Agtech Sweden

Project Catalog

Projects carried out within, or in collaboration with, Agtech Sweden

August 2026

Foreword

Welcome to the project catalog of Agtech Sweden. As leaders of this platform, it is a privilege to present a collective overview of the work shaping agricultural technology in our region and beyond.

This catalog reflects the scope and steady progress of our ecosystem. Gathered here are 151 distinct projects and platform initiatives – a reflection of what can be achieved when research, industry, and agriculture come together. The portfolio includes 80 core innovation projects directly within Agtech Sweden, alongside 38 projects supported primarily through external funding (besides our core funders Vinnova, Linköping University and Region Östergötland). It also encompasses 25 studies dedicated to understanding and improving innovation processes, as well as 8 collaborative platforms and connected initiatives that broaden our shared reach.

Agtech Sweden remains a highly dynamic environment, with new initiatives continuously taking shape. Beyond the established work detailed in these pages, several newly decided projects have recently launched – ranging from smarter field machinery, precision irrigation, and track system comparisons, to AI-driven livestock monitoring, digital soil twins, and biodiversity monitoring. These efforts underscore our commitment to constantly addressing emerging challenges in real time.

151 distinct projects and platform initiatives are a substantial number. But numbers are not everything. Each project in this catalog represents a practical step toward solving real-world agricultural challenges through technology and collaboration. Behind the numbers are lots of struggling people that want to do something good.

We want to express our sincere gratitude to all the researchers, entrepreneurs, partners, and practitioners whose dedication made these initiatives possible, as well as those taking on our newest endeavors. Thank you for your trust, your expertise, and your shared commitment to moving this field forward.

Karolina Muhrman Per Frankelius

Platform Leaders, Agtech Sweden

Content

Please notice

Projects marked with an asterisk (*) are initiated and finished in the **First Phase** of Agtech Sweden (2018–2023), while all other projects are started during the **Second Phase** (or ongoing during the Second Phase but initiated already during the First Phase).

Please also note that the Agtech platform changed its name in January 2024, from **Agtech 2030** to **Agtech Sweden**. In this catalog, we use the name used at the start of each project.

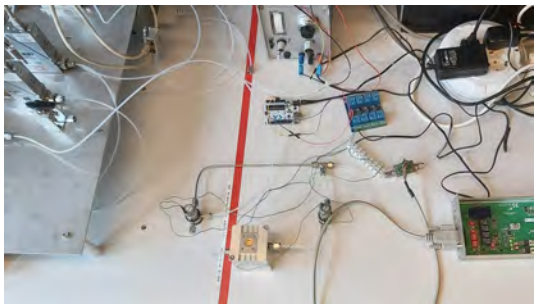
Agtech Sweden's main innovation projects

*Sex sorting of fertilized eggs

Determining the sex of eggs at an early stage has long been in demand in the poultry industry. But no one had yet developed a commercialized solution for sorting fertilized day-old eggs. This project aimed to realize that vision by starting a technical development process. The initiative came from the industry organization Svenska Ägg, which is headquartered in Östergötland. At Linköping University, researchers had over 30 years of experience developing sensor systems. A study used gas chromatography/mass spectrometry to identify which gases eggs emit before incubation and on days 0–4. The study found that the relative proportion of about ten different hydrocarbons emitted by the eggs differs by sex. The actual sex was determined by DNA analysis of embryos on day 4. The authors presented these findings in May 2019. Later studies used a sensor system to detect gases emitted by the eggs. Statistical evaluation methods were shown to offer high potential for determining sex. These groundbreaking advances were presented during the Agtech 2030 industry council on January 20, 2020.

The project was carried out within the framework of Agtech 2030 in collaboration between the Department of Physics, Chemistry and Biology (IFM) at Linköping University, Svenska Ägg and Swedfarm AB (which also provided the eggs).

Budget: 50,000 SEK
Duration: 2019-01-01 – 2019-12-31
Project number: 304536



Left: No one had yet developed a commercial solution for sorting fertilized day-old eggs. Photo: Depositphotos Right: The experimental equipment included advanced gas sensors. Photo: Jan Ybrahim.

*Highly efficient and flexible actuator for agricultural machinery (HILA)

A key factor in productive and sustainable agriculture is placing seeds at optimal row spacing. However, most seed drills have a fixed row spacing.

This project led to Flexrow, a new concept for dynamically adjusting row spacing in seed drills. The farmer can quickly switch between different row spacings with just the push of a button. No manual intervention is required. The secret is a new type of patented hydraulic actuator developed by the aircraft manufacturer Saab in Linköping. Inside the actuator, there are two short hydraulic cylinders that “climb” onto a fixed rod using hydraulic clamping joints. This allows the actuator to move back and forth along the rod. The concept also enables a new folding mechanism in which the seeding units pack together during road transport. The project focused on creating a demonstrator based on the invention, which originated in aviation technology. The project has led to several new patents and has attracted considerable attention in the international agricultural press. After the project, the goal is to build a test machine. As background, the Saab Group's official vision is "It is a human right to feel safe". Based on this vision, Saab formulates its purpose: "To keep people and society safe". A safer world is not just about protection against attack, but about supply security. During the Cold War, Swedish agriculture was an integral part of total defense. If people do not have food, the social structure collapses faster than in the event of a military attack. Automation and improved precision increase agricultural efficiency, which is essential to maintaining stability in a modern society.

The project was run within Agtech 2030 and was a collaboration between Saab Ventures, the Swedish Agricultural Society and the Department of Economic and Industrial Development (IEI) at Linköping University. Landberg Solutions and GN Tech also participated, as did the Department of Fluid and Mechatronic Systems (FLUMES) at Linköping University.

Budget: 1,482,000 SEK
Duration: 2019-01-01 – 2020-12-31
Project number: 305216

A key theme in this project is the use of technology from aviation.

The picture shows a test run of the technical concept at Hollstad farm.

*Digital platform

Data is king. But producing and benefiting from data in an efficient and robust way is easier said than done. However, it is a prerequisite if you want to realize visions about, for example, artificial intelligence and machine learning. Data must be stored securely so that it is not destroyed or spread to unauthorized parties, structured so that it can be found in a rapidly growing amount of data and visualized. Many players already do this today. The problem is that everyone does it differently. An open standard is needed. An enabler is a flexible and cost-effective infrastructure for data collection. This includes both field-based technology that does not require power supply or frequent battery changes, as well as a communication link that covers normal agriculture and minimizes ongoing license costs.

The goal of this project – which is actually a platform with several sub-projects – is, among other things, to develop a cable-free and license-free solution that is prepared for the future needs of data collection in agriculture. The project includes building demonstrators in collaboration with advisors and end users. Experiences from technology developed to protect rhinos in Africa against poachers are used as inspiration. A larger study was conducted in 2020-2021 with a focus on rape beetles. In 2022, the work continued in the form of a degree project in the Y program. Here, different cameras were compared and more insects were included in the study. Experiments also took place in Västergötland on a vegetable farm. The new angle in the degree project was to investigate how good machine learning is at automatically detecting insect pests in an image.

The project was run within the framework of Agtech 2030 in collaboration between the Department of Systems Engineering (ISY) at Linköping University in collaboration with farmers and other actors, such as Linköping Municipality's Tinnerö nature reserve, which served as the test arena.

Budget: 2,500,000 SEK
Duration: 2020-02-01 – 2020-12-31
Project number: 305215

Digital platform is about connecting sensors to get ongoing information about animals, soil, crops, machinery and silo facilities, etc. Photo from Tinnerö nature reserve.

Professor Fredrik Gustafsson in conversation with Fredrik Tidström (Växtab) and Sven-Åke Rydell (Hushållningssällskapet) in connection with the installation of cameras during the Linmästaren competition.

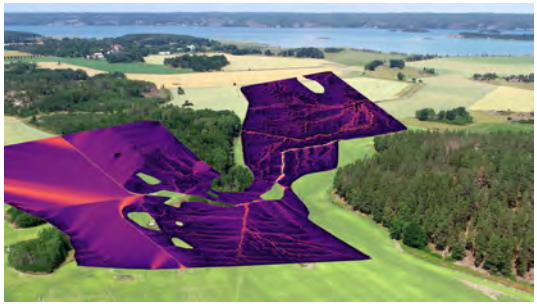
* Optimized farming through new spectral vitality measurements

Isaac Newton showed in his book Opticks (1704) that light consists of different parts with different wavelengths. We perceive these parts as colors. Visible light is a small part of the entire so-called electromagnetic spectrum. All materials such as a plant or a piece of soil absorb electromagnetic radiation in different ways and also reflect back radiation with different wavelengths. We therefore speak of different objects having different electromagnetic signatures. This project aimed to develop new knowledge about how these signatures relate to the actual properties of, for example, a crop.

Based on this new knowledge, the idea was to develop ideas for new services for farmers and advisors. The vision was to pave the way for the long-term use of artificial intelligence and machine learning in order to define more precise relationships between sensor data, for example the health status of a crop. That vision included combining spectral data from satellites or drones with data from soil samples, weather data, etc. The ultimate goal of the project was to get closer to the secret of what drives harvests and contributes to carbon storage. The project led to an analytical reference framework for analyzing factors affecting harvests that was published in Väderstad's publication series "Inför höstbruket". The project later contributed to a larger project "AI in the service of climate" which is now run by the Hushållningssällskapet Skåne with several partners.

The project was a collaboration between the Hushållningssällskapet Östergötland and T-Kartor. Linköping University and the Hushållningssällskapet Skåne also contributed to the project. In addition, there were "test pilots" and "sounding boards" in the form of farmers at Annelund, Fylla, Rotenberg Säteri, Åbylund, Glyttinge, Hyttringe, Vågerstad, Väderstad Farm, Kölbäck and Munkebo.

Budget: 479,000 SEK
Duration: 2019-08-23 – 2020-03-01
Project number: 304981



By analyzing the fields with sensors from satellites, aircraft and ground stations and combining such data with crop measurements, etc., we can get closer to the secret of what drives crops and contributes to carbon sequestration. Photo: Gustav Gerdes (aerial view) and Andreas Oxenstierna (water simulation).

*Physical environments that promote innovative processes

Driving innovation processes in the green sector requires major efforts if you aim to compete globally. In this context, innovative environments play a role. We see such environments emerging around the world. This concerns both collective environments such as science parks and individual companies that create their own innovation environment, sometimes in the form of buildings called “innovation centers”.

Based on the human need for stimuli to develop innovative concepts, this project defined several criteria for physical environments that support innovation. The method included studies of agtech-related environments that we knew with hindsight have generated innovation – but also interesting environments from other sectors. An example of a concept we used in the analysis was a mood board. A mood board is usually expressed in the form of a collage with texts, material samples, photos, sketches, and music. The collage describes the atmosphere or feeling of a place or in a room environment. Another example is the concept of neurodesign, which deals with the connection between work environments and their design on the one hand and what happens in our brains on the other – and after our senses take in visual impressions, smells and sounds etc. from an environment. In this project, innovation was defined as the development of something fundamentally new that gains entry into markets. Physical environments can stimulate both development and entry. The project included an experiment that was about creating an innovation space. But the project also analyzed how environments can stimulate entry and spread of innovations. Thus, an exhibition hall – or trade fair stands – can get potential users interested in a new concept.

The project took place within Agtech 2030 and was a collaboration between House by Stark, Väderstad, Sankt Kors Fastighets and Linköping University, but Crearum also participated.

Budget: 770,000 SEK
Duration: 2019-03-05 – 2022-09-30
Project number: 305220

A custom-made room for innovative processes was created next to a prototype workshop in Väderstad. Photo, room: Linnéa Stark

*Added value

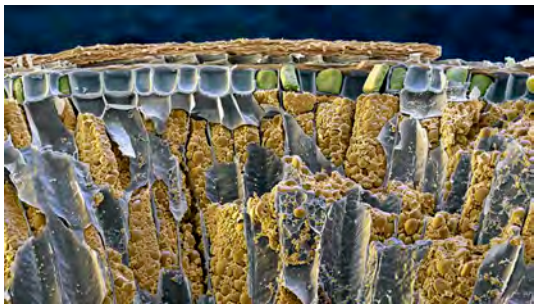
It would benefit agriculture if the area of use for agricultural products could be broadened and the added value increased.

The project focused on preparing an innovation process to create new products that meet international market needs. The project questions were formulated as follows: What are the use areas for different grain-based products? Who are the most interesting potential buyers? What do they really want? What opportunities are there for Sweden to meet demand through new technology? How do we best move from potential business opportunity to real business and bring the entire processing chain with us? The central point of the project has been an analysis of companies around the world that work with the processing of grains, such as wheat starch. Within the framework of the project, some analyses have also been made of how agriculture could contribute to better products. For example, the time of harvest or storage and drying can affect the quality of wheat or oats.

The project took place within the framework of Agtech 2030 and was a collaboration between Lantmännen and the Department of Economic and Industrial Development (IEI) at Linköping University.

Budget: 2,148,000 SEK
Duration: 2020-01-01 – 2023-06-30
Project number: 305919

The agricultural products of the future have new value added. The picture shows oat oil.



Coloured scanning electron micrograph (SEM) of a section through a grain (seed) of wheat. Photo: Eye of science / Science Photo Library.

*Establishment strategies for cereal crops

Crop establishment is a central aspect of agriculture. Establishment refers to methods and factors that affect how a sown crop germinates and begins to grow. A wide range of factors play a role here and can be divided into those that concern the time before sowing, during sowing, and the immediate period after sowing. Before sowing, a distinction is usually made between plowed and no-plow systems. But many other aspects are also relevant. The sowing itself can be divided into seedbed-based systems and direct sowing. The seed and any grazing of the same are also important for the establishment of crops. During the period after sowing, factors such as soil fertility, weather and wind, and any fertilization have an impact.

The project was about studying a number of factors with a focus on sowing and the time after sowing. The core of the project was field experiments, also called cultivation trials, and included specially adapted machines with which the experiments were carried out. The project also included the development of field stations with connected sensors to monitor the establishment and its results on the crop.

The project was run within Agtech 2030 in collaboration between Lovang Lantbrukskonsult, Väderstad, Hushållningssällskapet Östergötland, Linköping University and two experimental farms.

Budget: 925,000 SEK
Duration: 2020-03-20 – 2021-12-22
Project number: 305245

The establishment of cereal crops is a whole science. The photo shows parts of the team carrying out experiments with different seed drills.

Digging a pit with a 20-ton excavator for analysis of root development.

*My fertilizer 1.0 – a decision support

Mineral fertilizer is a limited resource and will likely increase in price in the near future. There will likely be both a consumer-driven change in the distribution of food based on the type of fertilizer used in the production system, and also regulatory changes regarding manure and mineral fertilizer. See various political initiatives regarding phosphorus in Sweden, Germany and the rest of the EU. Solving the problem of recycling nutrients to arable land is central to continued high food production both nationally and globally. It is therefore a matter of both ensuring long-term high food production and reducing the burden of nutrients on other habitats and environments, a typical example of which is eutrophication and anoxic bottoms in the Baltic Sea. The purpose of the preliminary study was to analyze how farmers need and benefit from decision support to shift toward reduced use of mineral fertilizer. The goal has been to identify solutions and business models for effective management and recycling of nutrients that can be implemented in agriculture.

The project was run within the framework of Agtech 2030 and by the Department of Theoretical Biology at the Department of Physics, Chemistry and Biology (IFM), Linköping University.

Budget: 90,000 SEK
Duration: 2020-01-01 – 2020-12-31
Project number: 306504

Left: The project analyzes, among other things, the supply and demand for natural fertilizer. Right: The process "from table to soil" is just as important as "from soil to table". The picture shows a biogas plant in Linköping.

*My wildlife crop damages 1.0 – a decision support

According to LRF and others in the industry, game damage is a major and growing problem that contributes to large harvest losses and large losses of income. The project was run as a feasibility study. With the support of an environmental analysis and target group needs, a basis was laid for an analysis of business models. The project was linked to an ongoing project at the Department of Theoretical Biology at Linköping University to determine game population sizes. That project was funded by the Swedish Hunters' Association and the Swedish Environmental Protection Agency. The part fundAgtech 2030-funded part focused on analyzing the need for innovations, both technical and decision support, that can improve game management and reduceage. The results can form the basis for developing technical solutions and decision support together with various partners.

The project was run within the framework of Agtech 2030 and by the Department of Theoretical Biology at the Department of Physics, Chemistry and Biology (IFM), Linköping University.

Budget: 90,000 SEK
Duration: 2020-01-01 – 2020-12-31
Project number: 306503

Left: Game damage to grain is a big problem. Many farms have simply given up growing grain because game damage is too high. The picture shows a farm in Skåne, which has not given up, however. Photo: Wrams Gunnarstorp

*Smart Agtech

The "Smart Agtech" project was about increasing collaboration between innovation environments on both sides of Lake Vättern, namely between SmartAgri and Agtech 2030. The project partners together created value-creating meeting places, spread knowledge about technology in agriculture and developed the capacity to support technology development. The project included several sub-projects. In these, support was provided to just over 10 companies and over SEK 9 million in public funds were attracted for their innovation development. The central focus of the project has been to exchange methodological expertise to stimulate renewal and innovation among agtech companies. The initiative included creating a common toolbox for business development and applying these tools to concrete companies. In addition, networking and knowledge dissemination were arranged through activities such as conferences, fairs and field days. The project also mobilized an application for a European Digital Innovation Hub (EDIH).

The project took place within the framework of Agtech 2030 but also within the framework of other partners. The collaboration was between Linköping Science Park, Science Park Skövde, RISE, Vreta Kluster, AgroÖst, Agroväst and Linköping University. The project was co-financed by the European Regional Development Fund (ERDF), Region Västra Götaland and Linköping University.

Budget: 600,000 SEK
Duration: 2020-10-01 – 2023-01-31
Project number: 305629



Top right: Ivarssons i Metsjö AB was one of the companies that participated in the project. Bottom left: Live-streamed seminar at Elmiadalen 2020. Bottom right Filming of the joint collaboration arena at Borgeby Field Days 2021.

*Detection and control of rape beetles

A problem in the cultivation of oilseeds is that the crop can be affected by massive attacks by rape beetles. Today, chemical pesticides are often used, which is not permitted for KRAV certification. There is also a risk that current active substances in the chemical preparations will also be banned in conventional cultivation. Thus, there is a need for innovations, in addition to chemical pesticides, that can help limit the damage caused by rape beetles. The project aims to inventory and develop methods for detecting rape beetles and to inventory methods for handling them. It is therefore about detection, prevention and prediction, as well as control in the event of an outbreak. The project includes pilot tests of possible detection solutions, e.g. based on sound and connected cameras. It also includes a survey of farmers' wishes and needs and identification of methods for prevention and control.

The project was a collaboration between Lovang Lantbrukskonsult, Linköping University, the Swedish Seed and Oilseed Growers Association (SFO), Svensk Raps, Agrotec (Rotenbergs Säteri), Tolefors gård, Växtab, Lind Södergård, Klostergården and Boberg. The university involved biologists, sensor experts and economists – both researchers and students. Several members of the Swedish Seed and Oilseed Growers Association (SFO) have contributed by answering a survey.

Budget: 510,000 SEK
Duration: 2020-01-01 – 2021-12-20
Project number: 305297

Left: The project developed technology to detect rape beetles, but we also analyzed the biology of rape beetles, for example, what signals attract them to the rape fields. The photo was taken when we analyzed the color of about 15 different rape varieties and illustrates Albin Gunnarsson in conversation with Johanna Orsholm. Right: In addition to cameras, experiments were conducted with microphones and analyses of sound frequencies on the wing beats of different insects. Photo: Johanna Orsholm.

*From grassroots idea to innovation idea

Agriculture faces many challenges, not least when it comes to issues of sustainability, which require innovative solutions and new innovations. Farmers are characterized by being creative and solution-oriented, but unfortunately, ideas and solutions often stay on the farm because there is a lack of both time and knowledge of who to turn to to take the ideas further. The background to this project came from experiences with work methods previously tested within Agro Sörmland that, among other things, led to a currently patented robot, Fieldgofer, which interacts with combine harvesters, as well as concrete business development among horse-related companies. The purpose of this project was to create platforms for the development of innovations based on problems, needs or suggestions for smart solutions originating from agriculture. The platforms consisted of activities and methods. The basic idea was to activate people in the professional reality of agriculture ("grassroots level"), and then stimulate processes based on their thoughts. This was expected to result in products or services that facilitate, improve or even revolutionize certain parts of agriculture. The starting point was to create groups of interested farmers. In these groups, the farmers discussed challenges and solution ideas together – and with the support of innovation leaders. Access to external expert help was also provided. One of the methods used by the innovation leaders was developed by Åsa Öberg and Roberto Verganti and includes the steps Awakening (focusing on a challenge), Pre-empting (defining what is important), Criticizing (kindly offering criticism) and Embodying (embodying concepts).

The project was run within the framework of Agtech 2030 in collaboration between AgroÖst (with Agro Sörmland as project manager) and Vreta Kluster. It was also co-financed by Region Sörmland.

Budget: 800,000 SEK
Duration: 2020-11-01 – 2021-12-31
Project number: 306374

Left: The project developed methods for generating innovation based on ideas and problems that come directly from professionals in the industry. Right: Cilla Krantz is a true enthusiast and has run several projects within the framework of the concept "From grassroots idea to innovation idea".

*Digital Bee Assistant

The digital bee tree can best be described as a technology transfer project. The system that was to be developed was based on an existing backend solution developed by HiQ in collaboration with Linköping University. This system can easily be supplemented or removed with functionality such as sensors adapted to beekeeping. The user interface is already available, and only needed to be adapted to the beekeeping field. What we wanted to do in this project was to combine the existing platform with the functionality needed in beekeeping, and especially in professional beekeeping. In order to get a handle on what functionality should be added, we collaborated in the project with professional beekeepers who have extensive experience and have long thought about the issues we want to solve. The innovative approach in our idea was therefore to combine technical knowledge and existing technical solutions with needs and knowledge in beekeeping. The goal of the project was to create a system for managing beehives and apiaries by connecting the beehives digitally. Furthermore, cameras were included so that the hives can stream moving images in real time.

The project took place within the framework of Agtech 2030 and in collaboration between HiQ, the Department of Systems Engineering (ISY) and the Department of Economic and Industrial Development (IEI) – both latter at Linköping University. The company Beady also participated. The project received funding from the Swedish Board of Agriculture.

Budget: 165,000 SEK
Duration: 2021-07-01 – 2021-12-31
Project number: 306505

The project placed sensors and cameras to analyze what was happening in real time. Photo: Depositphotos.

*FOODÖMS

There are challenges related to the future food supply. The purpose of this feasibility study was to define in detail which challenges should be in focus within the area of "Sustainable Food Supply" and to clarify which actors do what. The idea was that the project would pave the way for the scaling up of funds in an upcoming, full-scale project in which Agtech 2030, Agro Sörmland and AgroÖst would have an important role. The project included a mobilization phase to identify which specific challenges should be worked on in the area and with which participating actors. It also included an anchoring phase to ensure support and long-term sustainability with all actors. The project concluded with an implementation phase to develop a joint action plan for the efforts that contribute to solving at least two concrete issues/sub-challenges. The action plan would form the basis for a detailed project description and application for support from the Regional Development Fund for full-scale implementation. The project would lead to the establishment of international contacts with regions in at least 2 countries. Among the results that Agtech 2030 provided is a compilation of 15 challenges in agriculture that were captured through an extensive survey study.

Budget: 248,000 SEK
Duration: 2021-03-01 – 2021-06-30
Project number: 307503

FOODÖMS was a project led by Vreta Kluster. Photo: Vreta Kluster.

*Breathing sensor

Being a dairy cow has been compared to running a marathon a day. If the cows' breathing rate starts to increase, it may be an indication that increased cooling is needed, but it can also provide early indications of illness in the animals. By being able to quickly and effectively detect an increased breathing rate, the farmer can start fans and sprinklers at an early stage or take measures to mitigate disease and reduce the spread of infection. Saab has developed technology to measure breathing rate using image analysis, which is an important vital parameter in healthcare. The idea behind this project was that this technology could also be applied in animal husbandry. For a dairy farmer, for example, it is important to prevent the cows from experiencing heat stress, as this significantly reduces milk production. Vreta Training Center had the project filmed in the cowshed and two thesis workers from one of the civil engineering programs at Linköping University showed that the technology for measuring breathing rate works. This became part of the analysis of the "Proof of Concept". The goal is to continue developing both the technology and how it is used to improve the well-being, productivity, fertility and resistance to diseases of cows.

The project was a collaboration between several parts within Saab, SLU and Linköping University and was run within the framework of Agtech 2030. Within Saab, Innovation Greenhouse participated, which captures new business opportunities, investigates market needs and possible business models, Saab Ventures, which among other things spins off companies that are outside of Saab's core areas, and the Dynamics business area with a section that works with image analysis.

Budget: 100,000 SEK
Duration: 2020-10-01 – 2020-12-31
Project number: 306405

Experiments in Lövsta animal stables. Photo: Cecilia Unell.

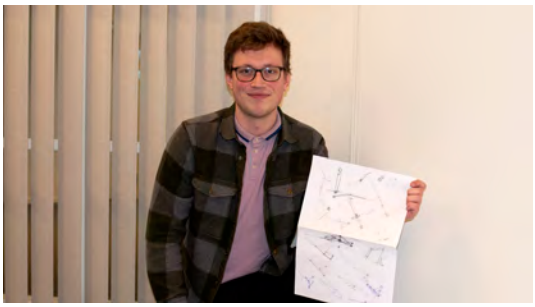
Pictures from Vreta training center in connection with verification of the technology.

*High-efficiency actuator for rotary and linear movement on demountable trucks

Agriculture is a logistics-intensive industry. For many years, so-called swap bodies have enabled the rational handling of many different types of agricultural transport of input goods and harvested products. The swap body includes a hook on a foldable arm with which you can pull up and unload standardized flatbeds or containers onto a carrier frame. The system is fast and cost-effective. However, the solutions available today are relatively heavy and have low efficiency. Furthermore, they cannot handle swaps where the ceiling is low. The project was about transferring knowledge from aeronautics in the form of a new type of long-stroke hydraulic actuator and developing fundamentally new swap body concepts. The outcome of the project is a completely new type of swap body, based on the new oil-efficient Flexrow actuator. It has significantly lower actuator forces and can work more energy-efficiently. It replaces today's inefficient large and heavy cylinders. The entire swap body can be built more cost-effectively and is about 40% lighter compared to a conventional swap body. A lower tightening angle is also possible. The project contributes to the fulfillment of several Agenda 2030 goals. Parts of the solution are confidential due to patent processes.

The project was a preliminary study and a collaboration between Ivarssons in Metsjö, which among other things manufactures swap bodies, Landberg Solutions, which developed the basic technology in Flexrow, Saab with cutting-edge expertise in aeronautics, GN-Tech, a company in product development, and Linköping University, which has expertise in hydraulics and environmental analysis.

Budget: 641,000 SEK
Duration: 2020-01-18 – 2021-12-31
Project number: 306490



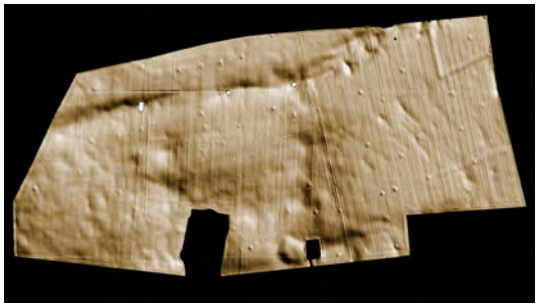
Left: A flatbed swap body trailer from Ivarssons in Metsjö in connection with the wheat harvest on the fields of Östergötland in August 2021. Right: Civil engineering student Robert Näslund with some sketches of smart swap bodies.

*New technology for smarter crop cultivation

This project revolved around analyses of fields and crop cultivation that were based primarily on five sources of information: Satellite images, sensor data through field stations, observations from farmers or advisors, soil samples, and crop mapping. Aerial scanning and drone images were also integrated. The aim was to establish and use a test bed in the form of selected agricultural companies' fields - and in connection with these to install new technical solutions with the aim of creating a better decision-making basis for measures in the fields during the growing season. The project was about getting closer to an answer to the question of which factors can explain total yield as well as yield variation within a field. Furthermore, the project was about finding new ways to keep track of the fields so that the right interventions can be made at the right time with greater precision than before (cf. the opportunistic effect). Examples of technology connected to the field stations that were used were cameras aimed at the crop for analysis of everything from growth to insects, soil sensors and sensors in drainage water. In 2022, efforts were also made to prepare AI analysis of fields. One of the information layers was modeled elevation models.

The project, which was carried out within the framework of Agtech 2030, involved T-Kartor Geospatial AB, Hushållningssällskapet Östergötland, Linköping University and a number of farms, including Hyttringe, Rotenberg and Klostergården.

Budget: 1,560,000 SEK
Duration: 2021-01-01 – 2022-12-31
Project number: 306489



Left: A model of the fields' topography based on laser scanning from aircraft. Illustration: T-Maps. Right: Silo towers on which antennas were mounted, Kårstad.

*Future technology for better decision support

Farmers want to get to know their fields as much as possible regarding soil and crops. However, not all potential optimization technology has been developed, and only a fraction of the technology presented in the last decade is known to farmers. Furthermore, assessing value for money for specific technologies remains difficult. The project had two sub-purposes. The first was to install and apply new combinations of digital technology on a selected field at Vågerstad farm and analyze their function and user benefits. These combinations included both existing technology and technology developed within the project, such as fixed soil moisture sensors. Additionally, a concept study was conducted for a mobile autonomous sensor platform – a ground-moving robot with sensors for crop analysis. The second sub-objective was to inventory digital tools launched internationally over the past 10 years that could benefit Swedish plant growers, including assessing their current reach in Sweden. The goal was to identify valuable technology not yet widely adopted, studying examples like Machine Sync (John Deere), MyData Plant (Kverneland), Harvest Lab (John Deere), and Topsoil Mapper (Geoprospectors).

The project took place within the framework of Agtech 2030 and in collaboration between Åhmans Tractor Center (John Deere), Kverneland and Linköping University (including Computer Vision Laboratory and Department of Systems Engineering (ISY). Tests were also carried out at Väderstad AB.

