals. Fortunately, there has been an increased global interest in working more in tune with nature as opposed to against it or exploiting its resources. This approach not only helps to protect our environment but also sustains agricultural productivity and supports human health. The Netherlands embodies this philosophy, blending tradition with cutting-edge advancements. By doing so, we ensure that everyone benefits, including nature itself. Are you with us?

[6] Rabobank, 2024