Budget: 700,000 SEK
Duration: 2021-06-15 – 2022-09-30
Project number: 306897

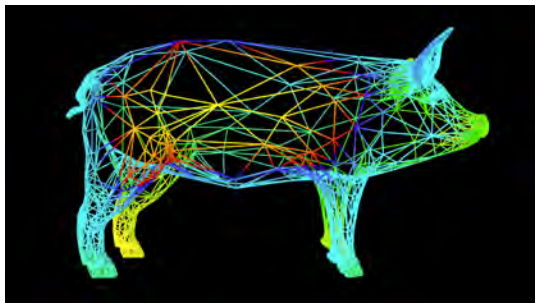
Left: Vågerstad Gård is at the center of this project. Right: Scanning the experimental field with an electromagnetic sensor that can also be used in growing crops. Bottom left: Vågerstaddagen with demonstration of technology. Bottom right: Installation of weather and soil sensor stations. Photo, aerial view: Valdemar Jensen. Other photos: PF.

*Individual analysis of pigs with AI

It is well known in the pig industry that pig producers lose revenue because they lack a smart system for analyzing daily growth. This is important for many reasons, not least the health aspect – a healthy pig is a profitable pig. Today, manual weighing is used, which is heavy, dangerous, time-consuming and stressful for the pig. Smart Agritech Solution of Sweden AB has developed a digital solution for automatic weighing with camera technology and artificial intelligence. The company became the first in the world to achieve a weight precision of ±2kg. The system, called Pigxcel (trademark protected), was tested in 2020 on six farms in Sweden, Norway, Finland, Australia and Mexico. A camera was mounted above each pig pen that generated images as a basis for the AI analysis. The question of individual marking arose because traceability is very important. Physical individual marking of pigs works poorly, compared to other animal species, such as sheep and cattle. Based on a database of four million images, the vision of camera and AI-based individual analysis was realized.

The project was a collaboration between Smart Agritech Solution of Sweden and Computer Vision Laboratory at Linköping University. The company EC Solutions in Helsingborg contributed images and time.

Budget: 355,000 SEK
Duration: 2021-05-01 – 2022-09-30
Project number: 306488



Left: Through images like this, the vision was to be able to individually recognize pigs with AI. Photo: Photo: Mark Stebnicki. Right: Analysis of pigs with AI means a revolution for both animal welfare and production. Photo: Depositphotos.

*Testbed Tolefors

The project was based on problems identified at the Tolefors farm and evaluated whether new technical ideas were feasible. One area focused on visualizing soil compaction. By connecting a penetrometer to GPS, the farm's soil compaction was mapped to analyze driving patterns and optimize field operations. A related area addressed the revitalization of compacted soil: an idea from the farm was realized by creating a one-meter diameter disk attached to a tractor, called a soil slit, which cuts through the plow sole created by repetitive plowing. A third area analyzed grain drying in a continuous dryer. Heat and moisture sensors were installed alongside grain moisture sensors from Canada to examine relationships between temperature, humidity, and drying efficiency. Finally, the fourth area involved continuous ammonia measurement in poultry housing. A sensor measuring ammonia, temperature, and humidity was installed in the chicken coop, supported by a measurement program developed with Linköping University.

The project was part of Agtech 2030 and was a collaboration between Tolefors Gård and the Department of Systems Engineering (ISY) at Linköping University. Analyses of connections were discussed with Vreta Kluster. The company SensorBee was also involved.

Budget: 450,000 SEK
Duration: 2021-01-01 – 2021-12-20
Project number: 306896

Soil compaction meter from SkogAgro during testing at Tolefors in the fall of 20221. Photo: Axel Lagerfelt.

The picture shows a test run of the ground slot. Photo: Axel Lagerfelt.

One of the sensors installed at the Tolefors drying plant.

Discussion about digital control of the chicken coop including ammonia sensors.

*Secure digitalization

In the spring of 2021, the US was hit by extensive cyberattacks against food companies and we can probably expect more of the same – including in our country. IT security is required to protect against cyber threats, incorrect handling and organizational aspects. Agriculture is probably not at the forefront of IT security, and therefore has reason to draw on experience from other industries. The goal of the project was to increase awareness and security around the digitalization of agriculture. The project included mapping needs and awareness around the issue. An "Advisory Board" was established (Region Östergötland, County Administrative Board, Knowit, Länsförsäkringar, Vreta Kluster, Linköping Science Park, Lantmännen, MSB, Teknikföretagen and Väderstad) and a study of the area that included interviews with farmers was carried out. In addition, a seminar was arranged around the report "Secure digitalization for agriculture" to which Commander-in-Chief Micael Bydén contributed with a co-sentence. The next step was a seminar series of 5 occasions that involved 50 companies. Lecturers were people from Säpo, Sectra, Linköping University, Sylog, Knowit, the Swedish Civil Contingencies Agency, Väderstad, Nixu, Cygate (Telia), Delphi Law Firm, Teknikföretagen, Agronod, Blackert lantbruk and Lantmännen. The project reduces the risk of disruptions in agriculture by increasing awareness, and it can also inspire suppliers to offer safer agricultural technology. Since agriculture is critical to society – as it concerns food and energy production, the project also means increased security at the societal level.

The project was run within Agtech 2030 and was a collaboration between Linköping Science Park and Linköping University. Several companies and organizations participated

Budget: 400,000 SEK
Duration: 2021-04-01 – 2021-11-30
Project number: 306478

Left: Modern agriculture is characterized by large amounts of data and being connected – which brings new security threats. Photo: Depositphotos. Right: Panel debate with Mikael Salander (Väderstad), Simon Binder (Cygate) and Jeanette Blackert (Lantbrukare) – led by Sofia Lundkvist.

*EcoWeb

The agricultural landscape is an exciting ecosystem that provides important functions to society, not least food production. All ecosystems can be described as networks, where the species are nodes and the interactions between them can be positive, negative or interacting. For example, field voles can be negative for the crop while birds of prey can be negative for the field voles. Species affect each other and a change in one species can lead to consequences for other species. The direct functions of ecosystems – for example, a harmful insect reducing the crop yield – are relatively easy to understand, but the underlying interactions and the full complexity of ecosystems are more difficult to understand. The project is about developing a computer game to enable interested people to gain increased knowledge about the agricultural landscape ecosystem in an interesting way. The development of the game is based on research on ecological networks, biodiversity, healthy ecosystems and ecosystem services.

The project was run by the company Lutra Interactive in collaboration with Linköping University and received support from reference people with connections to agriculture. The financing was done in collaboration between Vinnväxtplattformarna Agtech 2030 and Visual Sweden.

Budget: 203,100 SEK
Duration: 2021-08-15 – 2022-06-30
Project number: 307034

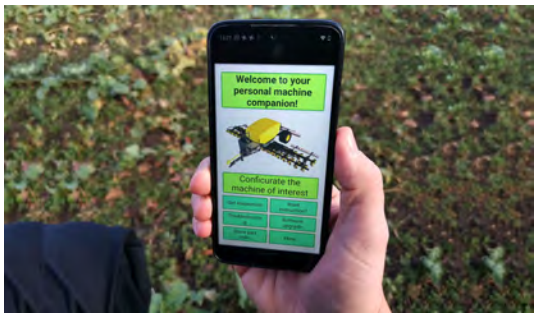
Left: Team EcoWeb during one of the first idea meetings back in 2019. Right: Prototype for EcoWeb.

*Remote technical assistance

Users of advanced agricultural machinery want to simplify the way to get information about - and an overall picture of - the machine remotely. This is to avoid having to contact an expert from the machinery company, who then needs to travel to the machine with the time and costs that this can entail for both users and machinery manufacturers. With digital remote assistance, there is a desire that it can be done regardless of the interface desired, for example, the internet, Android, or iOS. Information can be a digital manual, images, and films. Information can also be the current status or error message. For example, empty seed tanks, an error has occurred, service is needed or there are difficulties in optimizing the specifications for geographical position. Users also wa,nt in some cas,es either to do troubleshooting on their own directly on site, or if necessary, to get in touch with support via a link to, for example, set the machine correctly. For the machinery manufacturer, there is the possibility of collecting information about how the machines are used, and to get information out to users more easily - distributing videos, images and manuals. The manufacturer also has the opportunity to introduce new functions and keep the machines updated and safe. The manufacturer has the advantage of being able to easily see which spare parts need to be ordered for a customer, quickly locate and prepare for a service and repair. In this project, we developed a prototype for remote technical assistance.

The project was part of Agtech 2030 and was a collaboration between A-Electronix, Tolek and Gothia Redskap. Tolefors Gård and the Department of Economic and Industrial Development (IEI) at Linköping University also participated.

Budget: 600,000 SEK
Duration: 2021-05-01 – 2022-03-31
Project number: 306674



Left: Being able to remotely help customers set up machines correctly or fix errors is worth its weight in gold, not least for smaller companies with customers spread across several countries. Photo: Martin Andersson. Right: Suddenly it happens that users of advanced machines need support to, for example, set up the machine correctly.

*Spectrometer for soil analysis

Developments in spectroscopy have meant that the content and composition of more complex materials, such as soil, can be analyzed. The miniaturization that has occurred in both optics and electronics means that it is possible to build small handheld spectrometers for a few thousand Swedish kronor. With a quality that would have cost perhaps 100 times more and was only possible in a laboratory a few decades ago.

xSpectre AB has developed its own handheld and mobile-connected spectrometer for soil analysis. The spectrometer is built as a system camera, with replaceable light sources to be able to perform various tests. The purpose of the project was to develop, manufacture and test a new version of the handheld and mobile-controlled spectrometer developed by xSpectre AB. The spectrometer is primarily developed for sampling soil properties in the field or in the laboratory. The focus of the completed project was the design, development and manufacture of new electronic hardware. Design and manufacture took place of circuit boards as a replacement for individual components in previous versions. A stabilized and software-controlled energy supply of light sources of various types was created. A new microprocessor with built-in functions and connections for LiPo batteries was installed.

One step was the attachment of various light sources and sample holders with bayonet mounts and a 5-pole connection to light sources was arranged to enable information exchange and better control. Another step was the design and manufacture of circuit boards for light sources. Equally important was the design and manufacture of shells with bayonet mounts for connecting the processor unit and light holder. The platform-independent software for controlling the spectrometer was updated and adapted for the new microprocessor. Soil samples were collected and analyzed spectrally. What now remains is wet chemical analyses to be able to make evaluations and statistical tests of the possibilities and reliability of spectral soil analyses in comparison with traditional methods.

The project took place within Agtech 2030 in collaboration between xSpectre and Miljömatematik i Malmö AB J2 Holding AB as subconsultant.

Budget: 340,571 SEK
Duration: 2022-04-01 – 2023-06-15
Project number: 308152


Testing of handheld soil analysis sensor. Photo: xSpectre.

*Technology park as a resource for agricultural innovation

The purpose of this project was twofold. Firstly, it would generate a methodology and an infrastructure for "docking" between technology and the needs of agriculture. Secondly, the project would generate concrete technology development, technology adaptation and technology use that would result in fundamentally new technology concepts gaining entry into agriculture or could be demonstrated to prepare and stimulate an entry into agriculture. The project took its starting point in two approaches, namely "technology push" and "demand pull". Within the framework of the "technology push" approach, the goal was to find (at least) one technology company that has "technology that seeks its use and potential benefit". Once this company had been identified, the plan was that new development projects would be designed with them. The second approach, "demand pull", was about testing and further developing methods inspired by IoT World. The idea was that users in the form of farmers would define unsolved problems whose solutions are urgent, but without knowing the solution from the start. Based on this starting point, efforts were made to (using the knowledge a technology park has) identify technology that solves the problem in a cost-effective and otherwise relevant way. One result of the project was a dialogue with Ericsson about the possibility of using local 5G networks as infrastructure for certain purposes in the agricultural sector.

The project took place within Agtech 2030 and was a collaboration between Linköping Science Park, Linköping University and Vreta Kluster.

Budget: 382,300 SEK
Duration: 2022-01-01 – 2022-06-30
Project number: 306902

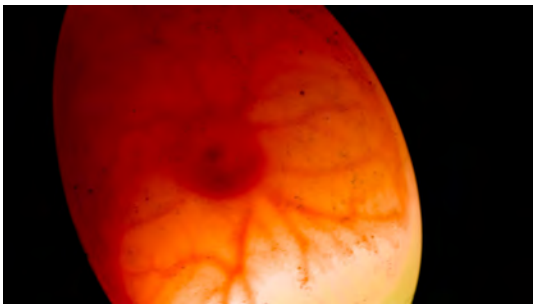
Left: In dialogue with Ericsson, both problems and opportunities with local 5G networks emerged. Right: Technology parks such as Linköping Science Park are a gold mine when it comes to interesting technology for agriculture. Photo: Sankt Kors.

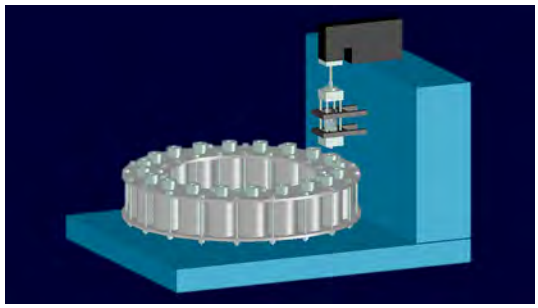
*Demonstrator for sexing newly laid eggs

In hatcheries, male chicks are currently killed immediately after hatching. The meat becomes too lean for human consumption if they are raised as broilers, which is a consequence of breeding good laying hens. With DANSiC's method for sex sorting, only female chicks are hatched. The eggs are sorted on day 0 and discarded eggs can be used as food. Laws that prohibit the killing of male chicks already exist in some countries. The commercial method that exists today in, for example, Germany sexes the eggs on day 9, when embryos with partially developed nervous systems are present. Laws that prohibit the killing of embryos after days 4-7 are also expected. The gases that are naturally emitted from eggs have some differences in composition depending on whether the egg is to become a rooster or a hen already on day 0. The method developed in this project detects the gases and, together with advanced data processing, enables sex sorting of the eggs. But the difference measured by this method is small and the measurement method itself is as important as the data processing. In this project, a basis was developed for a simple system that automatically detects the sex of 20 eggs. This can remove a large part of the human factor in the measurement itself, and the hope is to thereby achieve reproducibility in the measurement data and thereby also in the data processing that is required for a commercial method.

The project was carried out within the framework of Agtech 2030 in collaboration between the Department of Physics, Chemistry and Biology (IFM) and DANSiC.

Budget: 274,000 SEK
Duration: 2022-01-01 – 2023-06-15
Project number: 307535





Left: Egg with glimpse of nervous system: Depositphotos. Right: CAD drawing of system for automatic reading. Image source: DANSiC.

*From grassroots idea to innovation idea – preparation for step 2

The project from Grassroots Side to Innovation Idea aims to create platforms and a method for developing innovations that come from real problems. The basic idea was to activate people in the working reality of agriculture ("grassroots level"), and then stimulate processes based on their thoughts by discussing and assessing ideas within multidisciplinary teams consisting of different skills such as farmers, researchers, business promoters and companies from other industries.

The project is divided into two stages (stage 1 and stage 2). In stage 1, the working method was tested, key functions were identified and innovation ideas were analyzed in the multidisciplinary teams. In stage 2, the idea is to scale up ideas into innovation projects. In this project, a preparation phase was carried out for stage 2. In this phase, meetings have been held to exchange experiences with others who work with similar processes. An expert network has been established with contact persons from academia, research institutes, advisory organizations, science parks that invest, and for continued evaluation of the method, the recruitment process to find the target group (farmers) has been analyzed. Coaching of idea carriers from stage 1 has also taken place, which resulted in three own innovation projects, of which one project idea is in the final phase for submitting a project application and one idea carrier has been linked with experts in their field. Examples of projects that have come about through the grassroots idea are Apollo, Self Sustainable farm, Gas analyses in soil and Health monitoring of farm animals. In summary, the preparation phase has made the project From grassroots idea to innovation idea ready to be scaled up to proceed to stage 2.

The project was run within Agtech 2030 in collaboration between AgroÖst (especially Agro Sörmland) and Vreta Kluster.

Budget: 315,000 SEK
Duration: 2022-02-15 – 2022-06-30
Project number: 308148

Left: The grassroots project is about methods and environments, but not least about composing innovative teams. Right: The grassroots project originated from Agro Sörmland. Photo from the inauguration.

*Standardization – an important tool now and in the future

Standardization is vital in agriculture. In history, we have seen many examples where standards have both hindered and promoted innovation. When the tractor arrived, it did not fit the standard for implements, because these were adapted for horses. On the other hand, standards such as the three-point linkage paved the way for mechanical innovations related to the tractor. Smartly designed standards can cause innovations to arise or spread. In agriculture today, there is a lot of digital technology that must be connected and standards are important for the user's functionality when many systems are to interact. Interestingly enough, the areas of innovation and standardization have generally "lived in their own worlds".

In this project, that connection is made and with a focus on the area of chemical plant protection. A number of regulations surround plant protection technology, both laws and voluntary industry agreements. There are ongoing technological shifts in the area. Example: The traditional way has been to control the spray nozzles through different pressures. Then all nozzles get the same spray profile and there is no possibility of variable adjustment of individual sections or nozzles. A new technology is nozzles that generate pulses and where the pressure can be constant or vary without affecting the spray from the nozzle. The system is called Pulse-width modulation (PWM). The project contributes to increased knowledge about how standards play a role in innovation. The project also includes getting engineering students and others interested in agricultural technology. The project includes action research by having researchers participate in a sharp standardization committee, namely SIS/TK 224 Agricultural Sprayers, which also includes Norwegian robot developers (Kilter) and others.

The project was a collaboration between the Swedish Plant Protection Agency, the Swedish Institute for Standards (SIS), Enköpings Maskinstation and Linköping University. It was run within Agtech 2030.

Budget: 275,000 SEK
Duration: 2022-01-01 – 2023-06-30
Project number: 307992

Left: The project was based on technology in crop protection. The picture shows a self-propelled sprayer at Enköpings Maskinstation, which participated in the project. Photo Erik Axelsson. Right: Sara Berggren, Andrea Fried, Hans Hagenvall and Besma Glaa during the final seminar at Linköping University.

*Apollo Generation 3 – counting chickens with AI

When chicken coops are to be emptied, a machine is used that picks up the chickens from the coop floor and places them in shipping crates via a conveyor belt. To determine when the correct number of chickens is in the crate, the machine weighs the crates continuously using weigh cells. The problem is that the system tends to give large deviations from the ideal number of chickens in each crate, which can affect both animal welfare and productivity. This project was about making a test rig for a model that controls the picking machine based on the number of chickens instead of weight. Today, there is no product on the market that uses image analysis to count the number of chickens and controls the picking to the crates based on the number.

The model that was tested consisted of a camera with lighting that was placed near the end of the conveyor belt, a computer and a screen on the picking machine that showed the estimated number of chickens that were considered to be placed in the current crate. Algorithms for detecting and counting the chickens were developed using AI-based object detection algorithms that were trained using machine learning from video material. The results showed that the model was able to detect and count stationary chickens with good certainty, with some deviation if the chickens flapped their wings or jumped sideways. The next step is to further develop the model with more training data to train the algorithm to count correctly even if the chickens were moving, and to develop a system so that the machine is automatically controlled using information from the screen about the number of chickens.

The project was carried out within the framework of Agtech 2030 by AgriStella AB and Gallus Elit AB.The sub-consultant for AI algorithms and prototype development was the research institute RISE. The Italian technology company CMS Industries also participated in the project.

Budget: 480,000 SEK
Duration: 2022-03-15 – 2022-06-30
Project number: 308150

Camera technology and artificial intelligence were central to this project, as was mechatronics. In terms of artificial intelligence, tools such as Kalman filters were used to find patterns in noisy data. Photos: Bo Eriksson.

*Self Sustainable Farm – Step 1

This project is about an idea to create a completely circular energy system on a farm. The background to the project is that Swedish agriculture today is completely dependent on imported fossil energy. At the same time, there are great opportunities for agriculture to become energy producers and be able to produce its own fossil-free energy for the entire farm's needs. Energy can be produced in many different ways in agriculture, for example through solar power, wind power or biogas. An important question is also how the energy can be stored. Self Sustainable farm consists of several steps. This project concerns the first step where the focus was on investigating the effects of using solar cells that were mounted on stands four meters up on arable land that will continue to be used for cultivation.

In the project, five sun-tracking panels were mounted on pillars on active arable land. To see how the shadow effects of the solar panels affected the harvest outcome on the arable land, test and reference plots were created, and methods for measuring harvest outcome were developed. The impact of solar tracking panels on the underlying crop has been studied previously, but only when growing pasture, and in other parts of Europe where there are different conditions regarding, for example, climate and solar radiation, which made it relevant to study this under the current conditions we have in Sweden and for more crops. Before installation, the soil was inspected by Tora Råberg, a researcher at RISE, with respect to maintaining the same types of underlying weed pressure and comparable crop status. During the project, samples were then taken from the crop and analyzed, among other things, with respect to harvest yield in terms of wet weight and DM content as well as visual changes. The project also involved a large exchange of experience with several projects with solar panels on pillars on active arable land, with the aim of being able to make comparable analyses of harvest yield in different environments.

The project was carried out within the framework of Agtech 2030 in collaboration between HelioZenit International AB, Sunflake Technologies AB and RISE and AgroÖst/Agro Sörmland. Several others participated, not least Eneby gård, Stallarholmen.

Budget: 650,000 SEK
Duration: 2022-03-20 – 2022-12-31
Project number: 308151

Parts of the team, Ola Pettersson, Dan Jonsson and Tora Råberg during the installation of solar trackers at Eneby farm, Stallarholmen. Photo: Cilla Krantz

*Automatic health monitoring of farm animals

Healthy farm animals are crucial for a well-functioning farm. Therefore, the health of the animals must be checked regularly. Today, this is largely done manually, which requires extra working time and can also be associated with a certain risk when handling the animals. This project was about exploring what is required to develop an automated, 24/7 monitoring of the health of farm animals, initially for pigs and horses. The project's approach was to investigate the possibilities of automatically reading relevant health data and using artificial intelligence and machine learning to define individual health values in the animals. Any changes in an individual can then be detected faster and thus provide the animal with care more quickly, stop infection, etc. The project resulted in a conceptual solution and a feasible plan for the development of an automatic health monitoring for animals. The conceptual model took the form of a graphical diagram of various technical components that together form a functioning system. The components included the placement of sensors, data acquisition, charging, automatic switching, data storage and data presentation. The project was the first phase of three stages in the development work.

The project, which was carried out within Agtech 2030, was a collaboration between OptiAnimal and RISE. Also participating were Wången, DSruptive, Flemminge gård and others.

Budget: 360,000 SEK
Duration: 2022-04-01 – 2022-06-30
Project number: 308153

Left: Visit to Flemminge farm. Photo: OptiAnimal. Right: The project focused on horses, but the technology is applicable to several animal species.

*Testbed infrastructure

The basic idea of this ongoing project is to develop digital technology in interaction with experimental farms and other experimental sites. These include the farms Rotenberg, Kårstad, Vågerstad, Tolefors and Klostergården as well as the farm and knowledge center Vreta education center. Experimental sites are also located at Kolmården Zoo, Linköping University's Valla campus and Tinnerö nature grazing area owned by Linköping Municipality. There is also a collaboration with the Ngulia reserve in Kenya. At these sites, various types of infrastructure for communication such as LoRa, 4G and long range Bluetooth are developed, tested and evaluated. Other technology is sensors such as rain gauges, air sensors, solar intensity sensors, soil moisture sensors, RGB cameras and accelerometers. As for cameras, there are sub-projects that also include image analysis, e.g. to classify animals - everything from farm animals to wild animals. Satellites should also be mentioned and, for example, the project has collaborated with Airbus to see how much detail can be obtained from the best satellite technology. All of these sensors and systems are used to analyze changes in soil, animals and machinery, but also facilities such as drying houses or chicken coops. The project also analyzes power supply strategies, including analysis of battery life and solar cells. Antennas are also subject to analysis and how wireless communication is affected by obstacles in the landscape such as rock outcrops or forest areas. A central part of the project is the development of a user-friendly dashboard. The goal is not only to develop robust and efficient technology, but also technology that has good value for the farmer, i.e. does not cost too much but still generates value. An intermediate goal is license-free systems, which is extremely unusual but welcome in these contexts. Several insights have already been gained in the project. Important aspects have proven to be (1) Selection of location for antennas. (2) Drainage and dehumidification of encapsulated electronics (3) Calibration of soil moisture sensors. (4). Placement of camera lens vs. crop or insect trap as well as focal length of lens. (5) Advanced drawing tools to create custom map layers for boundaries and points of interest directly in the Dashboard map.

The project took place within Agtech 2030 and was run by the Department of Systems Engineering (ISY). This project connects to several of the other projects.

Budget: 597,000 SEK
Duration: 2022-01-01 – 2023-12-31
Project number: 308443

Left: Installation of sensor and communication infrastructure. Right: Fredrik Gustafsson and Sara Ohlsson installing a field station in Kenya, a system that inspired parts of the technology now applied in agriculture. Photo: Team Ngulia.

*Remote sensing of maturity in growing crops

Farms in Sweden are becoming larger in size and several farms/fields that are spread out are often farmed together under one farming center. Harvesting the different fields in the most optimal order and at the best possible time can be of great economic importance. The weather during the harvest period in Sweden can be uneven with short periods of dry weather when threshing needs to be done. The increasing prices of energy to further dry the harvested crop make it increasingly important to be able to harvest the right field at the right time. Managers on larger farms need to be able to easily know the water content of the grain kernels in the field before and during the harvest period, which is often the hectic period of the year. With large machines and a slim workforce, they want to avoid having to regularly drive around to manually measure the moisture content of the crop in each field. There is a demand for some way to know the moisture content of the crop remotely in real time. The innovation aimed at in this project involves combining software with sensor data to calculate the water content of growing crops. Using a local weather station, a database and algorithms, the project has developed a model (digital twin) of crop development. This can help agricultural companies with information about the water content of the growing crop and provide support for making good decisions about the best harvest time. The project has developed an indicator for remote sensing of maturity in growing crops that shows both the current water content of the crop and a forecast for water content in the coming week.

The project took place within Agtech 2030 and was carried out by Envinn in collaboration with the Department of Systems Engineering (ISY) and based on dialogues with the team at Rotenbergs säteri.

Budget: 160,000 SEK
Duration: 2022-03-15 – 2022-06-30
Project number: 308154

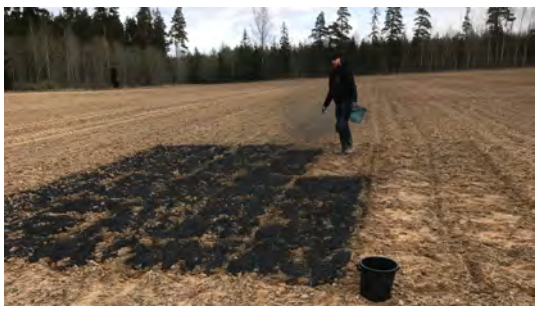
Left: Henric Andersson at the experimental field belonging to Kårstad farm. Right: Analysis of water content from field samples using classic and proven technology.

*Biochar knowledge transfer

Carbon sequestration is becoming an increasingly important issue for the agricultural industry for two reasons: firstly as a measure against increased CO2 levels in the atmosphere with its negative consequences, and secondly as a business opportunity via trading in carbon credits. For a few years now, there has been a functioning free market for carbon credits and at the same time the EU Commission is working on a regulatory framework for carbon credits, called the EU Carbon Removal Certification Mechanism (CRC-M) within the framework of the EU's Green Deal. Biochar and hydrochar are two methods among several for carbon sequestration and as a useful product in agriculture. Generally speaking, biochar is produced using pyrolysis of dry biomass, while hydrochar is produced using the hydrothermal carbonization (HTC process) of wetter biomass. This project included an analysis of how biochar/hydrochar alone or in combination with other methods can create sustainable business models for the agricultural sector in the coming years, with a focus on eastern central Sweden. Activities in the project were to collect, compile and disseminate knowledge through literature study, workshops, interviews, analysis and an open final seminar. One of the most important results of the project was the insight that business models around biochar should be based on collaborations. Furthermore, the importance of a new Swedish standard that is being developed with the Swedish Household Association as project leader was underlined. A network of actors in biochar and hydrochar began to take shape during the project, including existing stakeholders from Vreta Kluster, Cleantech Östergötland, Linköping University, Agtech 2030 and the Swedish Biochar Industry Association.

The project, which was run within Agtech 2030, was a collaboration between Envinn AB and Vreta Kluster. In addition, Cleantech Östergötland and the Energy Office at Region Östergötland participated in parts of the project.

Budget: 207,500 SEK
Duration: 2022-03-20 – 2022-06-30
Project number: 308149



Left: Biochar experiment at Skogsjö farm in Mjölby. Right: Filming in Borensberg in connection with the Agtech Challenge.

*Flexible indoor robot for animal farms

Agriculture is currently undergoing a major development, with generational changes, a transition to fossil-free management and problems attracting young people. The aim of this project was to develop a well-developed concept for a fossil-free and flexible indoor farm robot for animal farms – a robot that can be operated both manually or via radio control and satellite navigation.

The project carried out a special analysis for the machine's function in autonomous mode, not only on sensors for the machine's navigation and safety, but also so that the machine can identify and carry out point interventions automatically. The idea is that the fossil-free machine platform could be used for a number of tasks on farms with animals, primarily in the horse industry. But the machine could also do simpler tasks on agricultural fields, such as improving embankments, harrowing, rolling and detecting and handling everything from weeds to analyzing horse droppings. An interesting result of the concept development was an idea for the production of electricity for the machine's batteries. The implication was that farms could produce their own electricity through solar cells, etc. Another idea concerned energy storage. For example, standardizing batteries would provide access to backup power that reduces vulnerability on farms. Batteries could therefore power both the machine and, for example, fans or lighting. Charging an electric chainsaw when sawing wood is another example. As part of the concept development, the project also included a systematic analysis of users' needs and wishes. One concept that was desirable among interviewed users was to place sensor equipment on the machine that detects horse manure in the pasture and can then pick it up in an appropriate way for analysis. Based on the user study, a concept was developed that could be visualized through physical 3D models and form the basis for scaling up and implementation on a larger scale, which was not included in the project, however.

The project was carried out within Agtech 2030 in collaboration between the innovation company FLIVAB, Vreta Training Center, Bala Agri and the Department of Business Administration at Linköping University. Informal partners were the retail chain Axima and RISE (the latter's current control system).

Budget: 325,000 SEK
Duration: 2022-10-01 – 2022-12-31
Project number: 308717

The team at Vreta training center and studies of Smedstorp riding center. Photo: Emilia Davidsson.

*New steel structures for agriculture

The project aimed to increase knowledge and interest regarding high-strength, wear-resistant, and corrosion-resistant steels—as well as innovative steel structures—within the agricultural sector. To explore steel-related concept solutions for future agriculture, the project conducted four types of collective idea processes: internal meetings, analyses at the Elmia Lantbruk trade fair (October 2022), an idea seminar at Väderstad, and knowledge-sharing seminars. During Elmia, the project delegation analyzed machinery from major companies including DeLaval, Kverneland, Ålö, Väderstad, John Deere, and Ydre-Grinden. Two key seminars were also held: an international event ("Steel and agriculture: Cases and visions") targeting steel experts and machinery buyers, and a national event ("How can new steel concepts create value in agriculture?") aimed at farmers, featuring insights from experienced farmers Elisabeth Svensk and Arvid Lindgren.

Key topics explored included using new steel concepts to reduce machine weight and soil compaction, improving corrosion resistance in contexts like manure management, and enhancing the working environment. A practical example highlighted was Nilssons Plåtindustri, which used high-strength steel (Docol 800) to reduce the weight of feed fences from 200 kg to just 60 kg.

The project was run within Agtech 2030 in collaboration between SSAB, the Department of Business Administration at Linköping University and AgroÖst/Agro Sörmland.

Budget: 580,000 SEK
Duration: 2022-08-22 – 2023-02-28
Project number: 308718




Left: In the studio during the second seminar January 2023. Right: Feed fence made of high-strength steel. Photo: Parsteel AB. Bottom left: Amanda Lindblad, SSAB, at Elmia Lantbruk. Bottom right: Studies of steel structures on loaders from Ålö.

*AI-based soil analysis

The project's participating parties share the view that new technology—particularly GIS, AI, and richer data—is underutilized in agriculture and holds significant potential for future farming. By coordinating existing data layers and developing new ones, the project aims to identify the key factors explaining intra-field yield variation. Beyond analysis tools, the goal is to implement new decision-making systems that optimize soil fertility and crop yields through data and AI.

Early achievements include developing farm elevation models via laser scanning to analyze how topography affects soil moisture—a variable rarely used in current analyses. The team has also decoded data from Sentinel 1 and 2 satellites, complementing satellite data with physical soil moisture measurements and heat-treatment sample testing. Using Markkartering.se as a foundational platform, the team is integrating multiple new data layers to build advanced decision-making tools. These tools support both farmer analysis and automated applications, such as machine guidance, precision irrigation, and regulated drainage. The project has garnered strong interest, leading to an invitation from the UN in February 2023 to present its vision.

The project took place within Agtech 2030 and was a collaboration between the Swedish Agricultural Associations, the Agricultural Association of Skåne, the Agricultural Association of Östergötland County, T-Kartor Geospatial AB, the Mathematics Center at Lund University, the Department of Systems Engineering (ISY) and the Department of Economic and Industrial Development (IEI) at Linköping University and Niftitech AB. Lawbase and The International Science Program at Uppsala University (EFFORT) also participated.

Budget: 599,900 SEK
Duration: 2022-08-28 – 2023-12-31
Project number: 308719

Left: This project used artificial intelligence and various types of computer simulations to analyze factors affecting harvest, etc. Photo: Thor Balkhed. Right: Professor Karl Åström at Lund University in connection with a seminar at Borgeby Field Days.

*The value of agricultural digital data

In 2017, The Economist magazine wrote that data is the new oil. Since then, the view of digital data as an invaluable asset has only strengthened. Some companies have been successful in capitalizing on digital data, while others are just starting to make better use of the data they collect. Agriculture has been at the forefront of this development and with increased demands for efficiency and the need to increase returns, the development in the industry will continue. But what is the value of data and how can business models based on digital data be created? The challenge that this project took on is to identify how data-driven technology can contribute to increased value for the farmer. Aristotle already realized that an asset could have value partly because it can be used by the owner of the asset (use value), and partly because the asset can be exchanged for something else (exchange value). The same should apply to digital data. They can create benefit through their own use (on the farm) or by sharing it with someone else in exchange for money or something else. The case becomes more complex when data is shared from many to someone and this someone then refines the data into something valuable that could not have been created without the many sharing the data. The project examines how the value of data can be determined, and how the value of data is affected when it is combined with data from other data sources. The project, which is still ongoing, is conducted through workshops with actors who are interested in valuing and using their data to a greater extent than is done today.

The project was run within the framework of Agtech 2030 in collaboration between the Department of Economic and Industrial Development (IEI) at Linköping University, the Swedish Seed and Oilseed Growers (SFO), Agronod, AgroÖst and the Swedish Association of Agricultural Companies.

Budget: 450,000 SEK
Duration: 2022-09-01 – 2023-06-30
Project number: 308720

Left: Project meeting at Agronod with CEO Emilia Lilliestråm, Professor Fredrik Gustafsson (sensor informatics) and Professor Lars Witell (business administration). Right: Sensors everywhere in agriculture collect large amounts of data. What value does data really have?

*Spray sensor

When spraying crops, you want to have as small droplets as possible and as precise a placement as possible. Small droplets are important for optimal coverage. The problem with small droplets is that they can drift with the wind and cause damage to, for example, watercourses or nearby sensitive crops. To reduce this risk, you want to secure the spraying time with as many variables as possible. Wind, distance to object, temperature and dose are the factors that are normally measured before spraying. The basic idea of the project is that by instead measuring these in real time and visualizing this for the driver, you get a safer and more precise spraying time. The background was an idea from farmer Axel Lagerfelt at Tolefors farm who won first prize in the Tekikutmaningen competition arranged by the magazine Land Lantbruk Väderstad, Lantmännen Maskin and Kramp. The project was about developing a concept containing sensors that measure wind, pressure and distance to the crop in real time. The development process was inspired by racing sailing, where real-time control of several weather parameters and other parameters are processed by computers in real time to optimize decision support and precision. For example, the project ended up choosing a gateway called Yacht Devices gateway, which is developed specifically for racing sailing. The project also led to a basis for the EIP application, and that process is currently underway.

The project, which has been run within the framework of Agtech 2030, has been carried out in collaboration between Tolefors Gård, A-Electronix AB, Kårstad, Lovang Lantbrukskonsult and the Department of Economic and Industrial Development (IEI) at Linköping University.

Budget: 240,000 SEK
Duration: 2022-09-01 – 2023-03-31
Project number: 308721

Left: The project drew inspiration from competitive sailing and also integrated technology from the sailing industry into the solutions developed in the project. Photo: Martin Andersson. Right: Agriculture can learn a lot from how competitive sailors analyze the winds. The photo shows Foxy Lady. Photo: Rickard Bergkvist.

*The potential of Swedish protein crops in vegetarian dietary supplements

Currently, Swedish-sold dietary supplements are based primarily on imported protein, while the ingredients for the dietary supplements could be produced in Sweden. Foreign protein has an unclear background in terms of raw materials and production. To create an ethically produced dietary supplement with full traceability, this project proposes starting with Swedish-grown peas processed in a Swedish production facility. When growing Swedish peas, a minimum of pesticides can also be used because here in Sweden, thanks to the colder climate, we have less of a problem with insects. In addition to the ethical profile, the protein raw material should also have a neutral taste to avoid the inclusion of masking flavors. It should also have a consistency that can be used in various types of dietary supplements for primarily training but also for use as a diet replacement and complement in rescue services (short on time, need for food supplements that are not bulky) and elderly care (difficult to get enough energy and protein). In order to fulfill the intended purposes, according to the project's problem analysis, different types of packaging models are also required, with different sizes and with different requirements for sustainability. The project, which is still ongoing, has already resulted in the development of different types of protein concentrates, analysis of properties and testing of packaging.

The project took place within the framework of Agtech 2030 and in collaboration between True Performance AB, Gropro AB and Lovang Lantbrukskonsult AB. The project also included collaboration with Adapted Medical Solutions AB, Globe Marketing, Lund University and Protein Import AB.

Budget: 200,000 SEK
Duration: 2022-10-01 – 2022-12-31
Project number: 308722

The project has the vision of refining protein crops such as peas.

*Smarter field machines

Seed drills and especially combination seed drills play a major role in the development of agricultural crops. In the industry, there is a trend towards increasingly intelligent machine concepts and increased precision in all possible dimensions. The project involves a preliminary study on the theme of smarter field machines, a preliminary study that includes prototype construction. By "smarter" here we mean that the machines can automatically adapt their settings as needed in real time and while moving at perhaps 15 kilometers per hour, decimeter by decimeter. A partial result of the project is a global environmental analysis on the theme of smarter seed drills and precision seed drills ("planters"). Another result of the project is the analysis and development of sensor concepts. For the farmer, the concept that the project results in means an opportunity to control the sowing and establishment process in a completely new way. It involves extremely high precision in the sowing moment itself and the concept also enables a new type of data stream that updates the picture of the farm's efforts, which can be used in analyses, decision-making processes and for forecasts of harvest outcomes, etc.

The project was carried out within the framework of Agtech 2030 and in collaboration between Väderstad AB, RISE, Lovang Lantbrukskonsult and the Department of Economic and Industrial Development (IEI) at Linköping University. However, the project also included collaboration with several technology developers and farmers in Sweden, the USA and elsewhere.

Budget: 900,000 SEK
Duration: 2022-08-31– 2024-12-31
Project number: 308723

Left: The development of seed drills and precision seed drills never stops. The picture shows Proceeed. Photo: Väderstad. Right: If you look closely at modern agricultural machinery, you will find computers and smart systems.

*Gas analyses in soil

Farmers who take care of their soil can expect higher yields, as soil fertility or "soil health" is central to achieving good harvests. Eight soil-related factors can be identified that shape fertility: Soil structure, water situation (water management, permeability, capillary forces), plant-available nutrients, plant pests, plant pathogens, beneficial organisms and carbon. This ongoing project focuses on analyzing the soil in a new way, namely by analyzing gases present in the soil and the composition of these gases. Furthermore, a prototype for soil analysis is being developed. The project also includes a historical inventory of 3 geographically dispersed field trials. This is done through interviews with farmers regarding soil type, cultivation history, fertilization, special observations, etc.

The project took place within the framework of Agtech 2030 and in collaboration between HECAAP (Nedersta gård), RISE, AgroSörmland and IEI Verkstad at Linköping University

Budget: 205,000 SEK
Duration: 2022-10-01 – 2023-06-30
Project number: 308724

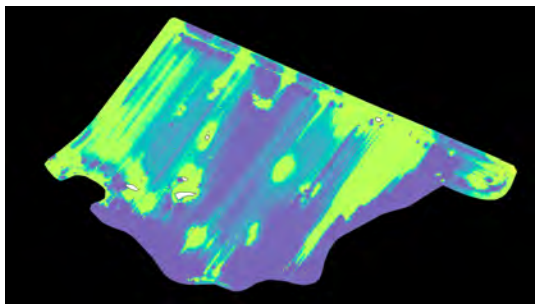
Left: Janne Klason from Nederstad farm in IEI Verkstad at Linköping University January 18, 2023. Right: Dialogue during Brunnby Farmers' Days.

*Segmented harvest measurement

Precision agriculture can increase yields, improve the economy and benefit both the climate and biodiversity. Yield measurement is a central aspect of precision agriculture. This project is about compiling knowledge about yield measurement and developing a new concept. The project is ongoing. Here are some highlights: American historiography usually gives the Yield Monitor the honor of having been the pioneer. According to these sources, the first product for continuously measuring crop yield during threshing was "Yield Monitor 2000", which after several prototypes was launched in 1992 in the USA. But as early as 1980, Jeff Claydon installed a yield meter in his Claas Dominator 80 combine on his farm Gaines Hall in Suffolk, UK. Claydon Yield-o-Meter Ltd was created and in 1982 the product Yield-o-Meter was launched on the market. It was not until 1989 that the world's probably first attempt was made to link yield measurement with GPS. The equipment (a Yield-o-Meter) and a GPS receiver were mounted on a Deutz combine harvester in Osterhof, Germany. While harvest measurement has traditionally been about measuring the amount of harvest, new findings have made it possible to measure quality variables such as protein content. Next Instruments in Australia began offering the technology in 2013 through the product CropScan. Furthermore, the waste from the combine harvester is interesting as it is also part of the harvest even if it is not taken care of. The world's probably first electronic waste indicator was probably handed over to the state-owned combine harvester manufacturer "Fortschritt Landmaschinen" in 1967. The project is now developing a new concept for harvest measurement that partly builds on existing technology and partly adds new angles of approach.

The project took place within the framework of Agtech 2030 and in collaboration between A-Electronix, Tolek and Lovang lantbrukskonsult. However, the project also included people from Linköping University, Saab Dynamics and Elvestad farm.

Budget: 160,000 SEK
Duration: 2022-12-01 – 2023-06-30
Project number: 309318



Left: Analyzing the harvest is a key factor in agriculture. Right: Harvest maps are becoming increasingly common. But there is still great potential for development in this area. Illustration: Tolefors.

*Project management support

Innovative processes always have a background and there are stages when concrete problems, solutions or projects are not yet clear, formulated, launched or financed. Furthermore, there are situations when projects have certainly started but are at a fragile stage. In these cases, coaching and care are important to ensure that they do not lose momentum or are interrupted. This was the background for the Project Management Support project to be initiated. The aim was to strengthen the management of Agtech 2030 regarding dialogue and advancement of existing or potential Agtech 2030-funded projects, to facilitate new contacts regarding new and existing innovation projects, etc. The project can be considered as a competence-based infrastructure for other projects. The result exceeded expectations. Several projects were created or successfully promoted. One example is Gas analyses in soil. Another is New steel structures for agriculture.

The project took place within the framework of Agtech 2030 and was implemented by AgroÖst in collaboration with the company Cilla Krantz Kompetens och Utveckling.

Budget: 140,000 SEK
Duration: 2022-08-01 – 2022-12-31
Project number: 308392

Team SSAB project during a visit to Väderstad's booth at Elmia Lantbruk 2022. The SSAB project was shaped through contributions from the Project Management Support project.

*Quality sorting of grain

A batch of grain from the harvest or an entire drying or silo batch on the farm usually receives a certain quality classification at the receiving depot. This classification determines the price and what the batch will be used for. BoMill has invented a device that can use NIR technology to sort grain kernel by kernel with regard to protein. Fusarium and don can also be sorted out. The patent was titled "Method of sorting objects comprising organic materials". The primary idea is that farmers or grain users should be able to sort out different quality fractions from a bulk batch. This possibility has great importance and potential and the project aims to deepen that potential. In addition to theoretically defining the potential for this technology, the project also included conducting physical experiments where mechanical technology, optical technology and biology interact. The project uses a new type of technical solution: The new machine has a different structure and instead of a cylinder like a roulette wheel that sorts the kernels, the kernels flow like a waterfall for accurate detection and sorting into two fractions. It is faster and the machine is cheaper overall for the customer with a lower purchase price and operating costs. The customer can choose to buy only one or up to eight modules. The one with one module has a capacity of up to two tons per hour. The sorting is now also done with NIR technology and what is sorted is protein content.

BoMill, Väderstad and Linköping University participated in the project. The Swedish Agricultural Society and Forsbecks also participated in the project.

Budget: 67,000 SEK
Duration: 2023-09-01–2023-12-31
Project number: 310687

Sorting wheat through BoMills machine September 22, 2023.

*Stimulation of new technology with a focus on drone technology

Drone technology has made progress in recent years. The project aimed to analyze and demonstrate existing technology and conduct experiments with potential technology connected to drones. The idea was to gather experts in the field, use an agricultural company as a test bed and use Västervik Airport as an experimental site. With the help of existing and future drone technology, farmers can increase their knowledge of fields and animals and increase precision in both animal husbandry and field cultivation. Drone technology can also develop logistics. The project was innovative in several ways. Firstly, new available technology was tested and evaluated "live" in front of a group of experts. Secondly, a theme day was included that was neither a typical conference nor a demonstration as it involved a combination of demonstrations and experiments. Thirdly, the development and testing of a completely new concept was included, namely filling seed drills with seed or fertilizer using drones. The theme day "Drones in Agriculture" took place in September 2023 at Gamlebygymnasiet and Västervik Airport. 15 lectures focusing on areas of use for drones were held. Växtab, Spraydrone and Scandinavian Farmers demonstrated drone-based spraying and fertilizer spreading. Crister Stark, Väderstad, analyzed the vision of filling seed drills with drones. Czech CultiWise and Danish Brøns Group showed how a drone first drove over the field and documented each individual weed and then made maps that were fed into the sprayer.

The project was a collaboration between Drone Center Sweden, the Swedish Agricultural Technology Association (JTF), the Swedish Agricultural Society Kalmar Kronoberg Blekinge and Linköping University. The project also involved the Royal Swedish Academy of Forestry and Agriculture (KSLA), Agria Insurance Company, RISE, Aero EDIH, Visual Sweden, Linköping Science Park, Vreta Kluster, LRF and Ogestad Egendom.

Budget: 547,500 SEK
Duration: 2023-01-01–2023-12-31
Project number: 310686

Team CultiWise and Bröms group at Västervik Airport.

*Gas analyzes in soil, pilot study, stage 2

Currently, there is very little information about which gases and in what quantity they occur in the soil, and how the composition varies between different soil types. With knowledge of the gas content and the impact of different gases on the crop result, new opportunities open up for, for example, optimizing cultivation and farming methods, avoiding growth-inhibiting factors and better utilizing growth-promoting concentrations of specific gases, etc. The purpose of the project is to develop a technical solution for gas detection and then find out which gases and in what quantity they occur in different soil types, as well as how they affect crop growth. A preliminary study was carried out during the period September 2022 to April 2023. At that time, a literature study was compiled on gases in agricultural soil and the impact that gases can have on the crop result. The occurrence of different sulfur gases in the soil was then measured for three different fields, two of which were suspected of containing harmful sulfur gases. Undisturbed soil cylinders were brought into the laboratory and the gases from the soil were captured during four days of aerobic incubation. The collected gases were analyzed for a range of sulfur compounds. Sulfur gases could not be detected for any of the locations. The conclusion was that future sampling should be done during the summer, when temperatures and thus biological activity in the soil are high. Furthermore, a sketch of a field equipment for collecting and measuring gases in agricultural soil was prepared. From the sketch, a first prototype was developed at Linköping University's workshop. Validation of the technology now remains.

The project was run by HCAAP AB, Yara, RISE, Linköping University and AgroÖst/AgroSörmland.

Budget: 192,000 SEK
Duration: 2023-06-30– 2023-12-31
Project number: 310239

Test of the gas sensor at Nederstad Gård.

*Rotenberg innovation farm 2023

The project was about establishing a development farm for innovation based on an existing platform in the form of a successful and dynamic farm business, in this case Rotenberg Säteri. The idea was then to use that platform for identifying strategically important innovation needs as well as for generating need-motivated innovative processes. The idea included a collaboration between the farm and Linköping University and in particular the digital platform initiative that focuses on communication technology, sensors and dashboards. It should be emphasized that the project was not about creating a "test bed" or "demo farm" because these labels reflect a perspective where it is assumed that a certain product or solution already exists and then only needs to be tested or demonstrated. Although testing and demo were also important and were not excluded in this project, they were definitely subordinate to the vision of capturing needs and the innovative energy of farmers. An example of a result from the project was the development of a lifting jack, which later became a separate project. Another example was the development of a new idea linked to threshing which is now subject to planning for patenting.

The project had two main partners, Rotenbergs Säteri (through the company Agrotec AB) and Linköping University.

Budget: 100,000 SEK
Duration: 2023-01-01 – 2023-12-31
Project number: 310776

Rotenberg and Agtech Sweden's experimental field in the foreground.

*Kårstad innovation farm 2023

The project was about establishing a development farm for innovation based on an existing platform in the form of a successful and dynamic farm operation, in this case Kårstad. The idea was then to use that platform for identifying strategically important innovation needs as well as for generating need-motivated innovative processes. The idea included a collaboration between the farm and Linköping University and, in particular, the digital platform initiative that focuses on communication technology, sensors, and dashboards. It should be emphasized that the project was not about creating a "test bed" or "demo farm" because these labels reflect a perspective where it is assumed that a certain product or solution already exists and then only needs to be tested or demonstrated. Although testing and demo were also important and were not excluded in this project, it was definitely subordinate to the vision of capturing needs and the innovative energy of farmers. Examples of results from the project were the development of a sensor system that included a base station, antennas mounted on silos and different types of sensor installations in the field.

The project had two main partners, R & R Kårstad AB and Linköping University.

Budget: 100,000 SEK
Duration: 2023-01-01 – 2023-12-31
Project number: 310797

Sensor installation at Kårstad.

*Tolefors innovation farm 2023

The project was about establishing a development farm for innovation based on an existing platform in the form of a successful and dynamic farm operation, in this case Tolefors. The idea was then to use that platform for identifying strategically important innovation needs as well as for generating need-motivated innovative processes. The idea included a collaboration between the farm and Linköping University and in particular the digital platform initiative that focuses on communication technology, sensors and dashboards. It should be emphasized that the project was not about creating a "test bed" or "demo farm" because these labels reflect a perspective where it is assumed that a certain product or solution already exists and then only needs to be tested or demonstrated. Although testing and demo were also important and were not excluded in this project, it was definitely subordinate to the vision of capturing needs and the innovative energy of farmers. Examples of results from the project were the development of a sensor system that included a base station, antennas mounted on silos and different types of sensor stations in the field.

The project had two main partners, Tolek AB and Linköping University.

Budget: 100,000 SEK
Duration: 2023-01-01 – 2023-12-31
Project number: 310799

Filming at Tolefors.

*Vreta Education Center Innovation Farm 2023

The project was about establishing a development farm for innovation based on an existing platform in the form of a successful and dynamic farm operation, in this case the Vreta Education Center. The idea was then to use that platform for identifying strategically important innovation needs as well as for generating need-motivated innovative processes. The idea included a collaboration between the farm and Linköping University and in particular the digital platform initiative that focuses on communication technology, sensors and dashboards. It should be emphasized that the project was not about creating a "test bed" or "demo farm" because these labels reflect a perspective where it is assumed that a certain product or solution already exists and then only needs to be tested or demonstrated. Although testing and demo were also important and were not excluded in this project, they were definitely subordinate to the vision of capturing needs and the innovative energy of farmers. An example of a result from the project was the development of an idea about egg picking in chicken coops, which later became a separate project.

The project had two main partners, Vreta Education Center and Linköping University.

Budget: 100,000 SEK
Duration: 2023-01-01 – 2023-12-31
Project number: 310798

Manure robot at Vreta Education Center.

*Vågerstad innovation farm 2023

The project was about establishing a development farm for innovation based on an existing platform in the form of a successful and dynamic farm operation, in this case Vågerstad. The idea was then to use that platform for identifying strategically important innovation needs as well as for generating need-motivated innovative processes. The idea included a collaboration between the farm and Linköping University and in particular the digital platform initiative that focuses on communication technology, sensors and dashboards. It should be emphasized that the project was not about creating a "test bed" or "demo farm" because these labels reflect a perspective where it is assumed that a certain product or solution already exists and then only needs to be tested or demonstrated. Although testing and demo were also important and were not excluded in this project, they were definitely subordinate to the vision of capturing needs and the innovative energy of farmers. Examples of results from the project were the establishment of an experimental field with over 20 different sensors distributed over six sensor stations.

The project had two main partners, Åhmans Tractor Center and Linköping University.

Budget: 100,000 SEK
Duration: 2023-01-01 – 2023-12-31
Project number: 310800

View from the silo tower in connection with the installation of the communication center.

*CluckBot: Eggcellent Robotics

In egg production, collecting eggs laid in the wrong place can be a time-consuming and labor-intensive process. When laying eggs, hens sometimes lay eggs on the floor of the hen house, instead of in the nest, making it difficult and unergonomic to collect them manually. Producers either neglect to collect the eggs, which results in unnecessary egg waste, or the eggs are picked by hand, which is a tiring task. To address these challenges, Ingela Appelsved proposed the idea of an egg-collecting robot called CluckBot. The robot will use sound and light to try to prevent the hens from laying eggs on the floor and, through the “disturbance”, get the hens to learn to lay in the nest where they are left alone. The robot would also pick up the eggs that end up on the floor. The purpose of the project was to conduct a feasibility study to determine whether CluckBot is a sustainable solution for egg collection in egg production. The study resulted in a digital prototype that showed what the concept could look like. In summary, the project aimed to revolutionize egg collection in egg production by increasing efficiency and reducing labor costs.

The project involved Dyno Robotics AB, Vreta Education Center, Svenska Ägg and Tolek AB.

Budget: 145,000 SEK
Duration: 2023-06-01– 2023-09-30
Project number: 309952

Robot concept for picking eggs in chicken coops.

*Solar panel shading effects on crop yield

The background to the project was a previously completed project in 2022 where mobile solar cells were mounted on pillars over arable land. Five dual-axis solar tracking solar panels on pillars were mounted and installed on arable land belonging to the Eneby farm in Stallarholmen. The solar cells were placed in such a way that they did not obstruct the access of the farm's machinery. The project took into account the results of experiments conducted by the Fraunhofer Institute, which showed that the mobile solar cells on arable land actually create better conditions for the cultivated crop and the microclimate (biodiversity) than without solar cells. The goal of this project was to conduct studies of shadow effects on arable land. The soil around the solar trackers was analyzed by researchers from RISE, and eight test plots were selected for more detailed studies of growth and yield in growing crops. Half of the test plots were placed in the shade and the remaining plots were reference plots. The method for measuring harvest yield was developed in such a way that the results could be compared with similar ongoing projects in Sweden regarding solar cells and shadow effects. Component shortages and the annual cycle meant that parts of this project continued even after the project was formally completed. It should be added that the project is part of a larger vision under the label Self Sustainable Farm. It is about developing a completely circulating energy system for a farm. This will be done by including everything from solar cell parks with AI and subordinate cultivation areas to energy conversion and storage, as well as the production and use of ammonia as vehicle fuel, for heat production, electricity generation, fertilizer production or direct nitrogen supply to the soil, etc. In this vision, solar cells form the basis for the farm's production of fossil-free energy and storage.

The project was run by Superstate AB, RISE AB and AgroÖst/Agro Sörmland.

Budget: 100,000 SEK
Duration: 2023-07-25– 2023-11-15
Project number: 310200

Solar panels at the edge of arable land. Photo: Cilla Krantz.

*Automated field phenotyping

Sweden and other Nordic countries, which extend from 54° to 69° north, are among the northernmost agricultural countries and are more threatened by climate change than other parts of the world. In the past, cold climate conditions have reduced the impact of plant diseases on crops in Sweden. However, climate change is increasing temperature and humidity, which creates favorable conditions for the spread of diseases. This has been particularly noticeable in Skåne, where diseases and drought have affected crops. Traditional manual measurement methods for studying plant traits are labor-intensive, expensive, time-consuming and imprecise. Although there have been advances in technical tools for phenotyping plants, they have limitations; most of these tools only measure the upper part of the plant stand and cannot analyze the inside of the plant layer. In this project, a concept has been developed into an innovative device that can penetrate between plants and examine their internal parts without damaging them. This device uses advanced sensors to obtain detailed information about plant structure and physiology, and monitor crop health and disease status. Using image processing and machine learning, the device will be able to measure hundreds of plant physiological traits. This device can revolutionize phenotyping of field crops and contribute to sustainable agriculture in Sweden. The concept is patented and the patent is titled "System and method for phenotyping using horizontal imaging" (SE2250270A1).

The project was run by DeepPhenoTech AB. Sony also participated.

Budget: 40,000 SEK
Duration: 2023-09-30– 2023-12-15.
Project number: 310561

Ajit Nehe, SLU, and Johan Grundström Eriksson, Sony during Borgeby Field Days.

*RATVAT: Rational and scalable water management in a changing climate

The changing climate is affecting agriculture. We are experiencing longer, more frequent periods of drought, while rain and snow tend to come in spurts. The management of the water resource must adapt to these new conditions, which requires new thinking about the management of water in agriculture. Previously, precipitation management has primarily been about how water can be diverted away from hard surfaces and roofs and arable land in order to avoid undermining and flooding, as well as soil compaction and/or difficulties in accessing with machinery. Water management-related innovation linked to climate change has focused on large-scale water storage, irrigation dams and irrigation for large areas. These ideas need to be complemented by small-scale, flexible and smart technologies and methods, so that precipitation – when and where it comes – can be utilized to the maximum. The aim of the project was to enable resource-efficient management of, for example, valuable trees, smaller plantations and pastures adjacent to buildings and facilities such as riding arenas and riding stables – without having to use large irrigation dams or spring water.

The project was carried out under the leadership of Kommunikationsdoktorn AB in collaboration with Lindbäck Arborist och Trädgårdsdoktor AB (Arbdoc), Gärstad Mellangård, AB/Theme Environmental Change at Linköping University, Department of Industrial Environmental Technology at Linköping University

Budget: 68,600 SEK
Duration: 2023-11-01–2023-12-31
Project number: 310562

Water is a strategic resource in agriculture.

*New method for processing and maintenance of trotting tracks – Tambut

Horses are an important part of agriculture and major consumers of feed, with trotting playing a key role in the horse industry. Sweden has 33 trotting tracks, typically with an inner circumference of 1,000 m and a width of 20–24 m. Their surfaces consist of macadam topped with stone flour, which faces heavy impact from horse hooves and frequent mechanical processing (daily sloughing and watering, and weekly harrowing). This wear requires applying new stone flour and traditionally replacing parts or all of the top layer, which is costly and environmentally taxing.

New technology now allows coarser stone flour to be milled directly into the track instead of removing worn material. While cheaper, repeatable, and considered more eco-friendly, scientific studies on the material's behavior are lacking. To address this, ground-penetrating radar will measure soil conditions before, during, and after milling. This preliminary study developed an implementation plan—including required machinery, personnel, and cost estimates—finding that three tractor operators are needed for milling and one for radar measurements, plus 1–2 track staff. The study revealed that using ground radar to analyze soil structure is complex and unprecedented for this application, making frequency selection critical for the main project.

The project was carried out by Mantorpstravet and Linköping University. Qamcom Research and Technology was a subcontractor.

Budget: 47,200 SEK
Duration: 2023-10-20– 2023-12-15
Project number: 310563

Creating perfect surfaces on riding arenas or roads is a pressing problem in agriculture.

*New transport solutions for reduced land impact

Soil compaction is a major problem in modern agriculture because it reduces the yield of cultivated crops and there are studies that show that greenhouse gas emissions increase from heavily compacted agricultural land. Approximately 6% of the world's food yield is lost due to soil compaction. In modern agriculture, there is a great focus on high efficiency for economic reasons and machines are therefore becoming larger. A possible disadvantage of modern high-efficiency machines is that soil compaction can be assumed to increase as the machines become larger and heavier. At the same time, some manufacturers in the agricultural transport sector use high-tech solutions such as high-strength steel, large wheels with low air pressure, and pressure-equalizing suspension, which can reduce soil compaction. This is compared to conventional technology that many farmers use, characterized by relatively heavy structures in ordinary steel with small, hard wheels and without advanced suspension solutions. The aim of the project was to investigate whether modern high-tech transport structures have lower soil compaction than older conventional agricultural wagons. Field tests were carried out on Ivarssons i Metsjö AB's field outside Linköping. Sensors were placed under the driving track through horizontal holes drilled in dug pits alongside the driving track. Each wagon was driven over the measuring pit three times, during which we measured both pressure and ground deformation. Three different wagons were used: a conventional two-axle wagon and two modern "Hi-tech" wagons (MetaQ75 and Metaflex4). The results show that Hi-tech wagons, with modern implement tires and more axles, can be driven with double the total weight of 30 and 33 tons respectively with reduced soil impact on the topsoil compared to conventional wagons with a total weight of 15 tons with tires intended for road transport. The test results also show that at the same tire pressure, the wheel load is decisive for differences in ground pressure, i.e. more axles make a difference.

Project partners were Ivarssons i Metsjö AB, RISE, Linköping University and Michelin.

Budget: 275,000 SEK
Duration: 2023-08-31–2023-12-31
Project number: 310199

Soil compaction Experiment in the fall of 2023.

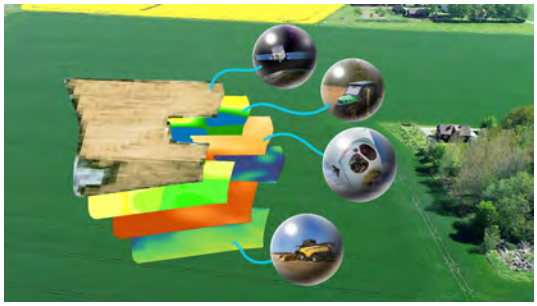
AI-Based Soil Analysis Reaches New Heights

Modern agriculture must increase production while optimizing resource use to meet economic and environmental demands. Despite the availability of large amounts of satellite and sensor data, it is difficult for farmers to make accurate decisions at the field level because variations in soil and weather create complexity. There is therefore an urgent need for systems that can transform this data into practical decision-making tools for effective precision agriculture.

In response, this project developed an analysis tool and new decision-making systems with the aim of putting them into practical use in the future. By utilizing artificial intelligence and new data sources, the work aimed to optimize both soil fertility and final yield. The project developed a framework that integrates multispectral images from the Sentinel satellites with advanced machine learning techniques, specifically Graph Neural Networks (GNN). By combining spectral indices, weather data, and specific soil properties, the system can predict variations in crop yield with very high precision. The method addresses specific technical challenges such as data variability and aims to significantly improve local yield predictions, which constitute a central building block for the sustainable and high-yield agriculture of the future.

Modern agriculture must increase production while optimizing resource use to meet economic and environmental demands. Despite the availability of large amounts of satellite and sensor data, it is difficult for farmers to make accurate decisions at the field level because variations in soil and weather create complexity. There is therefore an urgent need for systems that can transform this data into practical decision-making tools for effective precision agriculture.
The project is being carried out within Agtech Sweden and is a collaboration between the Skåne Rural Economy Society, the Östergötland County Rural Economy Society, the Center for Mathematics at Lund University, Linköping University, and Niftitech AB. Lawbase and The International Science Program at Uppsala University (EFFORT) also participated.

Budget: 1,622,000 SEK
Duration: January 1, 2024 – December 31, 2025
Project number: 312631



This project is based on the vision of having complete oversight of the fields through information from all possible sources.

Technology and Expertise for Innovation Hubs

The development of the agriculture of the future requires more than isolated tests on individual farms; it requires a cohesive technical infrastructure and a scientific foundation that can be widely applied. A major challenge for today's agtech innovations is the lack of standardized methods for integrating and analyzing data from different sensor systems in real-world environments. Without common tools and validation, technical solutions risk remaining fragmented, which hinders large-scale implementation. There is therefore an urgent need for a comprehensive project that develops the fundamental technology and knowledge required to turn the innovation farms into effective test beds for next-generation agricultural technology.

In response to this, the project serves as a link across all of Agtech Sweden's innovation farms. The project has delivered concrete technologies, such as sensor nodes for the mobile network developed by the team, code for data integration, and specialized camera kits and fixtures for measuring soil and crops. At the same time, important knowledge has been generated through scientific publications, including Gustav Zetterqvist's licentiate thesis on wildlife management technology and Emil Björndahl and Ebba Edenheim's study on vibration measurement to detect wear on harrow tines. By combining technical development with academic research and monitoring international trends – for example, through participation in Agritechnica – we are creating a robust platform for validating the digital agriculture of the future.

The project partner is Linköping University.

Budget: approximately 200,000 SEK
Duration: January 1, 2024–December 31, 2025
Project number: 310964

This project is developing technology that is used at several of our innovation farms. This particular example is a fixture for analyzing how satellite data compares to reality.

Stone detection on arable land

Several autonomous agricultural machines are on their way to the market after many years of mostly being prototypes and concepts. The tasks that autonomous machines can perform are limited by the fact that they cannot handle the same amount of deviations and problems that a human driver can. One such problem is detecting, locating and removing stones in connection with, for example, rolling. Larger stones that are not removed from the field cause problems and risk of breakdowns for combine harvesters and other machines. This project has led to an invention that is now the basis for the development of a technical prototype. This prototype is adapted to the Drever robot, which is under development by Traktorarvid AB. A sensor is mounted on the machine that can register the movement that occurs when the roller runs over a stone. The position of the stone is stored in the Drever's control system and the farmer can then collect the stones with a stone grab or four-wheel drive when it suits him. The system is called Stone Sniffer and a patent for the brilliant idea was applied for as part of the project.

Project partners are Traktorarvid AB (project owner) and Linköping University, but there is also interaction with Almi. The project is run within the framework of Agtech Sweden.

Budget: 140,000 SEK
Duration: 2024-10-01 – 2024-10-01
Project number: 312067

A patent application has been submitted for a system to detect stones with future robots in agricultural fields.

Innovation Arena Elmia Agriculture 2024

The concept of innovation is often associated with individuals developing new technology, but this picture is incomplete. Innovation is a broader phenomenon that occurs when original technical or non-technical concepts enter society, typically via a market. In this context, trade fairs play key roles as temporary physical meeting places. Unlike digital channels, fairs allow visitors to use all their senses to experience products and concepts, acting as idea generators, information sources, marketing channels, competitor monitoring platforms, and knowledge hubs.

This project aimed to leverage these opportunities by establishing an innovation arena at the Elmia Lantbruk fair in autumn 2024. Inspired by Agtech Sweden's pavilion at Agritechnica 2023, Agtech Sweden selected innovative companies and projects to serve as interactive "stations." Featured initiatives included autonomous electric tractors (Traktorarvid), NIR-based feed analysis (Foderteknik AB), soil compaction risk mapping (Novel Agro), farm-based protein fermentation (Dapibuset), AI disease detection (Agricam), precision weed removal (Ekobot), camera-based pig weighing (Smart Agritech Solution), and smart field machinery (Väderstad). Dialogues with teams focused on physical and digital visualization, complemented by stage presentations, guided tours, and promotional films produced by Lars Helgstrand. Overall, Elmia Lantbruk attracted 21,612 visitors across three days.

Project partners were Elmia AB and Linköping University. It took place within the framework of Agtech Sweden.

Budget: 599,400 SEK
Duration: 2024-10-01 – 2025-12-31
Project number: 312064

The innovation arena at Elmia Lantbruk was a real success.

Rotenberg Innovation Farm 2024–2025

Modern large-scale agriculture faces a difficult balancing act between operating a highly productive fleet of machinery and protecting the soil's long-term productivity. One of the biggest challenges is the risk of soil compaction, which occurs when heavy machinery is driven across fields and degrades soil structure, leading in turn to lower yields and poorer drainage. At the same time, there is a growing need to digitize operations in order to make data-driven decisions in real time, but the leap from vision to robust, connected solutions that can withstand harsh environments is often a significant one. There is therefore a need for practical test environments where advanced sensor technology and heavy machinery systems can work together to find solutions that are both gentle on the soil and at the cutting edge of technology.

The project builds on a long-standing collaboration with Rotenbergs Säteri and Agrotec AB to develop technology that benefits modern grain farms. Agrotec began operations in 1990, and founder Anders Henningsson's experience in the construction industry has created a creative fusion when applied to agriculture. Today, the company operates an extensive machinery station and cultivates approximately 1,150 hectares of grains and oilseeds around Norrköping, with a focus on high efficiency.

The project addresses this through a multi-year collaboration between Agrotec AB and Rotenbergs Säteri. Agrotec was founded in 1990, and founder Anders Henningsson's experience in the contracting industry has created a creative fusion when applied to agriculture. Today, the company operates an efficient machinery rental business and a crop-growing operation covering approximately 1,150 hectares around Norrköping. Central to the project is reducing soil compaction, which has, among other things, led to the idea of a weighbridge for checking the weight of machinery combinations. The project also encompasses a vision of connected fields through robust sensor stations, an effort being carried out in collaboration with a cutting-edge company from Silicon Valley. By testing these solutions across large areas, the project is generating knowledge on how digitalization and soil conservation can be integrated to optimize future grain cultivation.

The project had two main partners: Rotenbergs Säteri (through the company Agrotec AB) and Linköping University.

Budget: 200,000 SEK
Duration: January 1, 2024 – December 31, 2025
Project number: 312413

A variety of projects are underway at the Rotenberg Innovation Farm. The photo shows a trial using a hyperspectral sensor developed by Glana in Linköping.

Kårstad Innovation Farm 2024–2025

n the agricultural sector, there is often a gap between technological development and practical application. Traditional test beds and demonstration farms often assume that a ready-made solution already exists and simply needs to be evaluated, which risks overlooking the actual needs and innovative potential of practicing farmers. The challenge lies in reversing this perspective: instead, identifying strategic problems directly within farm operations and allowing these to guide the development of new technology. Therefore, there is a strong need to create dynamic development environments where academia and the agricultural sector can collaborate to generate needs-driven innovations that truly make a difference in everyday life.

In response, the project focused on establishing a development farm based on the successful operations at Kårstad. Through close collaboration between the farm and Linköping University – with a particular focus on digital platforms for communication technology and sensors – the project has served as a driving force for identifying and bringing farmers' own ideas to life. Unlike a purely theoretical test bed, the vision here has been to let the farm's specific needs guide the innovation process. A concrete result of this approach is the development of a customized sensor system that encompasses everything from base stations and silo-mounted antennas to various types of sensor stations placed out in the fields. The project has thus demonstrated how an existing farm platform can be transformed into a powerful environment for both technical development and practical validation of the digital solutions of the future.

The project had two main partners: R & R Kårstad AB and Linköping University.

Budget: 200,000 SEK
Duration: January 1, 2024 – December 31, 2025
Project number: 312412

At Kårstad, we have set up a command center at the top of the silo. From there, we communicate with sensors deployed in fields with various soil types, including acidic sand. "Acidic sand" refers to soil where there are water-bearing layers – such as clay – beneath the slightly sandier topsoil, and where the underlying layers draw water upward through capillary action.

Tolefors Innovation Farm 2024–2025

Amid rapid technological advancements in agriculture, a common challenge arises in validating advanced digital solutions in an environment that is both commercially demanding and open to innovation. For new technologies – such as satellite-based precision farming – to move from theoretical models to practical applications, platforms are needed that combine professional operations with a deep technical understanding. There is a great need for venues where complex data sets can be analyzed and translated into concrete actions to optimize yields and resource efficiency. At the same time, there is often a lack of forums where decision-makers and the agricultural leaders of the future can experience the technology in its proper context to understand its potential for the industry's competitiveness.

In response to these needs, the project has once again established Tolefors as a key innovation farm within Agtech Sweden. Thanks to the farm's diverse operations – which include both grain and egg production – combined with the owner's strong interest in technology, Tolefors serves as an ideal platform for developing and testing new concepts. A key part of the work involves the analysis of satellite data, with the goal of deepening our understanding of the interaction between soil and vegetation to identify the most effective measures for optimizing yields. In addition to technological development, Tolefors serves an important function as a demonstration and inspiration farm. By welcoming everyone from members of the European Parliament to future farm managers, the farm acts as a bridge between cutting-edge technology, political decision-making, and practical training.

The project had two main partners, Tolek AB and Linköping University, and was carried out within the framework of Agtech Sweden.

Budget: 200,000 SEK
Duration: January 1, 2024 – December 31, 2025
Project number: 312414


PORTRÄTTET

Axel Lagerfelt, Tolefors gård:

"Tillsammans har vi skapat en rörelse som gör lantbruket synligt"

In this article in Lantbrukets Affärer, Axel Lagerfelt shares his perspective on the collaboration within Agtech Sweden.

Vreta Education Center Innovation Farm 2024–2025

Amid the rapid digital transformation of agriculture, a critical challenge lies in securing the supply of skilled workers and bridging the generational gap between established technology and the solutions of the future. For innovations in areas such as 3D printing or advanced light analysis in livestock barns to reach their full potential, they must be integrated into educational environments where the next generation of farmers is being trained. There is a great need for platforms that not only develop new technology but also serve as educational tools to enhance the digital maturity of both students and professionals. Without this connection between research, practical operations, and education, the adoption of new technology risks stalling due to a lack of knowledge and understanding.

In response to this need, a collaboration between Linköping University and the Vreta Education Center has been established as a central innovation farm within Agtech Sweden. By combining the agricultural high school's educational environment with an active farm operation that includes both animal husbandry and crop production, the project serves as a unique arena for identifying needs and testing solutions. The project has already carried out significant knowledge-building initiatives, such as seminars for farm management students and technology stations for high school students. Among the innovative avenues being explored are 3D printing of replacement parts and advanced light analysis for animal welfare. A key milestone is the development of an interactive 3D model of Vreta, which visualizes approximately 25 digital technologies and was successfully showcased during the Borgeby Field Days 2024. The project is ongoing and continues to generate results that strengthen the connection between academia, education, and practical agriculture.

The project has two main partners, the Vreta Education Center and Linköping University, and was carried out within the framework of Agtech Sweden.

Budget: 200,000 SEK
Duration: January 1, 2024 – December 31, 2025
Project number: 312415

At Vreta Education Center Innovation Farm, not only development takes place, but also knowledge days. The picture shows students from the Berzelius School visiting in 2024.

Vågerstad innovation farm 2024–2025

One of the biggest challenges in today's precision agriculture is bridging the gap between advanced sensor data and practical decision support. Despite access to technology such as drones and soil moisture meters, it is difficult to determine with certainty when a crop is under critical water stress and how this information should be translated into effective measures. There is therefore a great need for test environments where digital technology can be validated against human expertise. Without this connection between high-resolution data and proven experience, technology investments risk underperforming, hindering agriculture's ability to optimize yields and conserve resources in a changing climate.

In response to this need, Vågerstad functions as a central innovation farm through a collaboration between Åhmans Traktorcentrum and Linköping University. Within the framework of Agtech Sweden, the farm is used to identify strategic needs and develop solutions in a real operating environment. In 2024, extensive sensor networks were established around the experimental fields, and the farm served as an important knowledge arena with over 500 visitors during its demo day. In 2025, the focus was on using drones with multispectral sensors to detect water stress by combining soil moisture data with plant water content analysis. By having an experienced agricultural expert validate the sensor analyses, the project ensures that the digital methods are relevant and reliable for professional agriculture.

The project has two main partners, Åhmans Traktorcentrum and Linköping University and takes place within the framework of Agtech Sweden.

Budget: SEK 200,000
Duration: 2024-01-01 – 2025-12-31
Project number: 312166

Several projects have been carried out at Vågerstad Innovation Farm. The picture shows a film shoot with a photographer from Japan in collaboration with Cloudberry.

Agtech Torsåker

Understanding the complex interplay between weather, soil conditions and plant biology is one of the biggest challenges in modern plant breeding and precision farming. Data is often collected point by point, making it difficult to see exactly how a crop reacts to specific events such as a heat wave or heavy rainfall in real time. There is therefore a great need for integrated systems that can visualize the growth process continuously and connect image information with actual measurement data from the ground. Without this overall picture, it is difficult to draw correct conclusions about the potential and adaptability of new crops to local conditions.

In response to this, the Innovation Farm concept is being established at Torsåker through a collaboration between Agtech Sweden and Axfoundation. The project involves installing advanced sensor stations equipped with solar-powered communication technology, cameras, and soil sensors to monitor the perennial wheat Kernza. By combining time-tagged still images with data on soil moisture, temperature and solar radiation, a visual and measurable timeline of the plant's development is created. The work is carried out in close collaboration with SLU to analyze growth factors such as "Growing Degree Days" and compare the results with international trials. The system also makes Torsåker more public, as the technology enables stakeholders to follow the status of the field remotely via digital dashboards.

Project partners were Axfoundation c/o Axel Johnson Holding AB and Linköping University. It took place within the framework of Agtech Sweden.

Budget: 125,000 SEK
Duration: 2024-01-01–2025-12-31
Project number: 311505

At innovation farm Torsåker we work with analysis of Kernza crops.

The good biochar

Agriculture faced extensive demands to reduce its greenhouse gas emissions, with methane gas from cattle making up a significant portion. At the same time, there was great interest in biochar as a circular solution with the potential to improve animal health and sequester carbon. However, the challenge lay in the lack of clear scientific evidence; despite many theories, at the start of the project there was a lack of sufficient evidence to determine how biochar actually affected methane production in the stomachs of ruminants. There was therefore a great need to gather researchers, producers and farmers to identify knowledge gaps and create a clear structure for how future studies should be designed.

As a response to this need, a preliminary study was carried out to map obstacles and driving forces around biochar as a feed additive. A central conclusion of the project was that the existing literature did not provide sufficient support to draw definitive conclusions about methane gas reduction. This led the project to focus on developing frameworks for future research, from laboratory tests (in vitro) to large-scale animal trials (in vivo). The basic question concerned the degree to which different types of biochar – depending on raw material and manufacturing temperature – gave the best effect. In order to anchor the theories in reality, field surveys were also carried out among farmers who used biochar, to capture their practical experiences of pros and cons. By involving the entire chain, from feed producers to dairy farmers, the project created a broad platform for the further development of biochar as a feed ingredient.

The project owner was Envinn AB and the project partners' Inst. for Applied Animal Science and Welfare (SLU), Inst. for Land and the Environment (SLU), Meva Energy AB, Skånefrö AB and the Sjuhärad Association of Households. It took place within the framework of Agtech Sweden.

Budget: SEK 455,500
Duration: 2024-01-10 – 2025-04-30
Project number: 312045

Can biochar become an important feed additive? That is the question.

Drizzle Disk Cultivator

Tillage is one of the most energy-intensive processes in crop production. Despite decades of product development, today's implements still rely on age-old principles: mechanically breaking, cutting or turning the soil through horizontal force. Energy consumption is directly controlled by working depth, width and angle of attack, where the trend towards higher speeds to intensify the breaking has further increased both power requirements and wear. Modern machines have certainly become heavier and more durable, which provides a more controlled depth control and optimized working angles. But even though the design of cultivator tines, discs and plough bodies has been refined, the basic mechanical principles remain the same as several decades ago.

The project is about developing a tillage tool that works the soil in a completely new and much more energy-efficient way than previous methods. We are prevented from providing information about the details of the project, but information will be published in the future.

The project partners were Karlsson Agro AB (project owner) and Linköping University. The project also involved farmer and inventor Per Eke-Göransson. It was carried out within the framework of Agtech Sweden.

Budget: 400,000 SEK
Duration: 2024-06-13 – 2025-12-31
Project number: 311528

In modern agriculture, tillage usually involves ploughs, cultivators and harrows, the latter two of which have either tines or discs. In many ways, the design of these implements has been fairly stable for many years, but new concepts are beginning to emerge. The Elvestad Rip Disc disc harrow belongs to the new concept category, but cannot be described in more detail here for patent reasons.

Space technology for agricultural development

Space research is a catalyst for innovation and has for decades provided innovative tools, technologies and methods to solve specific challenges to increase both productivity and sustainability in various industries. Despite its potential, knowledge and technologies from the space sector are relatively difficult to access and it is complex to find tailor-made solutions for specific purposes.

The aim of the project is to use a more structured new innovation process, developed by International Space Asset Acceleration Company AB (I.S.A.A.C.) with partners. This process has previously been adopted by several well-known companies Koenigsegg and Stena Fastigheter and the idea was now to apply it to agriculture. More specifically, it is about helping agriculture integrate space technology to solve specific challenges. The team includes, among others, astronaut and KTH professor Christer Fuglesang and space entrepreneur Cecilia Hertz. The process involves identifying challenges facing the sector, which are then evaluated and processed through databases in collaboration primarily with the European Space Agency (ESA) and to some extent also with other international contacts within our network - such as the National Aeronautics and Space Administration (NASA). By integrating space technology with agricultural practices, we strive to create a more efficient, sustainable and resilient agricultural sector that can meet the challenges of the future.

Project partners are International Space Asset Acceleration Company AB, Umbilical Design AB and Linköping University. It takes place within the framework of Agtech Sweden. During the course of the project, International Space Asset Acceleration Company AB has been wound up and ceased to exist as a company.

Budget: 201,000 SEK
Duration: 2024-01-01 – 2026-12-31
Project number: 311304

In this project we connect agriculture with space technology. The picture shows organization leader Karolina Muhrman and astronaut Christer Fuglesang.

Integration of methane capture unit into ventilation system

The animal metabolism of farm animals releases greenhouse gases including methane. Stable buildings therefore constitute an interesting application area for the capture of methane and CO2. The technology is called Direct Air Capture (DAC).

The project investigated the possibility of integrating a DAC unit into the ventilation system of agricultural premises with the aim of capturing greenhouse gases. Originally, the focus was on methane, but during the project the focus was changed to also include CO_2. The gases have similar characteristics and need to be handled separately. The project resulted in the development and installation of a dehumidifier as a critical step for multi-phase capture, where CO_2 is captured in the first phase and methane in the next. The experiments confirm that the technology works and that a clear reduction of CO_2 can be measured after the DAC unit. At the same time, two central challenges were identified: pressure drop across the adsorbent bed and the influence of air humidity and air temperature. The dehumidifier is therefore a vital component of the continued development work and makes it possible to evaluate the effectiveness of the technology in an agricultural environment.

The project generated great interest among several target groups. It was presented at the Department of Energy Systems' graduation day, at a Lunchklubben seminar, a seminar within the Journal Club seminar series for researchers at the university, and during an Erasmus+ visit to Zagreb. Students were involved through the course projects TMPE07 and TEIO06, where they contributed with sub-studies linked to the DAC unit. Collaboration also took place with several industry players – including Total Ventilation, Sweco, MKlint System Design AB and GreenCap Solutions – which added valuable industrial knowledge and support to the project. A spin-off (UseNexus Carbon Capture Sweden AB) was established to commercialize the DAC technology. After some time, the research group also received research grants from the Swedish Board of Agriculture to further develop the technology to capture methane, ammonia, and CO2 from agricultural stables.

Project partners were the Department of Energy Systems at Linköping University and the Department of Energy Systems at the University of Gävle. It took place within the framework of Agtech Sweden.

Budget: 400,000 SEK
Duration: 2024-01-09 – 2025-01-04
Project number: 311445

A prototype for capturing methane in animal stables. Photo: Vlatko Milic

Heating Optimization & Visualization

Large amounts of energy are used to run agriculture. This is especially true for farms that have business lines such as chicken production where heating, lighting fixtures and fans are major consumers of electricity and heat. Many times farms can have several types of energy input and several types of energy output. Here, a problem arises of having control over all flows and their costs in order to be able to optimize the system as a whole as well as to be able to make rational decisions about new investments in equipment, etc., for these systems.

This project is based on a specific farm, Myra Gård, to investigate whether it is possible to halve the amount of biofuel used to heat 10,000 m2 of chicken coops, grain dryer and workshop. The aim is to identify where and how much energy is consumed at the various consumption points and to measure how much energy is produced at each heat source. Based on the collection of all data, the idea is to be able to calculate and optimize the system so that less biofuel is used. A central part of the project is to make accurate mathematical calculations of current flows and related costs, as well as to modulate different types of changes in the existing system. The entire project will generate lower costs for heating, which will generate lower costs for producing raw materials for the food industry. In general, the project will lead to an innovative method for making a diagnosis and treatment strategy for this type of farm.

Project partners are Agristella AB and the Department of Mathematics (MAI) at Linköping University. The project also involves the Department of Behavioral Sciences and Learning (IBL) and the Department of Economics and Industrial Development (IEI). The project is carried out within the framework of Agtech Sweden.

Budget: 430,000 SEK
Duration: 2024-01-12 – 2026-12-31
Project number: 312222

Myra Gård is not just a farm, it is also a complex energy system.

AI system for monitoring in greenhouses

Running a modern greenhouse is becoming increasingly complex as demands for precision farming and resource efficiency increase. While advanced climate systems create new opportunities, they also generate an enormous amount of data that the individual grower is expected to analyze. At a time when the number of professional growers in the EU is decreasing, there is rarely enough time to both manage the daily operations and stay up to date with the latest research. There is therefore a great need for intelligent support systems that can translate complex sensor data into understandable advice and automatic actions, so that the grower can focus on the core business without losing control of the growing climate.

In response to this challenge, the project has developed SCA (Svensson Climate Advice), an AI assistant based on large language models that allows the farmer to "talk to his greenhouse". By combining the power of technologies such as ChatGPT with IoT sensors and cameras, the system monitors parameters such as light, humidity, temperature and soil quality in real time. SCA acts as a digital advisor that not only identifies improvement potential and provides concrete action suggestions, but can also adjust cultivation conditions automatically to maximize growth. The vision is to create a simpler and more profitable greenhouse operation where AI-driven analysis leads to more harvests per year and more sustainable food production.

Project partners were Aktiebolaget Ludvig Svensson and Remanis Adventures AB. It took place within the framework of Agtech Sweden.

Budget: 120,000 SEK
Duration: 2024-01-12 – 2025-01-31
Project number: 312313

A modern greenhouse generates extensive amounts of information and all of this can be difficult for the farmer to handle and utilize. But with language models this can be solved. Photo: Remanis Adventures

Standardization and innovation

The relationship between strict regulations and creative innovation is often portrayed as a contradiction. In agricultural technology, standardization is crucial for safety, compatibility and environmental protection, but incorrectly designed standards run the risk of locking technology into yesterday's solutions and thus inhibiting innovation. There is therefore a great need to understand how standardization processes can be designed to instead act as a springboard for new technologies. The challenge lies in balancing the need for uniform requirements with the scope for radical technological leaps, especially in areas of high environmental stress where the demands for precision are constantly increasing.

To address this challenge, the project has analyzed the connection between standardization and innovation through close collaboration with Linköping University. Led by Andrea Fried, assistant professor of business administration at Linköping University and expert in organizational standards, the project has combined theoretical depth with practical application. Through action research, the team has participated directly in the standardization committee SIS/TK 224 Agricultural sprayers, which has provided unique insights into how future plant protection requirements are shaped. This practical experience has then been reflected against extensive literature studies based on Fried's many years of research on technical standardization. The result is a deeper understanding of how regulations can promote rather than hinder the development of sustainable and innovative agricultural technology.

The project partner was the Department of Business Administration at Linköping University.

Budget: SEK 133,000
Duration: 2024-01-01 – 2025-12-31
Project number: 312911

Agricultural technology is complex and requires different types of standards, making the connection between standardization and innovation worth investigating.

Plantguard – listening to plants

New research shows that plants under stress - such as water shortages or pest attacks - emit measurable ultrasound. This opens up unique opportunities for growers to monitor crop health in real time. The challenge lies in developing reliable hardware and AI models that can filter out background noise and accurately identify specific stressors in complex growing environments.

The Plantguard project has developed a prototype to locate and identify early health markers in plants based on their sound emissions. The system, which was developed in collaboration between Frontality Tech, SLU and the cultivation partner Rotblöta, consists of specialized ultrasound microphones and an AI-based analysis platform. Through iterative tests on tomato plants in a lab environment, the team succeeded in training machine learning models that could distinguish with good accuracy between normal status and stress effects, mainly in the case of water shortage.

An important milestone was reached when the team succeeded in replicating international research results with their proprietary equipment. The prototype was then validated in a commercial cultivation facility, providing valuable insights into the robustness of the system outside the laboratory. The success has led to the newly started company Sonicflora AB securing SEK 2.7 million in external investment from, among others, Almi Invest and LiU Invest. Thanks to this, the team is now working full-time on commercializing the technology and preparing more extensive pilot tests for the market.

Project partners were Frontality Tech AB, SLU (Department of Forest Mycology and Plant Pathology), Rotblöta and Linköping University. The project took place within the framework of Agtech Sweden.

Budget: SEK 365,672
Duration: 2024-12-18 – 2025-01-07
Project number: 312519

With PlantGuard, team Sonicflora has the vision of analyzing plants by capturing their sound. The picture is from Borgeby Field Days 2025 when the project was demonstrated at Agtech Sweden's booth.

Florence

Despite decades of digitalization, the foundation of today's crop cultivation still rests on mechanical principles that are largely unchanged. To meet the future demands for extreme yield increases combined with radically reduced input materials, incremental improvements to existing technology are not enough – a system shift is required. The challenge lies in daring to challenge established truths about how sowing, fertilizing and plant protection are carried out. There is therefore a need for high-risk projects that dare to combine cutting-edge expertise from completely different industrial branches to create a breakthrough that is as technologically advanced as it is economically transformative.

In response to this need, Agtech Sweden is running a groundbreaking project that aims to develop a completely new concept for cultivating agricultural crops. The project is characterized by an exceptionally high technical level and combines unique skills from Östergötland's areas of strength, where traditional expertise in agricultural machinery meets advanced aerospace technology. Due to ongoing patent processes, the details of the technical solutions are currently confidential, but the goal is a total rethink of how agriculture handles its most central processes.

Project partners are Stark Innovation, Väderstad AB, ACC Innovation AB and Linköping University. The project is taking place within the framework of Agtech Sweden.

Budget: 3,051,000 SEK
Duration: 2024-12-18 – 2026-10-31
Project number: 312558

The way in which various activities are carried out in agriculture is partly associated with traditions. Here we see a fertilizer spreader on the farm road towards the field. In the Florence project, new concepts are being developed for carrying out different types of interventions.

Advanced light analysis in animal stables

Indoor environments in agriculture and agricultural schools are often characterized by static and light of varying quality, something that these environments share with most other environments in our society. Since natural daylight is one of our most fundamental neurophysiological controls for circadian rhythm, alertness and stress regulation, inadequate lighting can lead to impaired cognitive ability and work environment. Similarly, good lighting can stimulate the health and ability of people and animals that work in the environment.

In this project, the quality of light was analyzed in three types of environments: classrooms, horse stables and cowsheds. This was done with advanced measuring equipment. Through analyses of spectral distribution, flicker, contrast and biological impact, etc., the light profile of different environments was mapped. The aim was to create a fact-based basis for replacing traditional lighting in the future with technology that is better in various dimensions and that, for example, mimics daylight. The project found that daylight is superior for concentration and health, but that modern technology can mimic these properties artificially. By optimizing the spectral signatures of light and introducing dynamics, you can create environments that support health and performance. This benefits not only people but also farm animals that live in indoor environments.

Project partners were the Light Initiative, Vreta Education Center, Linköping University and SLU Gigacow (within the Department of Animal Life Sciences). The project took place within the framework of Agtech Sweden.

Budget: 160,000 SEK
Duration: 2025-04-01 – 2025-12-31
Project number: 313010

Light studies at Vreta Education Center.

AI review of 3D models

Agricultural machinery is an advanced construction that often starts with drawings, specifically design drawings. A farmer often experiences that different machines are different in terms of ease of servicing, repairing or replacing parts. Maybe there is something that gets in the way of changing a coulter or maybe there is something sharp that is easy to injure yourself on when doing a certain form of service. Furthermore, when designing a component that is part of an agricultural machine, there are many standards and rules to adhere to. For example, there is equipment that requires certain dimensions, where errors can make the component difficult or even impossible to manufacture.

To address these concerns and errors, the project “Pilot project for 3D review at Väderstad” has expanded the existing drawing review within Väderstad to also support review of 3D models. The result of this project is a functioning 3D review system with five basic Väderstad-specific checks, for example regarding the distance between holes and bending lines as well as size restrictions. The system has been tested by Väderstad on a small scale, but it remains to test the system more thoroughly.

Project partners were T&S Engineering Intelligence and Väderstad. Linköping University has been a partner. The project took place within the framework of Agtech Sweden.

Budget: 283,200 SEK
Duration: 2025-04-15 – 2025-12-31
Project number: 313109

Thinking ahead at the drawing board makes it easier for both the machinery company and the farmer.

Water control of growing crops through smart technology

For a farmer, it is important to understand why the crop develops in a certain way in different parts of the field, partly to prepare the way for smart interventions that can increase yields. This includes such things as precision irrigation.

The project built on the vision of connected fields by using five sensor stations for collecting weather data and soil moisture at an experimental field on Vågerstad farm. The focus was on analyzing the moisture content of cereal crops, both for the field as a whole and for specific segments. To this end, various sensors, including multispectral sensors and passive microwave radiation, carried by both drones and satellites, were tested and evaluated. Drones were used to scan the field at strategic times during the different growth stages of the crop. To ensure accuracy, collected data was validated through field trials and assessments by experienced farmers and advisors. A unique part of the methodology was the focus on TS content analyzes in grain rather than in forage, where control measurements were performed by precision weighing before and after drying the samples. In addition to the moisture analysis, data from soil samples, such as pH value and nutrient content, were integrated to identify the factors that had the greatest impact on crop development. These analyzes were linked with yield data from John Deere's measurement system and, in some cases, protein sensors on the combine. Finally, the relationships between soil moisture, measured both via stationary and buried sensors, and the actual moisture content of the crop were examined to find patterns in the field's hydrology.

Project partners are Lovang Lantbrukskonsult AB and Åhmans Traktorcentrum AB. The project takes place within the framework of Agtech Sweden.

Budget: SEK 173,500
Duration: 2025-01-05 – 2026-12-31
Project number: 313164

Water is an important factor in plant cultivation.

Nordic Innovation Pavilion – Agritechnica 2025

If we take a holistic view of the concept of innovation and define the concept as “new concepts that are developed and also gain entry into markets”, we can conclude that trade fairs have an interesting function in several ways. Trade fairs can provide knowledge and ideas about technology, potential customers, or other things that feed the development processes of innovative concepts. Trade fairs also act as a catalyst for new, original concepts to gain entry into the market. In other words, by using the trade fair as a temporary physical meeting place, unique conditions are created for idea generation, marketing and knowledge development that affect both developers and users in innovation processes.

On the initiative of Agtech Sweden, a project was created that involved idea development, planning and implementation of the “Nordic Innovation Pavilion” concept at the world’s largest agricultural trade fair, Agritechnica, in November 2025. Agtech Sweden established a partnership (see below) and, in collaboration with Elmia, selected innovative companies and projects based on criteria such as a high level of innovation, novelty value and Nordic representation. In addition to the physical exhibition space, the project included structured information material, stage time for the participating actors and external analysis. The aim was to create an arena during Agritechnica that would have a positive impact on the realization of innovations. The initiative is partly financed by participation from the selected companies and received support from both the Swedish government and the Nordic Council of Ministers.

The project was a collaboration between mainly Linköping University and Elmia AB. In addition, the following actors participated: Nordic Agri Research, Nordic Testbed Network (part of the Nordic Council of Ministers), AgriFoodTech Norway, Innovation Norway, Handelsbanken, Kunskapsnavet för jordbrødsets digitalisering, BoMill, SoilMate, Traktorarvid, Novel Agro, Solmust, SoilScout, Winterleap, Jamk University of Applied Sciences, Lindcom, Future Fields, Sonicflora, SprayWithCare, Tech Partner, Leandry and Hushållningssällskapet. The project took place within the framework of Agtech Sweden.

Budget: 200,000 SEK
Duration: 2025-01-01 – 2026-12-31
Project number: 314902

The pavilion at Agritechnica.

Mobile hydrogen system for field charging

The need for this project is based on the rapid electrification of agricultural machinery. A significant challenge arises when electrically powered machinery is used in fields far from the farm unit, where access to fixed power grids is lacking. Traditional battery charging is also often time-consuming, which creates a need for mobile and efficient solutions that can deliver high power directly in the field or at temporary work sites such as construction sites and rescue operations.

The project involves developing an innovative prototype of a mobile, hydrogen-powered charging unit mounted on a trailer. The unit is equipped with a fuel cell, a hydrogen tank and an electric charger with the capacity to quickly charge batteries of up to 200 kWh. The originality lies in the combination of mobility and hydrogen technology to create a flexible infrastructure where energy is transformed from gas to electricity directly in the operating environment. By integrating small-scale hydrogen production at farm level with mobile fuel cells, a double benefit is created: energy storage and fossil-free fuel. The prototype will be rigorously tested for a year in collaboration with autonomous vehicles and test beds in several counties, paving the way for a new standard in fossil-free and digitalized agriculture.

Project partners are H2Solo AB and Traktorarvid AB. The project is implemented within the framework of Agtech Sweden in close collaboration with the project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden".

Budget: 2,050,000 SEK
Duration: 2025-12-01 – 2026-12-31
Project number: 314697

A prototype of a mobile hydrogen-based charging station.

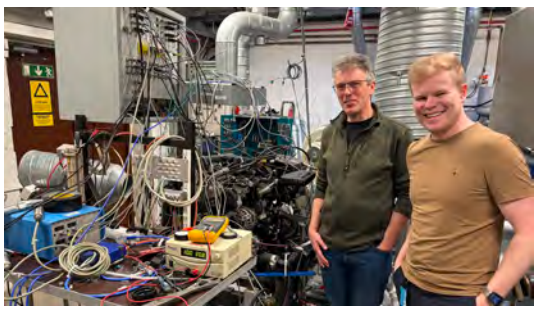
Rocket fuel additive in agriculture

One of the major challenges in agriculture is to meet society's demands to "reduce its climate impact" (and by implication this means a negative climate impact), not least carbon dioxide emissions from field machinery. Despite stricter environmental regulations, internal combustion engines are still dominant, and there is an urgent need to find efficient and profitable ways to reduce fuel consumption and emissions from the existing vehicle fleet. Traditional methods for evaluating fuel additives have often lacked the precision required for the specific and varying operating conditions of agriculture.

The project is about developing a method for analyzing and testing catalysts, based on the patented product Ferox. It is a metal-organic combustion catalyst (based on the substance ferrocene) originating from NASA's development of solid rocket fuels. The originality lies in the methodological approach: combining advanced laboratory tests at Linköping University's engine workshop with digital field tests in real time. By using digital technology such as Logmaster and IoT sensors, fuel consumption can be documented during actual work in the field. The innovation consists of creating this unique test system that analyzes the effect of rocket fuel technology on diesel, HVO and RME in a specific agricultural context. This paves the way for dynamic dosing and precision optimization of agricultural machinery, which combines increased profitability with a reduced climate footprint.

Project partners are Erikssons Djurtransporter i Tomelilla AB, Energifabriken i Sverige AB, Linköpings universitets Fordonslabb and NW Entreprenad i Skåne AB. The project also involves Lowergy and IEI at Linköping University. The project is implemented within the framework of Agtech Sweden in close collaboration with the project “Smart Energy Systems with Rural Enterprises in Eastern Central Sweden.

Budget: 186,000 SEK
Duration: 2025-01-01 – 2026-09-30
Project number: 313525



Tests in the Motor Lab at Linköping University March 10, 2026.

More and newly started projects

Agtech Sweden is a very dynamic platform and new innovation project are always started. Besides the mentioned projects there are many decided project that recently have started (Spring and Summer 2026). Among these are:

- **Smarter field machines** (Väderstad, Bleckenstad Gård, etc.)
- **Biohumus – new fertilizer streams from waste** (SCA, Ekoväx, Linköping University)
- **System comparison tire–track including a smart pin** (Scandinavian Farmers, etc.)
- **Multisensory AI-based analysis of pigs in real time** (Smart Agritech Solution, SLU, etc.)
- **Ground-Eye: Digital monitoring of biodiversity in arable land** (Hushållningssällskapet)
- **Digital twin for arable land: Time-based visualization of historical soil data as part of a digital twin** (Hushållningssällskapet)
- **Precision irrigation** (Åhmans Tractor Center)

More information on these projects will come as soon as we can.

Among the new projects started during 2026 is one about precision irrigation. The project aims to use precise water-need field maps for directing a new kind of irrigation machine, as seen in the photo.

Agtech projects with mainly external funding

*Collaboration for idea development and innovation in the agricultural industry

The aim of the project was to create a cross-industry collaboration model for idea development and innovation with a focus on technology based on pressing challenges in the agricultural industry.

The result of the collaboration in this model/process was a preliminary study where various concept proposals were analyzed and sufficient knowledge was obtained to proceed with prototyping and carrying out various tests. The collaboration model facilitated and accelerated the idea and innovation process, which provided good conditions for more easily capturing challenges and developing ideas from the “grassroots level”. The pilot project built bridges between city and country by creating collaborations between rural entrepreneurs and the city’s resources within the innovation system and academia. The pilot project thus contributed to social inclusion, which meant being part of a society where one has equal access to society’s resources, and where diversity is seen as an asset. An innovative process that was created through the project came to be called Fieldgofer. In short: Fieldgofer is an innovative robotic system developed to meet the challenges of agriculture with increased global competition, difficulties in recruiting labor and the environmental damage caused by increasingly heavy machinery. By replacing heavy vehicles, such as combine harvesters weighing over 30 tons, the system aims to dramatically reduce soil compaction. Soil compaction is a serious problem that compresses arable soil, damages micro-life, impairs drainage and increases greenhouse gas emissions. The concept is based on a U-shaped robot equipped with a three-point lift that can carry specially adapted tanks. The robot is designed to be multifunctional and can be used to collect grain from combine harvesters, spread mineral fertilizer or biofertilizer, and perform precision irrigation like a mobile watering can. To ensure high precision, the machine can be equipped with advanced sensors, so-called see-and-act sensors, and it can also be used as a carrier of analysis instruments to, for example, identify plant diseases such as pea root rot. The work process itself means that the robot can independently retrieve and replace tanks at the edge of the field by lowering itself, driving under the tank and then locking it in place. This automation means that the farmer can be freed from tractor work and instead focus on logistics and other tasks.

The project had a long start-up project and was prepared for a long time. As early as April 3, 2017, an idea meeting took place with people from Automation Region, Stora Lövhulta Gård/Agro Sörmland, Research Institutes of Sweden, RISE, Abbotnäs Säteri, Robotdalen and Linköping University.

The project was run within AgroÖst and the Agro Sörmlöand node with financing from Leader (Landsbygdsfonden).

Budget: 1,090,300 SEK
Duration: 2018-08-15 – 2019-05-15
Project number: 2018-1877

*Delegation trip to Israel

The project was about planning, implementing and following up on a delegation trip to Israel. The trip was the culmination of various activities over a period of 3 years. A milestone occurred in 2019 when we received a letter from Israel's ambassador Ilan Ben-Dov, as a result of an article we had written on DN Debatt. Since then, analyses and dialogues have been carried out with the theme of Israel/Agtech. The purpose of the trip was to give a keynote speech, participate in discussions with Swedish and Israeli companies and make study visits to innovation environments.

It was a large program that included conferences, innovation centers, an incubator, university visits, company visits and mingling events. Some highlights: We visited the biotechnology company MeaTech in Tel Aviv, which grows artificial meat in its lab. They 3D print fat and protein threads with material grown through stem cells. And then the pieces of meat are allowed to grow in fermenters. They have received large amounts of venture capital and believe that the future is meat without us needing any animals, because animals are not sustainable, they believe. We got to taste the meat. We also visited Kibbutz Hatzerim in the Negev (photo). It was there that modern drip irrigation was born, which laid the foundation for the company Netafim. A central concept was “fertigation”, i.e. irrigation with nutrient-enriched water. We heard about adapting nutrient-enriched water to each segment of the fields (VRDI), about methods to prevent frost damage (frost migration) and about sub surface drip irrigation (SDI). We also visited the business incubator “The Kitchen FoodTech Hub” in Ashdod. //The Peres Center for Peace and Innovation in Jaffa was magnificent. It is an experience-based innovation center for visualizing Israeli innovations. The Faculty of Agriculture, Food & Environment, Hebrew University in Rehovot, also made an impression. They have extensive research and, among other things, experimental greenhouses full of sensors of various kinds. Volcani Center – Agricultural Research Organization in Rishon Lezion, is a kind of institute with world-leading research in both agtech and foodtech. // During the week we had time for two major conferences. One took place at Start-Up Nation Central with a focus on start-ups and global companies. The other took place at the Israel Export Institute. The title of my talk there was “Agtech innovation: Urgent needs and fantastic opportunities”. I discussed a number of challenges and problems but emphasized that agriculture is bursting with innovative power and showed several examples. I also talked about Agtech 2030. A general conclusion from the trip was that Israel has great visions in this area.

The project partner was Linköping University. Vinnova co-financed the project with a travel grant of SEK 25,000.

Budget: SEK 50,000
Duration: 2022-01-01 – 2022–12-31
Project number: 308622

The knowledge hub for the digitalization of agriculture

Modern agriculture is facing a comprehensive digital transformation, but the road ahead is marked by significant challenges. Although new technologies such as sensors, AI and autonomous systems have the potential to revolutionize the sector, there is a large gap between the possibilities of the technology and its practical application on the country's farms. Many farmers experience uncertainty about which investments are profitable, while knowledge about the benefits of digitalization is fragmented and difficult to access. There is therefore an urgent need to gather expertise, conduct needs assessments and package complex technology for practical use to secure the future competitiveness and sustainability of Swedish agriculture.

Against this background, Linköping University has been commissioned by the Swedish Board of Agriculture to establish a national knowledge hub in digitalization for agriculture. With a budget of SEK 20 million for the coming years, the hub will function as a central engine for external analysis, testing of new technology and dissemination of knowledge to the industry. The activities are led by Karolina Muhrman and Per Frankelius, who, together with a dedicated team and a unique expert network consisting of 15 different actors, work to strengthen collaboration throughout the sector. By bringing together research, authorities and business in a joint initiative, the goal is to increase digital maturity and lower the thresholds for the country's farmers. Participants in the project also have the opportunity to receive certificates that confirm their competence development in the area. The overall goal is for more farmers to see and dare to invest in digital equipment, which in the long run strengthens Sweden's position in a global market.

The project owner is Linköping University (IBL). Project partners are Gård och Djurhälsan, Lovang Lantbrukskonsult, Ludvig & Co, Växa Sverige, SLU, LRF, DeLaval, Väderstad, AI Sweden, Sweden Secure Tech Hub, IoT World, Linköping Science Park, Agtech Sweden, Hushållningssällskapet and RISE.

Budget: 20,000,000 SEK
Duration: 2024-01-01 – 2026-12-31
Project number: 311657

The Knowledge Hub for the Digitalization of Agriculture had its official kickoff at Linköping University on October 23, 2024. In addition to a series of interesting lectures in front of a packed audience, a new robot from Mapro Systems was shown as well as a modern tractor full of digital technology, including a new route optimization system that had just been launched on the market (and which we illustrated with an A4 poster).

The prototype lift

It is important to strengthen the innovation processes of smaller companies and thus increase the opportunities for new products and services to reach the market. Structured work with prototypes is a tool for this. Innovation-promoting actors in Eastern Central Sweden (ÖMS) can support companies with this.

The project was a feasibility study whose goal was to increase smaller companies' access to resources and expertise for prototyping. The project was carried out jointly by Agtech Sweden at Linköping University and AgroÖst. It included six work packages. 1) Project Management & Communication, 2) Target Group Analysis, 3) Inventory of Tools and Methods, 4) Stakeholder Inventory, 5) Identification of Cases, and 6) Exchange of Experience and Looking Forward. The project's goal was to contribute to smaller companies gaining access to information about which competencies and resources can support prototyping within ÖMS and to increase their insight into the importance of prototyping for the innovation process. In the preliminary study, a rough list of approximately 80 companies and actors within the innovation system was created that were considered able to contribute to discussions around early idea stages and prototypes - and thus contribute material in the area. Two of the project group members then conducted semi-structured interviews and took running notes. The interviews, 27 in total, followed a common template. The material was then coded based on different themes separately by the interviewees. They then conducted a joint analysis to further deepen the material. The results were then processed by the entire project group to further clarify and strengthen the results. The analysis resulted in two clear patterns that divide the prototype work into an “early” and a “subsequent” phase. The early phase is about the idea creator wanting to implement an idea and take it as far as he/she can, but at some points you get stuck - sometimes early and sometimes a little later in the process. We called this phase the “idea phase”. The second phase was about waiting with physical prototypes in favor of sketches and simple mock-ups, and then through several simple prototypes to arrive at working solutions. These idea makers work methodically and iteratively to produce a final product that works for the intended market. We called this phase the “prototype phase”.

The project partners were Linköping University and AgroÖst. Agro Sörmland, Åsa Öberg AB and Linköping Science Park participated in the project.

Budget: 450,695 SEK
Duration: 2024-01-01 – 2024-12-31
Project number: 311616

Prototypes are an important part of many innovation processes. The image shows a 3D-printed agricultural robot (Fieldgofer). Photo: Marcus Frankelius.

More digitalized rural businesses

Digital development is moving fast and companies that benefit from digital tools have a lot to gain. Micro and small enterprises in agriculture, forestry and fishing, which make up 21% of Sweden's companies but only 1.3% of employees, often have difficulty keeping up with this development. Supporting actors are vital to helping these companies identify and implement digital opportunities.

The project targets business promoters in the green sector and indirectly to farmers and rural entrepreneurs who need digital transformation to increase their competitiveness and sustainability. By adapting and evaluating the “Kickstart Digitalization” tool from the manufacturing industry, the project has created support for companies in green industries to take steps towards increased digitalization. Key insights from the project include the following: 1) Business promoters play a crucial role in supporting companies, but need to develop their ecosystems and contact networks. 2) There is a need to spread knowledge about local actors who can offer operational support. 3) Companies in green industries are in some respects more digitally mature than companies in other industries, but sometimes lack the networks and support to fully benefit from the opportunities of digitalization. The project identified a gap between the needs of companies and the support offered, and proposes measures to improve the offers of business promoters. By disseminating experiences from digitalization in other industries and adapting tools for green industries, the project contributes to increasing the digital maturity of small and medium-sized enterprises in rural areas.

RISE was the coordinator. Krinova and Agtech Sweden were project partners. The project was financed by the Swedish Agency for Economic and Regional Growth and the Swedish Board of Agriculture with funds from the European Agricultural Fund for Rural Development (Rural Programme 2014–2020 within the call "Cooperating for increased digital maturity in small and medium-sized enterprises in rural areas").

Budget: 1,643,959 SEK
Duration: 2024-01-01 – 2024-12-31
Project number: 311616

The group that participated in the workshop "Kickstart Digitalization" at Linköping University in February 2024.

TechnoSoil

The project aimed to promote the development and application of digital tools in primary production and the food industry and to increase their technical scale-up to effectively manage the soil-food connection. The aim of the project was to develop or participate in one or more applications for international calls for research and innovation collaboration.

The project that formed the basis of the application was to identify which methods may be needed to identify factors that explain total yield and yield variation within a field. The proposed project also involved analyzing the possibility of influencing yield variation. The focus was on combining satellite resources, ground sensors, data capture and mathematical models. It was synchronized with the EU's Mission "A Soil Deal for Europe", in particular the objective of place-based innovations for soil health. Part of the planned project was also to analyse digital tools to monitor nutrients and biological stressors in soil and plants, and to improve the management of food safety risks. In-depth literature studies, evaluation of satellite data, pre-calibration of ground sensors and analysis of mathematical models were carried out. An important aspect was to bring together expertise from different disciplines.

The project resulted in two applications to Horizon Europe. One, led by Linköping University, was for the call “Horizon-CL6-2024-Communities-02” and included eight partners, including JAMK University in Finland. The other, with 25 partners, was for the call “Horizon -Widera-2023-Access-07” and was led by RISE. No support was received, but the project created a lasting network.

The project was funded by Vinnova through planning grants for Horizon applications, with Linköping University as a project partner.

Budget: 343,000 SEK
Duration: 2023-01-01 – 2024-12-31
Project number: 2023-01683

The project was about technology related to soil.

Standardization committee for data-driven agriculture and food systems

In modern agriculture, enormous amounts of data are generated from various sources such as sensors, machines and satellites, but a lack of standardization prevents the systems from talking to each other. This creates digital islands and lock-in effects that make it difficult for farmers to fully utilize the potential of the technology. Without common international standards for how data should be structured and shared, the pace of innovation, competitiveness and the possibility of creating more sustainable food systems are hampered.

The project involves actively participating in the national standardization committee "Data-driven agricultural and food systems". This committee is directly linked to the international work within ISO (ISO/TC 347 Data-driven agrifood systems), where global rules for data management in the agrifood sector are being designed. By participating in this work, it is ensured that Swedish interests and needs are taken into account when the new global rules of the game for digital agriculture are written. Within the framework of the project, the team will compile knowledge about existing and upcoming standards, participate in technical committee meetings and act as a bridge between international work and Swedish innovation projects. The aim is to spread knowledge about standardization to Swedish actors so that they can develop solutions that are compatible in an international market. By participating and influencing standardization at an early stage, the project contributes to creating a more open and efficient digital infrastructure for agriculture. This facilitates future innovations in everything from precision farming to traceability in the food chain, which ultimately strengthens both profitability at farm level and the digital maturity of the entire sector.

Project partners are Linköping University and Lovang Lantbrukskonsult. The project is partly financed through the strategic plan 2023–2027, partly by the European Agricultural Fund for Rural Development. Linköping University is represented by Agtech Sweden.

Budget: 498,832 SEK
Duration: 2024-09-15 – 2027-12-31
Project number: 314568

More and more data is flowing within agriculture and this is leading to increased focus on data standardization.

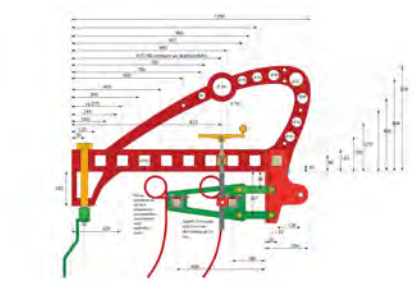
Practical application of machine-readable standards

Today, standards are mainly delivered as static documents (e.g. PDF files), which creates a significant gap between the requirements set in the standard and the digital systems that are supposed to comply with them. As industry and agriculture become digitalized, it is no longer enough for people to read standards; machines and software systems need to be able to consume and interpret the content directly to enable automation, regulatory compliance and seamless integration. Without machine-readable standards, digitization work remains manual and inefficient.

The aim of the project is to increase understanding of and practically test how machine-readable standards can be integrated directly into users' own systems. By developing and implementing concrete case studies, the aim is to demonstrate the benefits of this format, both for internal processes at standardization bodies such as CEN and ISO, and for end customers. The implementation is divided into several phases, with the first part, which extends over 2026, focusing on planning and practical implementation. The project includes identifying architectural requirements, testing data models and evaluating how digital standard content can best be made available via cloud-based services and APIs. A central part is to use Agtech Sweden as a testbed to see how these standards can support the digitalization of the agricultural sector. The goal is for the project to result in an increased ability to deliver standards as a digital service instead of just as documents. By creating structured and machine-readable data, the foundation is laid for future AI support and more efficient digital value chains, which in turn strengthens the competitiveness and innovation capacity of the organizations that apply the standards.

The project is a collaboration between SIS (Swedish Institute for Standards) and Linköping University (Department of Business Administration) and was initiated through Agtech Sweden.

Budget: 1,584,000 SEK
Duration: 2026-01-01 – 2027-12-31
Project number: 100680-39-INP



What if you could input standards directly into the drawing program?

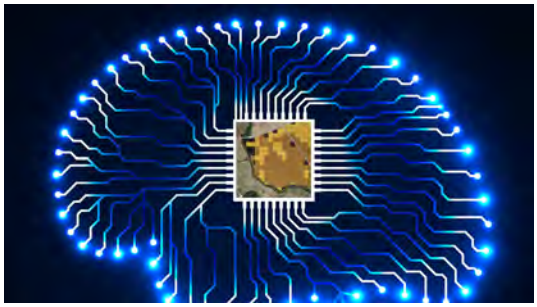
Optimize harvest forecasts with satellite data for increased precision

Agriculture is struggling with large variations in yields, not only between years but also within the same field. Factors such as soil type, moisture and weather make it extremely difficult to make accurate yield estimates. Traditional methods with manual sampling are time-consuming, expensive and have low precision. This creates uncertainty for industries and financial markets in their planning, while farmers lack the decision-making basis required to optimize their cultivation strategies and inputs.

By leveraging advances in AI and the fourth industrial revolution, this project aims to create a data-driven platform for advanced analysis of complex datasets. The project builds on a previous platform funded by the Swedish Space Agency (as well as a previous project funded through Agtech Sweden) and combines millions of data points from satellites (Sentinel-1 and Sentinel-2) with soil data, weather data and topography.

Project partners are the Swedish Agricultural Society (HS) Skåne, Lund University, Niftitech, NBR Nordic Beet Research and Linköping University. The project is financed to 75% (4.28 million) by the Space Application Program within the Swedish Space Agency. Linköping University is represented by Agtech Sweden.

Budget: 5,530,000 SEK
Duration: 2025-01-01 – 2027-12-31
Project number: 2025-00016



The vision is to increase knowledge about the fields through AI and especially "foundation models".

Sustainable water conversion of Gotland's dry agricultural landscape

Climate change has made extreme drought and water shortages an acute threat to agriculture on Gotland, threatening the food supply. Historically, drainage focused on diverting water from arable land, but in today's climate this loses precious water. The challenge lies in changing the landscape's water management – from diversion to storage and circular reuse – without compromising productivity. A comprehensive system change is required where technology, biology and management work together to create a resilient cultivation landscape. Within the framework of Impact Innovation: Water Wise Societies, the project "Sustainable water transition of Gotland's dry cultivation landscape" has been launched to establish a "transition lab" on Gotland. The core of the project is to develop and test system solutions to retain water in the landscape, such as smart irrigation dams and innovative technology for resource utilization. Agtech Sweden's role focuses on contributing expertise on soil moisture detection and advanced technology for precision irrigation. Through practical experiments, the project evaluates how digital tools can support farmers in irrigating exactly where and when needed. The goal is to create a scalable model for sustainable water supply that can also serve as an international role model for other dry farming regions.

The project is coordinated by Gotland Grönt Centrum AB, with financing from Vinnova and the Swedish Agency for Economic and Regional Development. Scientific expertise is secured through SLU, Uppsala University, Linköping University (via Agtech Sweden), IVL Swedish Environmental Institute, RISE, SMHI and SGU. Practical implementation is represented by local agricultural companies (including Stora Tollby Trädgård, Mickelgårds, Widegrens Gård, Skags gård, GLM Gård, Ahlbys Lantbruk, Birch Branch Ranch, Havor Lantbruk and Stefan Virgins Lantbruk) alongside Lantmännen Group. Industry support comes from LRF and Hushållningssällskapet Gotland, while the public sector is represented by Region Gotland and the County Administrative Board. Additional environmental and local stakeholders include the Eastern Gotland Water Council, Gotland Marine Environment Association, the Anglers' Association, Baltic Sea Forum, Mälaren Water Conservation Association, and the Priestly Funds of the Visby Diocese.

Budget: 17,706,022 SEK
Duration: 25-11-30 – 28-11-30
Project number: 2025-03155

Kickoff in early 2026.

Information and demonstration activities in digitalization for primary producers

Swedish agriculture is facing a major digital transformation, but many primary producers experience a significant gap between the potential of technology and practical everyday life on the farm. Although modern machinery is often equipped with advanced digital technology, many functions remain unused due to a lack of knowledge, complex systems and uncertainty about the profitability of investments. There is therefore an urgent need to lower the thresholds and concretely demonstrate how digital tools can be used to optimize resource use, improve decision-making and thereby strengthen the competitiveness of both the individual farm and the entire country.

Against this background, the project, which is run by Linköping University and the Knowledge Hub for the Digitalization of Agriculture, aims to implement a wide range of skills-building activities aimed directly at farmers. Through information and demonstration efforts, the project will demonstrate practical benefits with everything from precision farming and sensor data to AI-based analysis tools. The activities focus on packaging scientific knowledge into easily accessible advice and examples that can be applied directly in operations. By increasing understanding of both existing and new technology, the goal is for more farmers to dare to take the step towards more data-driven production. Participants who complete the project's activities will also receive a certificate that confirms their competence development in the digitalization of agriculture. The end result is expected to be more efficient resource utilization and a strengthened position for Swedish food production in a digitalized world market.

Linköping University (IBL) leads the project. Project partners are Växa Sverige, Gård & Djurhälsan, Lovang Lantbrukskonsult, Hushållningssällskapet, LRF, Agroväst, RISE, AI Sweden, Hushållningssällskapet, Växa, Sweden Secure Tech Hub, SLU, IoT World, Ludvig & Co, Väderstad, DeLaval and Agtech Sweden.

Budget: 7,000,000 SEK
Duration: 2026-01-01 – 2028-12-31
Project number: IBL2025-1

Professional Development for Advisors on Digitalization in Agriculture

Modern agriculture is undergoing rapid technological development, but for the full potential of digitalization to reach the country's farms, an advisory body is required that is confident in guiding new technologies. Today, there is a challenge in that advisory services do not always keep up with the rapid pace of technological innovations such as AI, autonomous systems and advanced precision farming. Farmers who want to invest in digital tools often lack access to independent expert support that can help them integrate the technology into their specific operating systems. There is therefore a great need to strengthen the expertise of advisors so that they can function as the necessary link between technological innovation and practical application in the field.

Against this background, the project, which is coordinated by Linköping University and the Knowledge Hub for the Digitalization of Agriculture, aims to implement targeted competence-raising initiatives for the country's agricultural advisors. Under the leadership of Karolina Muhrman and Per Frankelius, the project will package and convey current knowledge about the opportunities and challenges of digitalization. By focusing on everything from data collection and analysis to practical implementation of digital strategies, the project will ensure that advisors can offer qualified support to primary producers. Participants in the project's activities will also receive certificates confirming their competence development in the field. The goal is to create stronger and more coordinated advice that accelerates digitalization in the industry, which in turn leads to increased resource efficiency, better animal welfare and strengthened Swedish competitiveness.

The project is owned and operated by Linköping University and funded by the Swedish Board of Agriculture and the European Union. Within the framework of the Knowledge Hub for the Digitalization of Agriculture, Linköping University collaborates with an expert network consisting of Linköping University, Ludvig & Co, Växa Sverige, Gård & Djurhälsan, Lovang Lantbrukskonsult, Hushållningssällskapet, LRF, SLU, RISE, AI Sweden, Sweden Secure Tech Hub, IoT World, Väderstad, DeLaval and Agtech Sweden.

Budget: 6,000,000 SEK
Duration: 2026-01-01 – 2028-12-31
Project number: IBL2025-2

Collaboration to increase knowledge about the coexistence of ag and solar farming

At times, very high electricity prices have increased interest among agricultural entrepreneurs in their own production of electricity by establishing solar parks, partly on agricultural land. Decisions about the production of electricity from solar cells in agriculture are a complex process that requires careful consideration. These include trade-offs between food production, electricity production and the preservation of landscape values. The decisions made have far-reaching consequences for the companies involved, people and companies in the vicinity of the establishments, and for authorities.

The aim of the project is to fill knowledge gaps about the coexistence of solar electricity production (solar farming also called solar co-farming) and agriculture/food production by collecting data, developing method descriptions and guides, describing system solutions, and disseminating information about the environmental, economic and social benefits of agrivoltaic solar cell plants. Through a multifaceted approach and broad collaboration with actors in several industries, we hope to strengthen the scientific and practical knowledge of agrivoltaic systems and thereby contribute to a more sustainable future for both electricity and food production. The project has three parts: 1. To gather knowledge and experiences, 2. To adapt knowledge and information material to the target group, 3. To disseminate and anchor knowledge and information material. The project also includes some evaluation and measurement of demonstration facilities. The formal name of the project is “Cooperation for increased knowledge about coexistence between solar farming and agriculture in Sweden” but we have chosen to use the name “Solbruk”.

The project owner is Science Park Gotland (SPG) and the partners are Mälardalen University (MDU), the Swedish Farmers’ Association (LRF), Swedish Solar Energy and Linköping University. The project is financed by the Swedish Board of Agriculture, although not EIP but partly within the Strategic Plan 2023-2027 within the measure Cooperation / Environment & climate / Production of renewable energy. Linköping University is represented by Agtech Sweden.

Budget: 3,326,938 SEK
Duration: 2024-03-26 – 2027-01-15
Project number: 313629

Solar panels on acreage outside of arable land.

Skills development for stronger competitiveness

Swedish food production is facing major demands for increased profitability and a strengthened domestic supply capacity, but many producers lack the specific tools and in-depth knowledge required to optimize their operations in a changing market situation. A significant challenge lies in translating new research findings and technical possibilities into practical measures that actually make a difference to the company's financial results. The need for independent expert support and adapted skills development is therefore great for agricultural companies to be able to maintain or increase their production levels while meeting high demands on animal welfare and environmental considerations.

The project aims to implement training and information initiatives to strengthen the competitiveness of agricultural companies. The project will offer courses and seminars in strategic areas such as business management, economics and production optimization. By offering practically applicable knowledge and promoting networking between producers and experts, the project will lower the thresholds for development and innovation in the green industry. Participants who complete the skills-enhancing activities receive certificates documenting their strengthened professional competence. The overall goal is to create more robust and profitable food companies that can drive sustainable development throughout the sector.

The project is owned and operated by Vreta Kluster AB in collaboration with Linköping University, Ludvig & Co, LRF and Växa Sverige as central participating parties and expert support in the implementation. The project is supported by the Swedish Board of Agriculture and the European Union via the County Administrative Board of Östergötland. Linköping University is represented by the Knowledge Hub for the Digitalization of Agriculture and Agtech Sweden.

Budget: 695,000 SEK
Duration: 2025-04-14 – 2027-03-31
Project number: 2024-2717

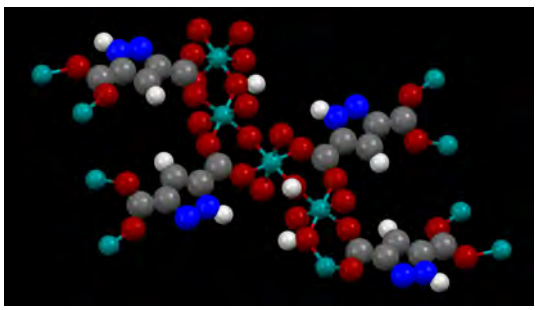
Leandry EIP

Grain drying is one of the most critical but also most problematic bottlenecks in modern agriculture. Today, the process relies almost exclusively on hot air dryers powered by fossil fuels, creating a direct conflict between food production and climate goals. The challenge is twofold: firstly, the high energy consumption means extreme vulnerability to fluctuating energy prices, and secondly, the high temperatures in conventional dryers mean a risk of reduced grain quality. There is therefore an urgent need for a technology shift – a method that can radically reduce energy requirements without compromising capacity or quality. However, moving from combustion to molecular separation requires a leap into the absolute frontier of research, where chemistry and agricultural technology meet in a previously unexplored symbiosis.

The idea for the Leandry project was born in 2019. Farmer Kurt Hansson realized the possibility of using metal-organic frameworks (MOFs) to dry crops. Instead of focusing on the MOF material's ability to extract water, which was a common perspective among those familiar with MOF, Hansson realized that the byproduct – the dry air – could become a drying method. In collaboration with Agtech Sweden, Lund University and the Silicon Valley company Water Harvesting, an experiment was established at Hasta Gård and Norrbäck's farm. Despite the pandemic, a bank bankruptcy in Silicon Valley and a shortage of components, a unique MOF machine was tested starting in the fall of 2024. The results showed that the method only requires 0.6 kWh per liter of water dried, which is less than half the energy of a conventional dryer. Leandry was presented internationally at Agritechnica in the Nordic Innovation Pavilion (arranged by Agtech Sweden) and at Elmia Lantbruk. In October 2025, the team was reached by the information that Professor Omar M. Yaghi at the University of California – also founder of Water Harvesting – was awarded the Nobel Prize in Chemistry for his discovery of metal-organic frameworks. Although the step from prototype to finished product is long, Leandry represents a potential revolution for agricultural drying processes by radically reducing energy requirements with the help of Nobel Prize-winning chemistry.

Project partners were Gasilage AB, Linköping University and Lund University. Hasta Gård also participated in the project. The project is financed by all these partners but also EIP Agri (European Union). Linköping University was represented by Agtech Sweden.

Budget: 2,452,948 SEK
Duration: 2024-05-01 – 2025-12-31.
Project number: 308671



This project utilizes a scientific discovery from Berkeley in the form of a new material that can absorb water molecules.

Fieldgofer EIP

Agriculture faces major challenges, including rising demands for efficiency and difficulty recruiting personnel, which has led to more efficient but heavier machines and harmful soil compaction. This affects micro-life and reduces harvests.

As a solution, this project developed the Fieldgofer robot system, a U-shaped robot with a three-point lift that could carry specially adapted tanks. The system aimed to reduce working hours, soil compaction and fossil dependency. The project was carried out in several stages. The first version collected grain at harvest, while Fieldgofer 2.0 was adapted for fertilizer spreading. In version 3.0, the concept of a mobile watering can for precision irrigation was introduced. The robot could independently dock with tanks at the edge of the field by lowering itself and locking them in place. With the help of sensors, high precision was enabled in both fertilization and analysis of plant diseases. By being able to replace heavy tractors, the robot would significantly reduce the load on the farmland. The farmer can focus on logistics while the robot takes care of the physical work in the field. The project resulted in several prototype versions, including digital simulations, interactive 3D models and 3D printed physical models that were used to demonstrate the future potential of the concept. The goal was to pave the way for a full-scale prototype, which however requires more money and time.

Project partners were Linköping University, Abbotsnäs Säteri AB, St. Lövhulta gård, A-Electronix Integrator AB and Cilla Krantz Kompetens och Utveckling. Linköping University was represented by Agtech Sweden.

Budget: 120,000 SEK
Duration: 2023-12-19 – 2024-08-31
Project number: 312023-3543-1

Fieldgofer is a patented robot that can handle different types of materials in the fields.

Agri Living Lab Sweden EIP

There is a need in Sweden to build a systematized network of “living labs” to support research and development projects through access to different farm environments. Furthermore, there is a need for a clear method for such activities.

Therefore, Agtech Sweden has entered into a collaboration with Odling i Balans, which includes 16 contracted farms and which already function as a kind of living laboratory. These two platforms have in turn joined forces with experienced agricultural companies (including Hilmér Lantbruk, Lödderup Växt and Tolefors gård), one of Sweden’s sharpest advisors (Hushållningssällskapet with HIR Skåne) and representatives of future users (Swedish Seed and Oilseed Growers, SFO). The Swedish Board of Agriculture has granted the project, which has been named “Model for a Swedish living laboratory and demo farms for sustainable crop production”. Linköping University is the project owner. The idea of the project is that the aforementioned actors will together build on their respective experiences to develop a new model for taking innovation projects all the way to a finished product that works in agriculture. The farms that will be included in the project have different roles. 1. Development farms (for research and development projects), 2. Test farms (for testing e.g. new technology or prototypes) and 3. Demo farms “lighthouse farms” (for spreading knowledge about new technology or new processes). The formal name of the project is “Model for a Swedish living laboratory and demo farms for sustainable crop production” but we have chosen to shorten it to “Living Lab Sweden”.

Project partners are Linköping University, Odling i Balans (which includes 16 contracted farms), Hilmér Lantbruk, Tolefors farm, HIR Skåne and the Swedish Seed and Oilseed Growers’ Economic Association, SFO. Linköping University was represented by Agtech Sweden in close collaboration with the Knowledge Hub for the Digitalization of Agriculture.

Budget: 6,052,447 SEK
Duration: 2024-01-01 – 2028-12-31
Project number: 313214

Hilmer Lantbruk is one of the farms included in this project. Photo: Hilmer Lantbruk.

The spray sensor Spray With Care EIP

When spreading chemical plant protection products, unforeseen wind drift and sudden wind changes pose a great risk of incorrect spreading. Today, farmers often make a static assessment of the risk before starting work, but during the actual driving there is a lack of continuous and objective information about how the wind actually affects the spray image in real time. This can lead to both environmental impact and poorer precision in plant protection work.

After successful preparatory work within the framework of an Agtech-Sweden innovation project, this project will now, with EUP support, develop the "Sprutsensorn" into a finished product. The project, which is carried out at Tolefors Gård, will enable farmers to continuously receive information about current wind drift and wind changes during ongoing work. The technology is based on real-time measuring and compiling parameters such as wind speed and wind direction from a vehicle in motion, combined with data on sprayer pressure, boom height, nozzle type and temperature. The system will function as a digital further development of the Swedish Agricultural Agency's "Hjälpreda" by automatically or semi-automatically suggesting adjustments to the sprayer to increase precision and ensure correct protective distances. The goal of the project is to verify how well it is possible to calculate the resulting wind direction based on the speed of the vehicle and the conditions of the landscape. Furthermore, the project will test technical components, develop tools for data visualization and produce a working prototype. By integrating factors such as geo-coordinates and dosage, a decision support is created that reduces the risks of spreading and strengthens the sustainability of plant cultivation.

Project partner is Tolefors/Tolek AB and partners are Linköping University, R & R Kårstad AB, A-Electronix AB and Lovang Lantbrukskonsult. Linköping University is represented by Agtech Sweden.

Budget: SEK 2,358,141
Duration: 07/01/2023 – 12/31/2026
Project number: 314476

The spray sensor includes a wind sensor onboard the sprayer.

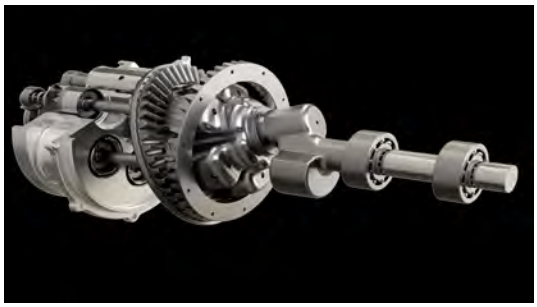
Steam engine for electric drive in agriculture 2.0 EIP

The transition to battery-powered vehicles in agriculture and forestry represents a radical shift, but faces a critical bottleneck: energy supply in remote locations. Modern work machines require either extremely large batteries or the possibility of fast and easy support charging directly at the edge of the field or deep in the forest. Since access to fixed grid connections is often non-existent in these environments, there is an urgent need for mobile power sources that are not only transportable but also climate-neutral. The challenge lies in creating a compact unit that can deliver high power with good efficiency, without relying on fossil fuels such as diesel.

In response to this need, the project team has developed a concept in the form of a compact, biofuel-powered and transportable charging station that also functions as backup power and a combined heat and power plant. By using wood pellets as fuel, the energy cost is reduced to around 50% compared to equivalent liquid motor fuels. The heart of the system is an innovative combination of a high-temperature pellet burner, a steam generator and a modern, compact steam piston engine that drives a 25 kW electric generator. Steam technology is the key to being able to build a system that is small enough to be transported on a covered trailer behind a quad bike, but still powerful enough for professional use.

Project partners are Ranotor AB, Zemission AB, Maston AB, RISE Agriculture and Food and Linköping University.

Budget: 120,000 SEK
Duration: 2023-06-01 – 2024-12-31
Project number: EIP-3



The steam engine that is part of this project is of a completely different type than the traditional steam engines that we know from history. Illustration: Ranotor.

Autonomous precision irrigation machine for agricultural crops EIP

Irrigation is one of the most resource-intensive operations in agriculture, both in terms of working hours, energy and water consumption. Today's standard technology, in the form of heavy retracting machines or large walking units, requires significant manual handling and is often operated at high pressure, which requires a lot of energy. At the same time, a changing climate means that water is becoming an increasingly precious resource that must be precisely controlled to avoid wastage. The challenge lies in creating a system that can operate autonomously in the field, minimize evaporation and soil compaction, and drastically reduce operating costs without requiring expensive reconstruction of existing infrastructure.

In response to these challenges, this project develops a completely new type of self-propelled, GPS-controlled irrigation machine for open cultivation. By allowing the machine to be directly connected to a hydrant at the edge of the field and navigate autonomously via the farm's existing spray tracks, dramatic improvements in efficiency are achieved. Compared to conventional technology, labor consumption is estimated to be reduced by as much as 60–85%, while energy consumption is reduced by about 75%. The precision of the GPS-controlled system also makes it possible to reduce water consumption by 20–40%, as irrigation can be optimized exactly according to the needs of the crop and the conditions of the field. The project thus represents an important step towards more sustainable and automated precision agriculture, where resources are used to the maximum with minimal environmental impact.

Project partners are Åkerby Mjölk & Maskin AB, Linköping University, Lantmännen Lantbruk, Adelövs Lantbruks Aktiebolag and Tenhults Försäljnings Aktiebolag. Linköping University is represented by Agtech Sweden.

Budget: 5,791,445 SEK
Duration: 2024-06-12 – 2027-12-31
Project number: 314908

Åkerby Mjölk is the hub of this project.

Flexibel robot för lantbruk, djurgårdar och trädgårdsodling EIP

The agricultural and horticultural industry faces major challenges with heavy, repetitive and time-consuming manual work, especially when it comes to smaller transports in stable environments and around outbuildings. There is a shortage of labor while the demands for efficiency and fossil-free solutions are increasing. Existing automated solutions are often costly or too specialized, which creates a need for flexible and multifunctional technology that can relieve staff and improve the work environment in an economically sustainable way.

The project aims to meet these challenges by developing a fossil-free powered, self-propelled robot that functions as a flexible tool carrier. The focus is on developing a solution that is small and agile enough to navigate in tight spaces where conventional machines cannot access, but which is also robust enough to handle tasks such as feeding, transporting heavy objects and cleaning. Since the robot can be equipped with different types of attachments, it becomes useful for a wide range of activities, from animal husbandry to horticulture. It is therefore a flexible "indoor robot" and it has electric wheel motors. It is also a robot that can be driven both manually via radio control and autonomously with the help of sensors and auxiliary systems such as satellite navigation. The robot concept is a fossil-free tool carrier that can be used for a number of tasks in agriculture. The working name is Norman.

The project leader is Agroväst Livsmedel. The project partners were GSTS Flexible Intelligent Vehicle AB (FLIVAB), Bala Agri, Linköping University, QRTECH, Dyno Robotics and Stallberg Lantbruk AB. Adigi Drives and Passegården AB also participated in the project. The project was run as an innovation project within EIP-AGRI. Linköping University was represented by Agtech Sweden.

Budget: 6,810,804 SEK
Duration: 2023-04-01 – 2025-12-31
Project number: 314855

Team Norman here during the Elmia Lantbruk fair.

Drever 120 – Autonomous electric tractor for agriculture EIP

Today, agriculture is dependent on fossil fuels as fuel for the machines that till the soil. Diesel, which is used as fuel for the tractors, emits greenhouse gases when it is burned in the engines. Diesel is not something that Sweden or most countries in the EU can produce themselves and thus impairs our degree of self-sufficiency. Over the years, the profitability requirements of agriculture have contributed to the fact that the machines used have become larger in order to increase efficiency and reduce labor costs. Large, heavy machines cause problems with soil compaction, which in turn causes crops to grow worse and yields to be lower. The largest, most diesel-thirsty tractors are used specifically for tillage such as cultivation, plowing or harrowing. These are also the work steps that require the least hands on the part of the driver and are thus the easiest to automate. In order to go back in machine size and thereby reduce the problem of soil compaction and high fuel consumption, the tractors need to be driverless for it to be profitable. The new version of the Drever 120, which is autonomous and fully electric, weighs about a third of a large diesel-powered tractor and enables, for example, tillage on a farm with the energy you produce at home on the farm, for example via solar cells or biogas. Electric tractors usually have problems with the battery draining quickly during heavy pulling work. Drever 120 solves that by having a large battery that is replaced when it runs out.

The innovation project would complete and physically build a prototype. Traktorarvid AB has started. The four agricultural companies that were part of the project had the task of ensuring, based on their experience as farmers, that the machine has the specifications required to be used successfully on their farms. The project also included the development of a control and safety system that must be CE-marked together with the machine as a whole. All this was carried out successfully.

Project partners were Traktorarvid AB, Västlands Gård AB, Örby Lantbruk, Firma Niklas Karlsson, Hargs Bruk AB, J & L Agriparts Aktiebolag and Linköping University. Linköping University was represented by Agtech Sweden.

Budget: SEK 6,991,624
Duration: 2023-10-30 – 2026-04-01
Project number: 314477

Drever is an electric agricultural robot.

Optimized cultivation based on moisture data via satellite EIP

Through the EIP project CPS, we have seen the possibilities of using satellite data to obtain information about soil moisture content. In the CPS project, the moisture data is used to assess the risk of soil compaction together with other parameters.

In this project, our intention is to instead use raw moisture data from the same satellite sources (but processed differently) to assess the cost of unsatisfactory drainage and thus the value of new drainage, which can then provide a better strategic basis for prioritizing which fields should be drained first. In addition, we intend to use the same satellite information to produce both strategic basis and up-to-date information on how irrigation should be prioritized. Improved irrigation strategies for agricultural crops are important in order to be able to prioritize the fields and field areas that provide the greatest economic outcome based on the conditions of the farm and the fields, the farm's irrigation capacity and the crops being grown.

Project partners are Lovang Lantbrukskonsult, Linköping University, Evolante Engineering, Tolefors Gård and Svenska Mätanalys. In addition, two technology companies are included as contracted suppliers of AI solutions, etc. Linköping University is represented by Agtech Sweden.

Budget: 6,500,000 SEK
Duration: 2024-03-24 – 2026-12-31
Project number: 314907

The hen – taking egg production into the 21st century EIP

Despite the general digitalization of agriculture, the egg sector suffers from the fact that critical data on production, feed, water and animal health are scattered in physical folders, isolated spreadsheets and closed supplier systems. This fragmentation creates extensive duplication, increased risk of errors and a lack of feedback throughout the value chain. Communication between farms and packing plants is still largely analogue, which leads to delays and information gaps. In addition, today's climate calculations are often based on general templates rather than real farm data. This hides the actual differences between producers and makes it difficult to fairly reward those farms that actively reduce their climate footprint.

The project aims to establish a common digital infrastructure that collects data from farm to packing plant to make it comparable and shareable. By further developing an existing prototype, integrations are created with the farms' existing hardware – such as feed and energy meters and egg packing machines – enabling automatic data collection. A central part of the project is to integrate the egg sector into the national data platform Agronod, where the industry is currently missing. The idea is also to create a specific climate module that allows continuous calculation of CO2e per kilo of egg directly at farm level.

Project partners are Frinkle AB, Lovang Lantbrukskonsult, Linköping University, KG:s Ägg AB and Tolefors Gård. Linköping University was represented by Agtech Sweden.

Budget: 4,997,750 SEK
Duration: 2025-01-01 – 2027-12-31
Project number: EIP-8

Digital advisory tool for the dairy industry – Cowpanion EIP

As dairy herds become larger and farmers are faced with large amounts of data coming from many different sources, help is needed to identify, collect and extract data and change things in the right order in the improvement work on the farm.

The innovation project will lay the foundation for an IT tool that can supplement, or in some cases replace, advisory visits to enable farmers to have cost-effective guidance close at hand.

The project leader is Växa Sverige. The project is carried out in collaboration with the partners Agronod, Linköping University, SLU and farmers in dairy production on the development of this digital system represents an innovative partnership in the agricultural sector. Linköping University was represented by Agtech Sweden.

Budget: 120,000 SEK
Duration: One year.
Project number: EIP-9

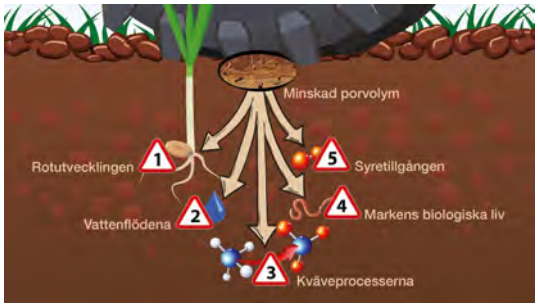
System to alert to the risk of harmful soil compaction EIP

Agriculture has undergone positive technological and methodological developments. Despite this, harvests have not reached their full potential. Soil compaction is part of the problem and it has to do with the fact that machines have become larger and larger. During the 1970s, a typical tractor weighed less than 6 tons. Today, tractors over 9 tons are more the rule than the exception. We see combine harvesters weighing over 30 tons and liquid manure spreaders weighing over 50 tons. If compaction occurs, the root development of the crop is inhibited. Water flows, nitrogen processes, biological life in the soil and oxygen supply are also inhibited. Because soil compaction leads to less oxygen supply, an anaerobic environment is created. In such an environment, nitrification (conversion of ammonium nitrogen to nitrate) and denitrification (conversion of nitrate to nitrous oxide) are stimulated. Nitrous oxide is negative for the climate and soil compaction; therefore, it has a climate effect. Soil compaction also means that tillage requires more energy and that you get less harvest per hectare, which means both increased costs and increased (negative) climate impact per unit of harvest.

The project was about developing a system that calculates the soil compaction risk in real time and provides the farmer with decision-making information. The system uses soil sensors, satellite data, soil mapping and digital calculation models and has been shown to work beyond expectations. The concept, which came to be called the Compaction Prevention System, CPS, won the world's finest innovation prize in agricultural technology, the Agritechnica Innovation Award, 2022 and development is now underway to develop a new generation of the concept.

The project was run by Elvestad Södergård, Tolefors Gård, Lovang Lantbrukskonsult and Linköping University. During the period 2021-01-24 until 2022-05-30, the project was run more or less with non-profit resources (see separate heading) but within the framework of Agtech Sweden. Subsequently, financial resources came through the EIP, which allowed the project to expand.

Budget: 4,506,674 SEK
Duration: 2021-09-30 – 2025-03-31
Project number: 313049



Left: Soil compaction creates several negative effects such as denitrification which can cause nitrous oxide emissions. Right: William Hepp and Alice Molin during DLG Feldtage 2022.

Innovation loose housing EIP

Swedish dairy production is undergoing a major structural transformation, with increasing demands on animal welfare, the work environment and efficiency. For smaller dairy farms, with up to 70 cows, the step of switching from a tethered system to loose farming is often an enormous challenge. Investment thresholds are high and there is often a lack of adapted decision-making documents, drawings and economic calculations for smaller herds. Many farmers experience uncertainty about which technical solutions are profitable on a smaller scale, which risks leading to a halt in development or incorrect investment decisions.

The project aims to lower the thresholds for change by developing an interactive, web-based planning tool tailored for smaller dairy producers. The tool functions as a comprehensive service where the user can get inspiration and concrete facts to find a solution that suits their own farm's specific conditions. The core of the tool is the visualization of 30–40 different example barns that cover variations in herd size, degree of automation and investment space. Through study trips in Sweden and abroad, innovative solutions are collected for everything from feeding to manure. For each example solution, complete documentation is provided in the form of drawings, technical specifications and economic calculations. The goal is to provide farmers with solid decision support that combines new knowledge with practically applicable models, which facilitates the path towards modern and sustainable loose farming.

Project partners are Växa Sverige (project owner) and four farms in the form of Skatauddens lantgård, Lovö Prästgård, Vatunga gård and Hildings mekaniska (Wendelas mjölkgård) as well as Linköping University, the Swedish University of Agricultural Sciences (Department of Human and Society and Department of Biosystems and Technology) and RISE. It is financed through EIP. Linköping University is represented by Agtech Sweden.

Budget: 7,538,092 SEK
Duration: 2025-01-01 – 2028-04-01
Project number: EIP-11

From Grassroots Idea to Innovation Idea EIP

Within the agricultural industry, there are a number of challenges that often require quick solutions. Farmers are therefore extremely creative and solution-oriented, and here there is a bank of ideas - an untapped potential for growth in agriculture.

This project is about how ideas are captured from the "grassroots" and further towards innovation. It is about "digging where you stand" - where the idea creator is. The farmer owns his idea and constitutes the "engine" in the development process. In this way, the project works contrary to practice in innovation support systems where the "system" often sets the conditions and initiates development. Instead, this project starts on the inside - "at home" with the idea creator and gradually expands outwards - towards other farmers, experts, researchers and advisors. The "inside-out" principle is guiding the project. The project is staffed by experienced pilots who follow the idea carrier through the initial steps in the development process and gradually connect to the existing innovation system (advisors, researchers, science parks, etc.)

This project is a continuation of an initiative that was first funded by the Agtech Sweden platform in two stepwise projects.

Project partners are AgroÖst Ideell Förening (project owner), Linköping University, Åsa Öberg AB, Agro Örebro and Agro Västmanland. Linköping University is represented by Agtech Sweden.

Budget: 5,848,916 SEK
Duration: 2026-03-01 – 2028-09-30
Project number: EIP-12

Flying Farmer EIP

Despite the fact that agriculture has undergone quite extensive digitalization, today's crop cultivation still rests on biological and mechanical principles. To meet the future demands for increased yields and reduced inputs, a system shift is required rather than incremental improvements.

This is a groundbreaking project that involves a fundamentally new way of conducting crop cultivation. Central to the project is the development of a new cultivation concept where intelligent sensors play a crucial role in controlling the processes with extreme precision. By integrating high-resolution sensor technology, a complete rethinking of how sowing, fertilization and plant protection are carried out is possible. Due to ongoing patent processes, the technical details are confidential, but the goal is a breakthrough that is as technologically advanced as it is economically transformative.

The project leader is Stark Innovation and the project is run with the partners Väderstad AB, ACC Innovation AB and Linköping University. Linköping University is represented by Agtech Sweden.

Budget: 20,709,050 SEK
Duration: 2026-03-01 – 2028-12-31
Project number: EIP-13

Control system for autonomous agricultural machinery EIP

Traditionally, the responsibility for monitoring the functioning of agricultural implements rests entirely with the tractor driver's senses. While working in the field, the driver must continuously identify and remedy everything from broken cultivator tines and blockages – for example, straw getting stuck between the tines – to punctures and hidden obstacles. The human ability to detect anomalies, such as wild animals in the crop, is today a prerequisite for safe and efficient work. However, this human factor constitutes a significant limitation for autonomous machines, which have so far lacked the corresponding ability to interpret complex sequences of events in real time.

The project aims to develop an advanced monitoring system based on high-resolution cameras and machine learning. By using artificial intelligence, the system can replace and in some cases surpass the function of the human eye. The technology enables the identification of critical objects that the driver may miss, such as deer scat in the veld or hare cubs in the stump, which increases both ethical and operational safety. The system consists of an integrated network of cameras and control units that communicate directly with the machine. When a problem is detected, the system can either signal for automatic adjustments or immediately notify an operator if a repair is needed. Although the innovation is primarily designed for autonomous machines, it also provides powerful driver support for conventional tractors where the driver's concentration can falter over long work shifts. The result is a system that reduces operational disruptions and enables autonomous machines to perform significantly more complex tasks than before. By digitizing the driver's senses, a solution is created that ensures that the work continues with the highest precision, regardless of whether a person is in the cab or not.

The project is led by Traktorarvid AB and partners are Skogforsk, Dyno Robotics, Linköping University, Menhammar Stuteri AB, Axfoundation and Siwi AB. Linköping University is represented by Agtech Sweden.

Budget: 4,139,392 SEK
Duration: 2024-01-01 – 2026-12-08
Project number: 314904

The Drever robot is at the core of this project. Photo: Traktorarvid.

Smart, renewable energy solutions for rural businesses

Agriculture and rural businesses are currently facing a paradoxical situation: they are often large energy consumers with enormous potential to produce renewable energy, but are hindered by limitations in the local electricity grid, complicated business models and technical uncertainties. Power shortages and difficulties in storing or regulating self-produced electricity mean that many green investments are stalled. To secure both the profitability of the businesses and the region's energy supply, new methods are required to transform individual facilities into active and smart parts of the regional energy system.

The project's goal is to increase local energy production by rural businesses in Eastern Central Sweden and to strengthen regional energy systems. The project will involve activities throughout the ÖMS region, with a focus on Örebro, Västmanland, Sörmland and Östergötland. The target group is smaller rural businesses that are large consumers of energy or have good opportunities to produce renewable energy, as well as technology and system suppliers. The project will lead to a strong knowledge base on the needs and opportunities for local energy production in rural businesses and develop new methods that strengthen the energy systems of businesses and the region through innovative solutions for storage and regulation of the electricity grid. By reducing technical and business barriers to investments in new technology, the project aims to realize new energy production and new energy communities through smart financing and business models. Furthermore, the initiative will increase the knowledge of the target group about the potential of new technology and how it strengthens local energy systems. Within the framework of this project, several sub-projects are underway that are described under separate headings.

Linköping University (through Agtech Sweden) is the project owner. Project partners are AgroÖst (incl. the nodes Agro Örebro, Agro Västmanland and Agro Sörmland), LRF and Vreta Kluster. The project's main financier is the European Union (via the European Regional Development Fund/Agency for Growth and Economic Development). The project is co-financed by Agtech Sweden at Linköping University, Region Örebro County, Region Östergötland, Region Västmanland, AgroÖst, Vreta Kluster and LRF.

Budget: 10,062,749 SEK
Duration: 2024-01-01 – 2026-12-31
Project number: 310910

An example of a challenge in the energy context is energy storage.

Sub-project within the project Smart Energy Systems

Converting agricultural farms into energy farms

The green transition is creating a growing need for domestic renewable energy, while many farms are facing high energy costs and risks linked to the lack of capacity in the electricity grid. The project addresses this by investigating how farms can become self-sufficient energy farms through solar or wind power combined with local hydrogen production via electrolysis. The aim is to find three pilot farms with different conditions and map out technical, economic and practical conditions.

The project focuses on creating a solution where produced hydrogen can both be safely stored on the farm and used for own energy, as well as providing a new source of income by selling surplus electricity when prices are highest. The project also analyzes the possibilities of converting the hydrogen into e-fuels at a later stage, based on carbon dioxide from the air or biogas purification. Expected benefits for agriculture are strengthened resilience, reduced energy costs, extended growing season and increased competitiveness through a low climate footprint. The innovation lies in the combination of renewable energy, flexible storage and fossil-free fuels adapted to different types of agriculture. The analysis will form the basis for future establishment of hydrogen plants on farms.

The project is led by LRF and is a collaboration between Hydrogen Nordic and LRF. The project is implemented as part of the larger project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" which in turn is part of Agtech Sweden.

Budget: 437,000 SEK
Duration: 2024-01-01 – 2026-12-31
Project number: 310910-1

Can hydrogen become part of the energy-smart rural businesses of the future?

Profitable digestion of green mass, such as green manure and catch crops

Agriculture is under increasing pressure to reduce climate impact and nutrient leakage, while low profitability and dependence on global inputs make farms vulnerable. There is great interest in self-energy production, but traditional biogas plants are often too expensive and complicated for small and medium-sized farms. The project addresses this by developing and testing a new modular digestion system that extracts energy from crop residues and catch crops with significantly lower heat requirements than existing technology.

The project evaluates a newly built prototype under real Swedish outdoor conditions. The volume, energy content and gas composition of the gas production are monitored over time, while the system's ability to increase mineralization in the digestate is analyzed. The extended residence time in the digester reduces greenhouse gas emissions and strengthens nutrient recycling. Initial results show that the design and choice of materials enable a significantly more energy-efficient and cost-effective system than traditional small-scale biogas solutions.

The project is implemented as part of the larger project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" in close collaboration with Loops of Nature, and Agro Södermanland, with practical tests carried out at Fräkentorp farm which also contributes with infrastructure and user perspective. The project owner of "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" is Linköping University through Agtech Sweden.

Budget: 302,250 SEK
Duration: 2024-12-01 – 2026-12-31
Project number: 310910-2

Mobile ground-based solar cells that adapt to the wind

The need for more efficient solar power on limited areas is rapidly increasing in agriculture, especially when the land also needs to be used for crop cultivation or grazing. Mobile solar cell systems that follow the path of the sun can provide 25–35 percent higher electricity production than fixed installations and also deliver more electricity precisely during the mornings and late afternoons, when prices are often higher. This creates new opportunities for economically and energetically robust solar photovoltaics (agrivoltaics).

The project aims to establish a ground-based testbed with Vaja's mobile solar cell system VajaTrack – a vertical, wind-responsive solar tracking system based on a patented design. The goal is to evaluate how the technology works in Swedish climatic conditions and how it can be integrated into a comprehensive concept for agricultural energy and food production. The project plans to build a solar photovoltaic plant in Södermanland and monitor the system's movement patterns, wind adaptation and operational reliability for at least one year. The work includes energy production measurements, analysis of revenue effects, and a profitability calculation. The expected results show that the VajaTrack system can generate 30–40 percent higher revenues compared to fixed south-facing panels, thanks to a smoother production curve and higher electricity production during times when the grid's needs and prices are highest. The system is also designed for low life cycle costs and is suitable for both small and large land developments, which makes it particularly interesting for the agricultural sector.

The project is being carried out in collaboration between technology developers and agricultural companies that provide land and operating environments. The project takes place as part of the larger project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden". The project owner of "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" is Linköping University through Agtech Sweden.

Budget: 50,000 SEK
Duration: 2026-01-01 – 2026-12-31
Project number: 310910-3

VajaTrack mobile solar system. Photo: Vaja

Solar cells on peat bogs

The need to produce more renewable energy without taking up valuable agricultural land is increasing. Peatlands and other areas with low bearing capacity have previously been difficult to use for solar energy due to soil stability, environmental aspects and limitations in today's mounting solutions. The project is therefore testing a smaller solar cell system from Sunsurf on peatland to investigate how a pile-free and mobile system works technically and environmentally.

During the course of the project, a pilot system will be installed, the performance, soil impact, shading effects and winching of which will be studied continuously. The project will also analyze how a mobile system can strengthen the resale value compared to traditional solar parks. The results are expected to provide important insights into how solar cells can be used on peatlands and on other surfaces such as landfills or land with limited bearing capacity. The project will thus open up new incomes for farmers and enable increased energy production without burdening productive arable land.

Within the project, students from Linköping University are also given the opportunity to study the biological effects of floating solar cells at a separate facility, as well as this facility from Sunsurf Solar, to strengthen knowledge about the impact on aquatic environments in the Swedish context. The project is carried out in collaboration between technology developers and agricultural companies that provide land and operating environments.

The project takes place as part of the larger project “Smart Energy Systems with Rural Enterprises in Eastern Central Sweden”. The project owner of “Smart Energy Systems with Rural Enterprises in Eastern Central Sweden” is Linköping University through Agtech Sweden.

Budget: 500,000 SEK
Duration: 2025-08-01 – 2026-12-31
Project number: 310910-4

Tractor to Grid for electric agricultural machinery

The electrification of agricultural machinery opens up great opportunities for agriculture, but also brings new challenges. Electric machinery requires reliable charging, peak power management and an energy system that can handle both the farm's production and its everyday operation. At the same time, farmers are facing increased costs linked to electricity prices, grid connections and investments in new technology. Many farms also have limited opportunities to participate in the grid's balancing markets, despite the fact that they are in practice sitting on large, untapped energy resources in the form of machine batteries.

The project is developing a complete Tractor to Grid system that allows electric field machinery to be used not only for work in the field, but also as an active part of the farm's energy infrastructure. By connecting autonomous, electric tools such as the Drever 120 with the farm's electrical system, the project is investigating how the machines' batteries can be used for energy storage, power reduction, support services and island operation. In this way, the technology can contribute to both lower costs and increased security of supply at the farm level. The project establishes a test bed at Hasta Gård, and connects the technology results to a development group with farmers and analyzes how the systems can be assessed within the framework of the Climate Leap. By utilizing the downtime of the machines, new revenue opportunities are created while reducing climate impact and resource consumption.

The project is carried out in collaboration between technology developers and agricultural companies that provide land and operating environments. Central actors are Traktorarvid, H2Solo and Hasta Eko. The project takes place as part of the larger project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden". The project owner of "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" is Linköping University through Agtech Sweden.

Budget: 200,000 SEK
Duration: 2025-12-01– 2026-08-30
Project number: 310910-5

Tractor to Grid is about a new energy system on farms.

Digital and mechanical optimization systems for small-scale hydropower

There is a great need to modernize small-scale hydropower, both to strengthen the climate benefit and to improve the profitability of smaller power plant owners. Many plants currently lack reliable and continuous data collection, which makes it difficult to optimize production or provide authorities with the information they need.

The project therefore takes on the challenge of combining new digital technology with mechanical solutions to create a more robust, data-driven and future-proof hydropower system. By developing cheaper measurement equipment, testing camera-based flow measurement and testing AI support for fish counting, completely new opportunities are created to understand and control the process in real time. The work also includes the development of infrastructure-independent systems that can operate without a fixed connection – a crucial factor for many plants in sparsely populated areas. In the project's four regional testbeds, the technology is tested under real-world conditions, where data is stored and shared via cloud-based platforms to reach both hydropower owners and authorities. The project also builds up working and knowledge groups with entrepreneurs who are trained in how the technology is used and how more effective forecasts and smart control can increase both production and income. In this way, technical innovation is combined with practical learning and clear benefits for the agricultural energy system.

The project is carried out in collaboration between technology developers and companies that provide land and operating environments. The main partner is Svensk Vattenkraft and large parts of the project are carried out at Ålberga bruk. The project takes place as part of the larger project "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden". The project owner for "Smart Energy Systems with Rural Enterprises in Eastern Central Sweden" is Linköping University through Agtech Sweden.

Budget: 500,000 SEK
Duration: 2025-04-01 – 2026-12-31
Project number: 310910-6

Small-scale hydropower is an important part of the Swedish energy system – and Swedish preparedness.

Platforms and projects that Agtech Sweden is a party to but no budget

Agrihub Sweden EDIH

The agricultural and food system that many of us take for granted is under pressure. Climate change is causing challenges for crop production due to floods and droughts, monotonous agricultural landscapes are reducing biodiversity, zoonotic diseases are spreading in animal production, and food fraud and ransom schemes are hampering the food industry. In addition, the sector is having problems attracting qualified labor due to poor working conditions. Swedish food production is a core sector of the economy with the potential to become an innovative growth engine for the 20th century. To succeed, knowledge investments, knowledge transfer and digital applications are required to improve production efficiency and the attractiveness of the sector. Digitalization is central to achieving Sweden's high ambitions regarding environmental and climate goals and food strategy. Agrihub Sweden is an initiative that brings together well-established and reputable organizations around a common vision: to transform the Swedish agricultural and food system into a world-leading example for achieving sustainability and competitiveness through digitalization.

Agrihub Sweden is coordinated by RISE and is based on collaboration with the Swedish University of Agricultural Sciences and other regional platforms in East-Central Sweden (Agtech 2030 and Visual Sweden c/o Linköping University), West Sweden (SmartAgri c/o Agroväst), and South Sweden (c/o Krinova).

Budget: 250,000 SEK
Duration: 2022-01-01 – 2025-12-31
Project number: Not given.

Sustainimal

SustAinimal is a center that will work to identify the role of production animals for increased, sustainable and competitive food production in Sweden. The function of animals for food production is primarily to convert plants and plant parts that humans cannot or do not want to eat into foods with high nutritional value. In addition, animals contribute with fertilizer and ecosystem services such as biodiversity and attractive landscapes. Animals also have a negative impact on the environment and climate, and more and more consumers are expressing concern about animal welfare. Researchers and the business community have focused for many years on reducing the negative impact of animal husbandry. Models for estimating the effects of animal husbandry are being developed and improved continuously, but there is a lack of studies that confirm through actual measurements that the models are correct and it is a major challenge to weigh up the pros and cons. In addition, the conditions for food production differ between different parts of Sweden and it is likely that the role of animals in future food systems will also vary between regions. SustAinimal will analyze scenarios for food systems in three regions from north to south. The animals' contribution will be evaluated in terms of both net food production, ecosystem services and the capacity to deliver food in the event of a crisis. The goal is to bring together many different skills and be able to take a holistic approach to these complex issues. Almost 25% of Swedish agricultural land is used for dairy cows, which is why they have a clear role in SustAinimal. The center's formation links to and increases the value of neighboring initiatives such as Mistra Food Futures, Mistra Environmental Communication and Agtech2030, as well as many ongoing research and development projects in academia, business, organizations and authorities. Knowledge exchange and skill building have a large scope in the center's formation. Examples of skills are ecology, crop production, animal science, veterinary medicine, food science, sustainability assessment, systems science, digitalization, landscape planning and economics.

The Swedish University of Agricultural Sciences is leading the application together with the research institute RISE. Other participating parties are the Swedish Veterinary Institute, Uppsala University, Linköping University, Dalarna University, Lantmännen, the Swedish Farmers' Association, the Swedish Agricultural Society, Norrmejerier, KLS Ugglarps, Agroväst, Vreta Kluster, Växa Sverige, Gård & Djurhälsan, the Swedish Natural Pasture Meat Association and the Swedish Pasture Association.

Budget: 56,688,384 SEK
Duration: 2020-12-01 – 2024-11-30
Project number: Not given

Sigrid Agenäs leads Sustainimal. Photo from a theme day in connection with the Norwegian Crown Prince Couple's visit to Sweden.

Sustainimal 2.0

Farm animals contribute nutrient-dense foods that are popular both for their taste and nutritional value. Animals make food raw materials from plants and plant parts that humans cannot or do not want to eat. In addition, animals contribute fertilizer to crop production and ecosystem services such as biodiversity and attractive landscapes. Pasture crops in crop rotation provide feed for animals and reduce the need for chemical inputs in the cultivation of other crops and improve soil fertility, including by sequestering carbon. Animal husbandry in agriculture also has a negative impact on the environment and climate, and there are concerns about animal welfare. Researchers and the business community have focused for many years on reducing the negative impact of animal husbandry. Models for estimating the effects of animal husbandry are being developed and improved continuously, but there is a lack of studies that confirm through actual measurements that the models are correct and it is a major challenge to weigh up the pros and cons. In addition, conditions differ between different parts of Sweden and it is likely that the role of animals in future food systems will also vary between regions. In SustAinimal 2.0, the work of understanding and describing the role of animals in future food systems is stepped up by using the new modeling tool C IBUS mod. The goal is to bring together many different competencies and be an arena for discussions about complicated questions about the role of animals. SustAinimal 2.0 connects to and increases the value of neighboring initiatives such as Mistra Food Futures and the three national knowledge hubs recently established by the Swedish Board of Agriculture. SustAinimal 2.0 will be relevant for many research and development projects in academia, industry, organizations and authorities. Examples of competencies are ecology, plant breeding, animal science, veterinary medicine, food science, sustainability assessment, systems science, landscape planning and economics.

The partners are the Swedish University of Agricultural Sciences, Rise, Vreta Kluster, the Swedish Veterinary Institute (SVA), Linköping University, Dalarna University, Lantmännen, the Swedish Farmers' Association (LRF), the Swedish Association of Agricultural Societies, Norrmejerier, KLS, Agroväst, Växa Sverige, Gård & Djurhälsan, Naturbeteskött i Sverige, Svenska Vallföreningen, Svensk Fågel, Svenska Ägg, Arla Foods and Martin&Servera. The project's main financier is FORMAS. Linköping University is represented by Agtech Sweden.

Budget: 58,700,255 SEK
Duration: 2025-01-01 – 2028-12-31
Project number: 2024-01021

StrawToTextile

The current textile industry is heavily dependent on materials that have significant environmental impacts. Fossil-based polyester, which dominates the market, contributes significantly to greenhouse gas emissions and microplastic pollution. Cotton, although natural, requires enormous amounts of water and pesticides, which leads to soil degradation and loss of biodiversity. Currently, the least environmentally friendly fibers, viscose and lyocell, are produced from wood raw materials and their growth is also limited by the raw material supply of expensive, virgin wood-based dissolving pulp.

The StrawToTextile project is based on a grand vision; to make textiles from straw in a Swedish-developed value chain. Straw contains cellulose, is a green product and can create interesting business for farmers and others. Part of the development is to create so-called dissolving pulp from which textile fibers can then be created. To achieve the vision, several skills are required and therefore the project is built around a collaboration between Lixea, which is a specialist in creating dissolving pulp from climate-smart raw materials, TreeToTextile, which is a specialist in creating textile fiber from cellulose, Tolefors Gård, which is a specialist in straw, etc., and Agtech Sweden at Linköping University, which contributes with research perspectives. TreeToTextile is an innovation company owned by H&M Group, Inter IKEA Group, Stora Enso and LSCS Invest. Lixea has a pilot plant and the project is now in full swing.

The project is led by Lixea AB. Project partners are TreeToTextile, Tolefors Gård and Linköping University. Linköping University is represented by Agtech Sweden.

Budget: 1,000,002 SEK
Duration: 2024-10-30 – 2025-06-30
Project number: 2024-02604

Imagine if you could make textiles from straw. That's the vision of this project. Photo. TreeToTextile.

Food Experience Center (Taste Lab)

There is currently a gap between the consumer's plate and the advanced process that lies behind the origin of food, from primary agriculture to processing. To strengthen the competitiveness of Swedish food production, arenas are needed that not only sell products, but also convey knowledge, ethics and the "storytelling" that surrounds sustainable Swedish food. The vision is to create a permanent experience center in Väderstad that functions as a hub for dialogue and innovation around the entire food system.

The project is about establishing a physical test bed and innovation environment in central Väderstad during the summers of 2025 and 2026, as a first step towards the larger experience center. The taste lab will function as a meeting place where small and medium-sized food companies can develop and evaluate new products and flavors in direct contact with consumers, research and business. By combining physical installations with advanced digital visualization, the project wants to show how choices at the primary level directly affect the quality and sustainability profile of food. The aim is to increase public knowledge about sustainable food and thereby stimulate demand for Swedish products. The Taste Lab creates a unique model for how innovation processes can be strengthened by integrating consumer insights early in the chain, which in the long run benefits both the growth of the business community and the future development of the sector.

The Taste Lab project is led by Mjölby Municipality and has Region Östergötland and Agtech Sweden as partners. The European Regional Development Fund, ERDF, is financing with 40%. The project also includes other actors, such as Väderstad AB. As for the big vision, the Experience Center for Food, it is also led by Mjölby Municipality but will have more partners. Among the companies that have shown their interest are Svenska Ägg, Saab, Svenskt kött, Vreta Kluster, Visual Sweden, Rise, Swedbank and LRF.

Budget: 10,530,960 SEK
Duration: 2024-09-01 – 2026-12-31
Project number: 313435

How does food actually end up on the plate and why does it taste the way it does? These are two of the questions that will be discussed in the project.

Efforts and studies for and about innovation (ISI)

*Facial recognition of horses with AI (ISI 1)

Previously, Ireland and the USA have succeeded in individual recognition via "face recognition" for cows. There is also a need to be able to identify individuals among horses in connection with, for example, feeding in pastures. This project was formed to investigate the possibility of achieving individual recognition of horses through AI-based facial recognition. More specifically, it was about using neural networks and especially the so-called Convolutional Neural Network (CNN). The project included cooperation with the horse business at Hollstad farm. There, horses were photographed from all possible different angles to obtain a basis for using artificial intelligence and especially neural networks to see if facial recognition is possible. Pictures were taken both outdoors and indoors. The conclusion was, after evaluating all data sets based on 500 photos, that the best result was achieved through a combination of "data augmentation" and "drop-out". This experiment was reported in detail in the report "Face recognition of horses using convolutional neural network" by the authors Ina Eriksson, Tommy Granström and Petra Gunnarsdotter which was published in Agtech 2030's publication series Agtech innovation.

The project was run within the framework of Agtech 2030 in collaboration between 3 MSc students in Media Technology and Hollstad farm.

Budget: Only own financing.
Duration: 2020-09-16 – 2020-12-31
Project number: ISI 1

Photography of horses at Hollstad Farm.

*Prototype Test Methods: Comfort Rider Case (ISI 2)

Prototypes are important in innovation work, but systematic evaluation of prototypes is also important. On October 1-2, 2020, a prototype test of a new implement for tractors was carried out at Vreta Training Center: Comfort Rider in a new generation. Several drivers – both experienced and inexperienced – were allowed to try out the implement and write protocols according to two developed templates. Two variants were used, a simplified protocol and a more detailed one. One interim goal was to develop prototype protocols. An earlier version of the protocol had been developed in collaboration between Linköping University and 3M. The project was therefore not only about evaluating the prototype but also about developing the prototype test method itself. The implement was mounted on a New Holland TS100. The result was a systematic examination of the implement's function, a list of improvement ideas and a basis for continued development of the prototype test method.

The project was run within Agtech 2030 in collaboration between Hässleby Västergård, Linköping University, Miljömaskiner and Vreta Training Center.

Budget: Self-financing only.
Duration: 2020-09-01 – 2020-12-31
Project number: ISI 2

The test team at Vreta Training Center

*Compaction Prevention System (ISI 3)

Despite the technological advances in agriculture, the harvest potential is hampered by a growing challenge: soil compaction. Since the 1970s, machine weights have escalated dramatically, from tractors under 6 tons to today's equipment where liquid manure spreaders can weigh over 50 tons. This load damages the soil structure and creates an oxygen-poor, anaerobic environment that disrupts nitrogen processes and stimulates the formation of nitrous oxide – a powerful greenhouse gas. Soil compaction is therefore not only an economic loss in the form of reduced harvest and increased energy requirements, but also a significant climate impact per unit produced.

In response to this problem, the Compaction Prevention System (CPS) was born. The innovation journey took off in the spring of 2017, in parallel with the formation of Agtech Sweden. The patent is dated April 26, 2017. By combining cutting-edge expertise from Tolefors, Elvestad Södergård, Lovang Lantbrukskonsult and Linköping University with practical experience from the field, a unique bridge between theory and practice was created. The breakthrough was made possible by the efforts of skilled engineering students who developed the system's technical backbone and an intuitive user interface.

The concept's high rate of innovation was internationally confirmed by a win in the Agritechnica Innovation Award 2022, followed by a commercial launch in the fall of 2023. In order to further refine the technology and integrate real-time data from satellites, the development is now being driven forward as a focused EIP project. CPS is not just a tool for machine control; it is a necessary piece of the puzzle for sustainable and high-yielding agriculture.

The project was run by Elvestad Södergård, Tolefors Gård, Lovang Lantbrukskonsult and Linköping University, where the latter included both researchers and engineering students.

Budget: Only own financing.
Duration: 2017-04-26 – 2023-12-31
Project number: ISI 3

The project is about developing a method for preventing soil compaction.

The Östergötland drying concept in a future perspective (ISI 4)

Handling of harvested crops, e.g. cereals and forage crops, is a strategic part of agriculture. The drying process is particularly important. Every farmer wants to know how the water content and temperatures change during the drying process. Insects, mites and fungi can quickly destroy the value of the dried product if the temperature in combination with humidity remains at certain levels for a certain time. Furthermore, protein, falling rate and germination of cereals can be affected at different temperatures. In Östergötland, a concept was developed a long time ago, following an international model, which has been called the Östgötatorken. Like several previous concepts, it involved drying harvested products on large flat floors with holes that let the lye through (driveable perforated plates). The Östgötatorken were often built of wood and with wooden beams onto which aeration plates were rolled out. These dryers are found in modern times in several forms and one concept is plant dryers, flat-bed dryers, flat-bottom dryers or flat-bed dryers. Since there may be economic benefits to drying in this way, there is a need to update the knowledge and relate it to future discussions.

The project is about summarizing knowledge about the basics of drying in general and about the most important types of drying. It also includes an account of the origin and development of Östgötatorken, which was about inspiration from the USA, Denmark, JTI, people in Östergötland, etc. The project also analyzes modern forms of flat-bottom dryers - type Farm Mac, and associated technology such as radial fans, AI-controlled agitators, etc. Finally, the project includes making future outlooks: How do we preserve in the future, need for new innovations?

The project is run by the company Christer Johansson in collaboration with one of the pioneers of Östgötatorken. Linköping University is also participating as a sounding board. The project is taking place within the framework of Agtech Sweden.

Budget: 25,000 SEK
Duration: 2022-11-25 – 2026-12-31
Project number: ISI 4

Left: Farm Mac dryer at farmer Tor Pålsson Hålegården. Photo: Axel Nilsson/Farm Mac. Photo on the right: Stirring screws at Hjularöds Gods. Photo: Schmelzer/Farm Mac.

Innovative companies that emerge (ISI 5)

Innovative companies can achieve success, but far from all of them maintain their success. Some succeed while others fade away, are bought out or close down more abruptly. It is interesting to speculate about or preferably find out the reason why certain innovative companies closed down or were bought out or what happened to them. Did they not focus on exports? Were they outcompeted? Did they continue with too small machines that did not fit the structural transformation? Did the technology in their design become obsolete? This project asks the question: "What happened to a number of companies that were once innovative and prominent but did not continue to exist as thriving companies". The project involves the use of historical sources and also contains creative and analytical discussions. The project is ongoing and will lead to a report with descriptions, analyses and conclusions.

The project was run by the company Per Thunström texts & images in collaboration with the Department of Economic and Industrial Development (IEI) at Linköping University. The project is taking place within the framework of Agtech Sweden. The idea for the project came from Väderstad AB.

Budget: 24,000 SEK and own financing.
Duration: 2022-01-25 – 2024-12-31
Project number: ISI 5

Munktells was an innovative company that, after its heyday, ran into problems and was later sold to Finland. Photo from Nostalgia Night in Väderstad.

*Technology analysis based on the case of combined sowing (ISI 6)

It was long natural in agriculture that a seed drill sows seed while a fertilizer spreader spreads or sows fertilizer. But this paradigm was questioned and led to the concept of combined sowing. From an innovation perspective, it is interesting to learn from this example and that is the purpose of this project.

The project involves a study of the development of combined sowing. It is ongoing but a few highlights can already be conveyed: Between the years 1962 and 1964 the first prototype of a combined sowing machine was built and put into testing from 1964 to 1966. Behind this was Åke Huhtapalo and his prototype for a combined sowing machine was generally called "The Camel" because it had two tanks. The trials were led by a Finnish professor at SLU whose name was Reio Heinonen, incidentally Sweden's first professor of soil cultivation. The result was a success, faster and more even crop development and ten percent higher yields. In the spring of 1969, Juko OY launched a commercially produced combination seeder. By 1970, three more Finnish manufacturers, Tume, Junkkari and Värtsilä, had caught on to the trend. In 1972, the three Danish manufacturers Nordsten, Fiona and Stegsted, as well as the Swedish Tive, also offered similar combination seeders. However, larger machines were delayed. Combination seeders became popular during the decade 1975–1985, as more machines were sold and more brands in the industry launched combination seeders.

The project was run within Agtech 2030 by Emgardsson Jord och Ord.

Budget: 24,000 SEK
Duration: 2022-12-15 – 2023-06-15
Project number: ISI 6

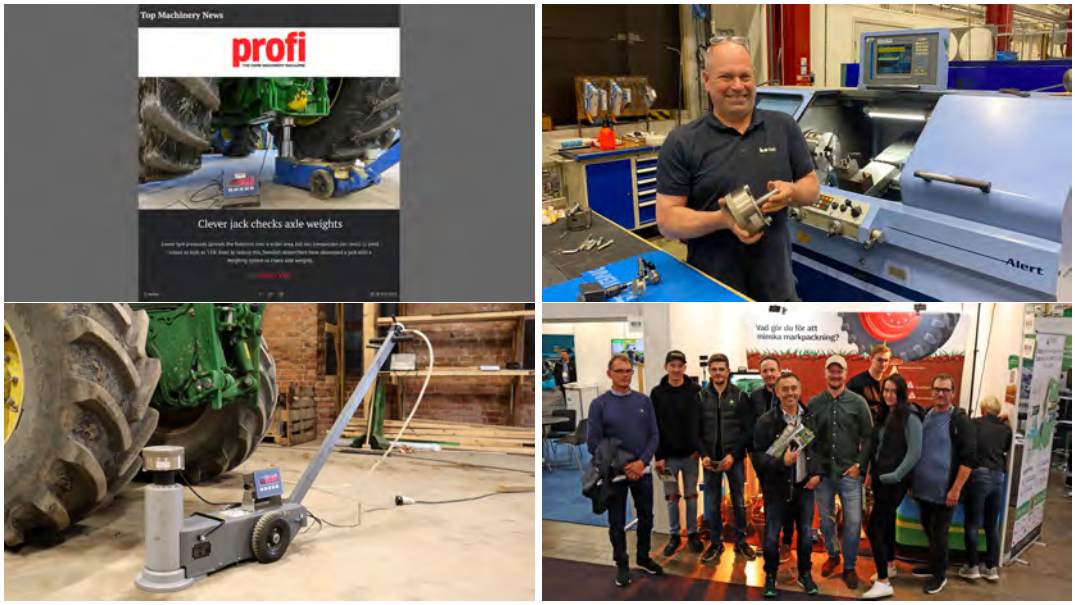
The photo shows a combination seeder at Hacksta farm in 1981. Photo: Bengt Fredén/Upplandsmuseet.

*Newton jack scale (ISI 7)

The weight of agricultural machinery varies significantly based on wheel setups, counterweights, and attached implements. At a December 2022 meeting at Rotenberg Säteri—a farm dedicated to preventing soil compaction—the need arose to measure axle and component weights under different configurations. Linköping University researchers searched for existing market solutions but found them expensive, imprecise, or unable to fit large agricultural tires. Using strain gauge expertise, they proposed an alternative: a jack with an integrated weighing cell. Developed with IEI Verkstad at Linköping University, the prototype was named Newton. Capable of lifting and weighing up to 30 tons, Newton consists of a compressed air-powered jack, an air unit, a strain gauge, a mechanical interface, and a digital display. To measure a machine, the user parks on a flat surface, places Newton under an axle, lifts until the wheels clear the ground, and reads the display. Newton was used to weigh Rotenberg's entire machine fleet and debuted at Elmia Lantbruk. In October 2022, the international magazine Profi featured Newton under "Top machinery news," spotlighting Rotenberg, Tolefors, Agtech 2030, and Linköping University. The innovation transitioned into commercial reality at Borgeby Field Days in June 2023, where it secured its first buyer, Anders Karlsson of Köinge Gästgivaregård.

The project was run within Agtech 2030 in collaboration between Agrotec AB (Rotenbergs säteri), Tolefors gård, Lovang Lantbrukskonsult, IEI verkstad at Linköping University and students in the Master of Science in Media Technology at Linköping University.

Budget: 48,000 SEK
Duration: 2021-12-09 – 2023-12-30
Project number: ISI 7



Top left: The professional article under the "Top Machinery News" vignette about the Newton weighing jack, which was published both physically and online. Top right: Per Johansson in the university's workshop with parts for the weighing jack. Bottom left: Testing of prototype No. 2 at Tolefors farm. Bottom right: Team Rotenbeg visiting the Agtech 2030 stand at Elmia Lantbruk where the weighing jack was premiered to a wide audience.

*Digital twins of entire farms (ISI 8)

Farmers today have many systems to manage – tractors, machines, milking robots and silos. Although some integration of the systems has been done, there is more to be desired. Furthermore, user-friendly interfaces are often lacking. This is the basis for the idea of making entire farms as digital three-dimensional models that can be navigated around intuitively. The idea has been around since the start of Agtech 2030 in November 2017 and was inspired by digital twins provided by Visual Sweden. During a meeting on December 9, 2021 at Rotenbergs säteri, it was decided to try to make a digital twin of Rotenberg.

In 2022, this idea began to be realized. Digital twins were made by Rotenbergs säteri and Vreta utbildningscentrum. The 3D model for each farm consists of two models, one overview that includes the fields and one that focuses on the farm center. Each model is based on approximately 4,000 still images taken with drones and images from the ground with a handheld camera to capture details. The images are combined into a 3D model using photogrammetry. The information is visual and easy to absorb – you can even see it through VR glasses. This allows you to quickly and clearly point to something you want to discuss, for example which solar cells need to be fixed. It makes it easy to plan the work and coordinate tasks. The 3D models also have focus points. If you click on them, photos and in some cases video appear in real time. Development of control functions, etc. is currently underway and the idea is to be able to integrate several digital systems into these models. In order to spread the idea to many people, it was decided to make an editorial advertisement in Dagens Industri in December 2022 with the headline "Can Agda revolutionize agriculture?". The 3D model was included by both Rotenberg and Vreta Utbildningscentrum. It had a great impact. Further development is now underway and the plan is to present new results during Agritechnica in November 2023.

The project was run within Agtech 2030 in collaboration between Rotenbegs säteri, Vreta Education Center, Department of Systems Engineering (ISY) at Linköping University and Department of Economic and Industrial Development (IEI) at Linköping University. Furthermore, a fruitful exchange has taken place with Visual Sweden and Envinn AB, among others.

Budget: 30,000 SEK and own financing
Duration: 2021-12-09 – 2023-12-31
Project number: ISI 8

Left: Two digital twins of Rotenberg and Vreta education centers. Right: Peter Borring and Oscar Hoffmann during aerial scanning of Vreta education center in the summer of 2022.

*Technology analysis for animal husbandry via Eurotier (ISI 9)

Agtech 2030 took the initiative to collaborate with Sustainimal at SLU in Uppsala, and SLU Alnarp. The project is about conducting an analysis of the technology frontline in farm animals and feed production. The idea was to send out observers – students and researchers – to conduct a technology monitoring (and analysis) and then report back through texts, photos and a seminar. The idea was that the observers would have their background in different "worlds", i.e. have different educational and experience backgrounds, e.g. the Master of Agriculture program, the Veterinary program, the Agronomy program at SLU or one of the technology programs or the economics program at Linköping University. The project was started and the analysis was conducted by Eurotier in the fall of 2022. Compilation and preparation for an ideas seminar in Alnarp with invited guests is now underway.

The project took place within the framework of Agtech 2030 but also within the framework of SLU and Eurotier and was carried out in collaboration between students and researchers at Linköping University, SLU and RISE.

Budget: approx. 50,000 SEK
Duration: 2022-09-01 – 2023-06-30
Project number: ISI 9

Technology monitoring team during Eurotier in Hannover.

*High-efficiency seed drill filling (ISI 10)

Filling seed and fertilizer into seed drills is important and often takes a lot of time. As much as 30% of the time in the hectic sowing can be spent waiting for big bags, moving the equipment to loading locations, waiting for wheel loaders or even for a single farmer to interrupt sowing to go and get seed or fertilizer himself. The logistics of sowing is a neglected part of agriculture and is not efficient enough. It is also dangerous and cumbersome to empty big bags into seed drills manually with a knife. The project was about designing a new, smarter solution and making it ready for filling via both wheel loaders and drones. A prototype was created and the whole thing was tested at Ogestad Gård and at Gamleby Airport. A special solution was also developed and tested in Åtvidaberg.

The project was a collaboration between Väderstad AB, Ogesetad Gård, Linköping University and ACC Group.

Budget: Only own financing.
Duration: 2023-09-01 – 2023-12-31
Project number: ISI 10

*Reconstruction of wooden harrow (ISI 11)

To understand innovations, it is important to understand historical transitions from tradition to innovation. The project collected information about how wooden harrow were constructed before Rune Stark started making metal cords. The project included studies on barns, literature studies and studies of personal memories. Furthermore, drawings of wooden cords were made and one was manufactured. The whole thing was then presented during a nostalgia day when the wooden cord was demoed in parallel with Rune Stark's steel cord.

The project was run by Väderstad AB and Linköping University participated through surveys, drawings and photo and film documentation.

Budget: Only own financing.
Duration: 2021-09-01 – 2023-05-02
Project number: ISI 11

Demo drive in Väderstad May 2, 2023.

*Fossil-free agricultural machinery – research analysis (ISI 12)

Agriculture is at the heart of the bioeconomy. A central factor in agriculture is energy, which is needed for processes such as driving field machinery such as tractors and combines, but also irrigation pumps, barn fans and grain drying systems. Modern implements such as seeders, planters and fertiliser spreaders need energy both for their movement (traction power) and for on-board equipment such as fans, pumps, computing power and hydraulics. This project focused on the analysis of energy solutions for field machinery in agriculture. These machines do their work in rural areas, far away from the energy infrastructure found in cities, and this is a challenge. A major part of the analysis was a historical discussion of energy supply. Another part was an overview of current initiatives, including both those implemented in practice (such as biogas and battery concepts) and those in trials or only being discussed among industry experts (such as fuel cell or hydrogen concepts). Based on this analysis, some future visions were carved out on the way towards a 1) fossil-free, 2) cost-effective and 3) sufficient energy system for agricultural machinery. In addition to these three dimensions, the need for small-scale circular systems, the weather independence aspect (for energy production) and autonomous machine systems were also discussed. The project led to a chapter titled From the Oil Era Towards a Sustainable Bioeconomy which was published in the book "Energy Solutions for Agricultural Machinery" (Springer Nature förlag 2021).

The project was run by two researchers at Linköping University in collaboration with Springer-Nature.

Budget: Only own financing.
Duration: 2020-02-01 – 2021-08-01
Project number: ISI 12

The book that resulted from this project.

*Photonics in agriculture and food production (ISI 13)

Ever since Agtech 2030 started, we have had a focus on photonics. Not least, Agtech 2030 has had a collaboration with Photonic Sweden. In the spring of 2021, an analysis of the latest news on the photonics front was carried out. The results were presented on May 21, 2021 in connection with the Nordic Photonics Forum Meeting. 112 people from 12 countries participated. Among the Swedish speakers were Anders Carlsson, Visual Sweden, who spoke under the heading “Visual Sweden, innovations cluster with a focus on visualization and image analysis with applications in industry, medicine and society”, Per Frankelius, Process Leader, Agtech 2030, who spoke under the heading “Towards future food production: Which role plays photonic technology?” and Bertrand Noharet, Programme Manager, Vinnova, who spoke under the heading “Photonics related ventures within Vinnova”. The organizers were PhotonHub Europe, Photonics Public Private Partnership, Photinic Sweden, Photonics Finland and Photonics 21.

The project was run by Photonic Sweden, Linköping University and Visual Sweden.

Budget: Only own funding.
Duration: 2021-01-01 – 2021-05-21
Project number: ISI 13

The conference in Kista.

Agro Tools (ISI 14)

The project is a collaboration between Agtech Sweden and LEAD, within the framework of the Entrepreneurs in Residence program. It began with dialogues about how business analysis and business development could be integrated into various projects that are part of Agtech Sweden. A pitch was made at LEAD on June 18th by two projects, the Newton weighing jack and the Level precision harrow. The students in Entrepreneurs in Residence were presented with a series of such pitches and then selected Agtech Sweden. Several dialogues followed and on August 22nd a day was arranged at Hollstad farm where the precision harrow was demonstrated. On December 19th the students' conclusions were presented, which meant that the innovative products were indeed innovative and that there was a need, but they still did not want to recommend going ahead with them as they did not believe the need was large enough and that the path to market entry would be too costly.

Project partners were Agtech Sweden and the business incubator Lead, which is part of LiU Holding.

Budget: Own financing.
Duration: 2024-01-01 – 2024-12-31
Project number: ISI 14

Sofia Hallman and Axel Larsson from LEAD in connection with testing a new precision harrow.

SmartFarm Pilot Training (ISI 15)

Agriculture is facing a challenge where the amount of digital data is increasing, but the tools to translate this information into practical decision support are often lacking.

To meet the need for risk-free skills training, a collaboration between the Finnish JAMK University of Applied Sciences and Agtech Sweden was launched in December 2024 on the development of SmartFarm Pilot Training. The key actor in the project is JAMK, but by acting as a strategic sounding board during 2025 and 2026, Agtech Sweden has contributed to shaping the system according to the needs of the users. A solution was developed by JAMK in the form of a digital twin of a real test farm, where simulation technology makes it possible to test cultivation strategies virtually. The solution was presented in the Nordic Innovation Pavilion at Agritechnica, where feedback from international farmers was collected to refine the tool. The pavilion was organized by Agtech Sweden in collaboration with Elmia and showcased several different innovative concepts, of which SmartFarm was one. The innovative concept from JAMK has resulted in users now being able to test how variables such as sowing time, sowing depth and fertilization interact with soil type and weather to see the direct effect on yield and profitability. As a concrete result, a free, online training platform has been launched with EU co-financing. The platform is available to Swedish farmers, advisors and students between 15 January and 15 March 2026, strengthening competence in data-driven decision-making. By bringing original concepts to the market, the project has translated technical innovation into practical benefit for the end user.

Project partners were JAMK University of Applied Sciences and Linköping University, represented by Agtech Sweden and the Knowledge Hub for the Digitalization of Agriculture.

Budget: Own financing.
Duration: 2024-01-01 – 2026-12-31
Project number: ISI 15

Minna Silvennoinen, Satu Aksovaara and Juho Pirttineinen in the Nordic Innovation Pavilion arranged by Agtech Sweden in collaboration with Elmia.

Collaboration with the UN and others on agricultural innovation (ISI 16)

To meet global goals for food security and climate adaptation, advanced technology must reach the markets with the greatest needs. Swedish innovations in satellite-based field analysis, AI, and fossil-free energy have great potential to contribute to sustainable agriculture globally. However, the challenge lies in navigating complex international regulatory frameworks and establishing trust with supranational bodies. A clear need exists to bridge the gap between Swedish innovation environments and organizations such as the UN, the World Bank, and regional bodies in growth regions to enable effective technology and knowledge exchange.

The project aims to deepen Agtech Sweden's international relations through strategic advice and legal expert support led by attorney Peter Sävblom (Lawbase). Building on established contacts with actors such as the UN space agency UNOOSA, UNDP, and the INFF Facility, efforts will focus on formalizing collaborations with major organizations like the FAO, the World Bank, the African Development Bank, and the EIB. Regional key players such as COMESA/ACTESA are also included to create pathways for Swedish technology into the African market.

Through bidirectional knowledge flows, the project will disseminate Swedish solutions internationally and bring new global perspectives to the regional platform. The work includes operational support at international meetings and legal guidance to enable global business development. As a direct spin-off, a targeted initiative toward the World Agri-Tech Innovation Summit in London in September 2026 is planned, though financing remains unresolved at the time of writing.

Budget: 149,500 SEK
Duration: 2025-02-25 – 2026-12-31
Project number: 314828

Peter Sävblom at the UN in New York.

KSLA Committee for Tomorrow's Cropping Systems (ISI 17)

Food production must increase as the world's population grows, and in Sweden we have good conditions to contribute to this. With the help of photosynthesis, agriculture and forestry store carbon in soil and biomass. Through changed farming methods, productivity can increase. This can happen at the same time as energy consumption decreases, carbon is stored in soil and plants and increased biodiversity is created, both above and below ground. Such farming methods are under development and are gaining more and more ground in Sweden.

The Committee for Tomorrow's Cropping Systems is an initiative under the Department of Agriculture at the Royal Swedish Academy of Forestry and Agriculture (KSLA) with the aim of contributing to a scientifically based and experience-based description of modern cropping systems. The initiative came from farmer Per-Åke Sahlberg. The decision to establish this was already made in March 2021 and a project group was formed to prepare the committee. The work would draw inspiration from international concepts such as Conservation Agriculture and the methods advocated by the FAO to reduce climate impact and strengthen biodiversity. The overall goal is to study and stimulate the transition to systems that bind carbon in the soil, improve fertility and reduce greenhouse gas leakage, while maintaining good growth and economic profitability under Swedish conditions. The more concrete goal of the committee is to develop instructions that, at the farm level, help farmers implement tomorrow's cultivation concept and how it creates a financially positive outcome for the company. Through open webinars with invited researchers, practitioners, machine developers and others, the committee will discuss and show how a transition to environmentally smart and productive cultivation systems and methods can be implemented. An important goal is also to suggest how the different cultivation systems can be evaluated, both at a theoretical level and among individual growers. The committee's work is organized around ten specific focus areas, including carbon sequestration, catch crops, machine development, plant protection and economics. By identifying knowledge gaps, the committee aims to initiate new research and development that supports farmers in the transition to environmentally smart and productive methods. A central part of the work is the implementation of webinars that serve as a focal point for discussion and practical application.

On February 1, 2023, the Tomorrow's Cropping Systems Committee began its work with a kick-off at the Royal Academy of Forestry and Agriculture in Stockholm. Since then, the committee has held a series of seminars, field trips and other activities. All work is summarized in the report "Cropping systems for better farm economics and future adaptation - knowledge and examples from research and practice", with two chapter contributions from Agtech Sweden.

Project partners, in the form of a steering group, consisted of SG Management AB, Vreta Kluster, SLU, Linköping University, Forsvik Säteri, Krokstorps gård, Greppa Näringen/Swedish Board of Agriculture, Väderstad AB, Tagelberg Gård, Hushållningssällskapet Östergötland, a science journalist Össjö and KSLA. Linköping University was represented by Agtech Sweden.

Budget: 190,750 SEK
Duration: 2023-01-01 – 2026-05-30
Project number: ISI 17

KSLA's AI Initiative (ISI 18)

AI development is moving rapidly and is affecting business and society in many areas. It brings great opportunities but also significant risks and may lead to important and transformative steps within our industries. Agtech Sweden is collaborating with the Royal Swedish Academy of Forestry and Agriculture (KSLA) and the question of AI plays an important role in KSLA's updated strategic framework for 2025–2028. In a first stage, KSLA has the ambition to start building an overview of AI for the areal industries. Which areas are already being affected today or in the future in the short, medium and long term? What are the opportunities? What are the risks?

KSLA's AI initiative started in the spring of 2025 and began with a seminar on June 3 under the heading "What transformative changes will AI development lead to in the areal industries?" at KSLA's premises in Stockholm. The seminar provided an overview of AI and important input for formulating a description of the AI landscape within the arable industries that will be developed. In-depth discussions took place within technological, societal and business perspectives. Some sister academies presented developments within their respective industries. Agtech Sweden participated with a presentation on AI in agriculture. At a meeting on August 12, a steering group for KSLA's AI initiative was decided upon. Among the members were representatives from Agtech Sweden, Lantmännen, KSLA's office and Stora Enso. After this, several activities have taken place in addition to a number of internal steering group and reference group meetings. KSLA's AI roundtable on October 20 had the title "What is happening in research and what is happening in companies?". On February 26, 2026, it was time for a new activity within the framework of KSLA's AI initiative. The seminar, which took place physically at KSLA's premises in Stockholm, focused on data quality and was titled "Is the availability of data an obstacle to the development of AI in the areal industries (food value chain & forestry sector)?"

The project is led by the Royal Swedish Academy of Forestry and Agriculture (KSLA). Project partners include SCA, Lantmännen and Linköping University, represented by Agtech Sweden.

Budget: Not determined.
Duration: 2025-06-03 until further notice.
Project number: ISI 18

One of the roundtable discussions in the project.

Nonstop Battery Concept (ISI 20)

Modern agriculture requires extremely high power for long continuous periods, which has been a fundamental obstacle to electrification. The relatively low energy density of batteries compared to diesel means that conventional electric machines are forced to frequent and time-consuming charging stops. These downtimes reduce productivity and make the technology difficult to calculate economically. At the same time, the need for large battery packs in heavy machinery leads to increased soil compaction, which in turn inhibits root development and harvest potential.

The innovation Nonstop Battery Concept (NBC) solves the energy issue by integrating the battery capacity directly into the machine's exchangeable load carrier for, for example, seed, fertilizer or water. Instead of stationary charging, the autonomous robot platform Fieldgofer receives new energy at the same moment that it changes the load. The batteries in the filled cargo carrier power the machine and its implements, while charging the robot's smaller stationary battery via a DC/DC converter. By synchronizing material logistics with energy supply, the need for separate charging stops is eliminated, maximizing effective field time. This paves the way for a fleet of smaller, lighter and fossil-free machines that both protect the soil structure and solve the labor shortage through full autonomy. The system, which has been nominated for the DLG-Agrifuture Concept, is estimated to be able to reach the market within five to ten years as the necessary technology for docking and power transmission already exists.

The concept has attracted international attention and was nominated in the prestigious DLG-Agrifuture Concept competition. Patent granted in February 2026. The technology is estimated to be ready for market introduction within a five to ten year time frame as the necessary technical components for docking and power regulation already exist.

The project is led by a group consisting of Stora Lövhulta farm, Abbotnäs estate and Linköping University. Linköping University is represented by Agtech Sweden.

Budget: Only own funding (due to the university's patent rules).
Duration: 2021-07-08 until further notice.
Project number: ISI 20

The innovative Nonstop Battery Concept (NBC) solves the energy issue by integrating the battery capacity directly into the machine's interchangeable load carrie

Standardization of tractor-implement couplings (ISI 21)

Historically, the three-point hitch is an interesting example of how a standardized hitch can revolutionize an entire field. The invention, introduced by pioneer Harry Ferguson with the Ferguson Black prototype in 1933, transformed agriculture by integrating the implement with the tractor instead of simply pulling it on a chain. This technological milestone created a global standard for how implements are connected and operated, laying the foundation for modern mechanization. In the same way that the three-point hitch required precise measurements to function, today's work focuses on mapping out modern standards for everything from drawbar eyes and ball sleeves to different categories of pins. The efficiency and safety of modern mechanized agriculture largely rests on the ability to reliably connect tractors and implements. A critical challenge is the wide variety of hitches and the tight tolerance requirements placed on measurements and dimensions to avoid unnecessary wear, breakdowns or accidents. Since the forces involved in heavy-duty pulling are enormous, it is of utmost importance to understand and follow established standards to ensure that different machine systems are compatible with each other. There is a need to create a common knowledge base around the technical specifications that govern the interaction between tractor and implement, which in the long run strengthens both operational reliability and the innovative power in the industry.

The project aims to highlight the importance of standardization in agriculture by highlighting the example of drawbars. Part of the project is a historical study of the three-point hitch from a standardization perspective. Another part is to take a closer look at modern drawbars. Among the standards that will be discussed are ISO 730 – Three-point hitch (Categories), ISO 24347 – Ball hitch (K80) and ISO 6489 – Mechanical couplings (Drawbar hooks and bolts). The latter has several sub-standards: ISO 6489-1 (Hitch hooks), ISO 6489-2 (Sprint drawbars) and ISO 6489-3 (Agricultural drawbars). In the project, a delimitation has made it possible to highlight the latter – ISO 6489 – as a more in-depth example.

Project partners are Linköping University and a number of farmers, including Tolefors Gård. Linköping University is represented by Agtech Sweden.

Budget: No budget set.
Duration: 2023-01-01 until further notice.
Project number: ISI 21

Prototype constructions IEI Workshop (ISI 22)

In several of Agtech Sweden's innovation projects, knowledge and resources are required to create technical designs that are usually prototypes.

Therefore, Agtech Sweden has established a collaboration with IEI Verkstad and workshop manager Jonas Wallinder for several years. He has extensive experience in design and manufacturing and access to advanced machines for metal, plastic and wood work. These include laser cutting, waterjet cutting, CNC-controlled five-axis milling, vacuum forming of plastic, advanced press brake, so-called wire spark and lathes. Waterjet cutting has a water jet of just 0.7 mm with a pressure of 4000 bar. With it, you can cut through material that is 10 cm thick. In an adjacent room there is a 3D printer that can work in metal. The workshop and Agtech Sweden have a close collaboration. Among the projects over the years are a gas drilling machine for soil analysis, a weighing jack, a fixture for calibrating satellite data, a stand for a time-of-flight camera and an enclosure for sensor stations with cameras to be used in the field.

Project partner is IEI Verkstad. The project is carried out within the framework of Agtech Sweden.

Budget: Adapted as needed.
Duration: 2019-01-01 until further notice.
Project number: ISI 22

Full speed ahead in the workshop.

Agtech book for Springer-Nature (ISI 23)

The world is facing a critical challenge where food supply must increase by 60 percent by 2050 to meet a growing population and changing dietary habits. At the same time, agriculture is being pressured by threatened biodiversity, climate change, acute labor shortages and the spread of animal diseases. A particular difficulty is the sector's enormous energy needs; the production of artificial fertilizers requires large amounts of natural gas and heavy field work cannot currently be replaced by battery operation alone. With less than 30 percent of the world's electricity being fossil-free, new solutions are needed for electrification to provide real environmental benefits. Incremental improvements are not enough - a fundamental system shift is required to ensure sustainable food production. There is a need for a comprehensive analysis of the development of agriculture, focusing on how technology has historically been the solution to various problems and how technology can solve today's problems.

In response to this need, this project has been initiated. It is a comprehensive research study that will result in a book. A book contract has been signed with the prestigious proposal Springer-Nature. The book will describe ways forward through innovation. Areas covered include field robotics, fossil-free agricultural systems, connected animals and AI-based analysis. The work explores how technological breakthroughs can bridge the gap between energy-intensive production and the goal of fossil-free agriculture. In short, a synthesis of agronomy and engineering is made with the goal of showing the way towards a more resilient and high-tech agriculture.

Project partners are Linköping University and Springer-Nature, but the project involves over 100 organizations that contribute facts and images, etc. Linköping University is represented by Agtech Sweden.

Budget: Own financing.
Duration: 2022-05-01 until further notice.
Project number: ISI 23

Innovation study of virtual fences (ISI 24)

Keeping animals on natural pastures has long been hampered by the high costs of fencing and the difficulties of continuous supervision. Although the idea of invisible boundaries was born as early as the 1970s, it took decades before GPS technology was reliable enough to replace buried cables. The biggest challenge, however, has been legal. According to modern innovation research, legislation is often defined as a "restriction factor" - a barrier that can completely stop an original idea from gaining a foothold in society. In Sweden, the ban on virtual fences has served as such a factor, where the debate around animal welfare and electrical impulses has constituted a threshold that has required extensive scientific and ethical clarification to be overcome. Since virtual fences are such a radical innovation, there is a need to understand how the innovation process took place.

The project was about analyzing innovation processes related to virtual fences. This led to a report in which the author analyzes how innovations arise in the interaction between originality, market entry and timing. By studying the Nofence case, it is highlighted how in 2011 goat farmer Oscar Hovde managed to combine GPS technology with practical animal husbandry to give his animals access to better pastures. The study uses a theoretical framework that identifies stimulators and inhibitors in the innovation process, from the early patents of the 1970s to today's system that is used on over 200,000 animals internationally. The report constitutes a case study in how technology, opinion formation and legislation interact. By following the history up to the Swedish decision to allow the technology from January 2026, the study shows how a system shift in animal husbandry is made possible. The result is a transparency of a technology that can fundamentally change the conditions for natural grazing and biodiversity by replacing physical barriers with digital precision.

The project was carried out by Linköping University, represented by Agtech Sweden.

Budget: Own financing.
Duration: 2021-01-01 – 2025-12-31
Project number: ISI 24

The report is about the technical background to virtual fencing.

The Milk of All Time Exhibition (ISI 25)

Modern society is facing a growing gap between the urban consumer and high-tech agriculture. Milk production, which has historically been a central pillar of Swedish livelihoods and culture, is undergoing a rapid transformation driven by digitalization and new sustainability requirements. There is a clear need to increase understanding of how innovations – from early milking machines to today's AI-controlled systems – affect both animal welfare and food safety. Without a historical context and a clear picture of future technological solutions, important debates about, for example, animal husbandry and environmental impact risk being lost in misunderstanding and lack of perspective.

The exhibition project "Milk of All Time" was produced in a broad collaboration between the Odalmannens Museum Association, the Open-Air Museum Gamla Linköping and Agtech Sweden (formerly Agtech 2030), with funding from the National Heritage Board. The project aimed to portray the history, present and future of milk from both a technical and social perspective. The exhibition was physically displayed at Valla Gård in Linköping during the period 2021–2023 and was supplemented with extensive digital in-depth material in the form of texts, images and films.

Agtech Sweden was responsible for the future part of the exhibition, where cutting-edge technology in modern animal husbandry was exposed to the public. Among the innovations on display were virtual fences from Nofence, which enables digital grazing control via GPS, and the calving alarm Moocall, which uses accelerometer technology to increase safety during childbirth. Through extensive film productions at, among others, Vreta Education Center, modern systems such as milking robots, manure robots and electric feeding systems were also documented. The result was a unique platform that combined agricultural history with the latest engineering, giving visitors the tools to understand the role of the dairy industry in tomorrow's sustainable food system.

Project partners are the Odalmannens Museum Association, the Open-Air Museum Gamla Linköping and Linköping University with funding from the National Heritage Board. Linköping University is represented by Agtech Sweden.

Budget: Own financing.
Duration: 2021-01-01 until further notice.
Project number: ISI 25

History meets the future in the exhibition Milk of All Time. From milk jugs to virtual fences.

Projects that Agtech Sweden is connected to but not a formal party

SEDDIT

SEDDIT (Sensor Informatics and Decision-making for the Digital Transformation) is a new competence center at Linköping University. In the center, the departments for control engineering and vehicle systems at ISY will work together with the department for signals and systems at Uppsala University – in collaboration with ten companies – ranging from large brands such as Scania, Saab, Volvo Cars and Väderstad to smaller and medium-sized ones such as the Linköping companies Sensorbee and UMS Skeldar. Agtech Sweden and SEDDIT have written a letter of intent for cooperation. The collaboration we intend to have is about exchanging external analyses and other information, providing contacts in our various networks, communicating about each other's activities and working to stimulate new projects or project applications. The letter of intent has no financial obligations, but the intention is to help initiate financial collaborations such as joint conferences or development projects. However, special agreements will be written in that case regarding the economy.

The project partners were SEDDIT and Agtech Sweden.

Budget: approx. 30,000,000 SEK
Duration: 2023-01-01 until further notice
Project number: Not defined.

Väderstad is one of the players in SEDDIT. Photo: Väderstad.

360 CARLA development program

360 CARLA is a competitive EU project that aims to take the initial programme created by the successful CARLA project to the next level by focusing on photonics market applications and providing underlying training, mentoring and experiential opportunities, thus helping students and researchers to be ready for the photonics of the future. 360 CARLA is a Horizon Europe project that creates comprehensive career development programmes focused on photonics applications. We call these applications “verticals” and in 360 CARLA they have the following themes:

- Health: Biotechnology and Medical Photonics
- Quantum Technologies and Communications
- Energy, Environment and Sustainability
- Manufacturing / Industry 4.0

These coherent photonics career development programmes will integrate career symposia, trainings, innovation and entrepreneurship experiences, networking and mentoring opportunities. 360 CARLA targets university students and early-stage researchers from photonics and non-photonics focused areas. Students and researchers from various STEM backgrounds are welcome to participate in the 360 CARLA activities, learn more about the professional opportunities that the photonics career landscape offers for the different applications and be updated on the latest developments. Participants will have the opportunity to either participate in all activities within the relevant vertical, form a coherent, comprehensive career development program, or choose specific activities to participate in. In order to build a comprehensive overview of a vertical, it is recommended that participants engage in all organized activities. Agtech Sweden participates through a representative on the Advisory Board.
https://carlahub.eu/360-carla-advisory-boards/

The 360 CARLA consortium consists of 12 institutions relevant to the photonics ecosystem from 11 countries. Linköping University operates in this in collaboration with Photonic Sweden. Linköping University is represented by Agtech Sweden.

Budget: 1,133,755 00 Euro
Duration: 2024-01-01 – 2026-12-31
Project number: Not defined.

Photonics deals with technology related to electromagnetic bands.

Living lab West drone

The Living Lab West drone project is about establishing a Living Lab for data-driven precision diagnostics with drones in agriculture and professional gardening. The aim is to contribute to the production of more and better crops, and to lower the threshold for using new technology. The goal is to enable innovations that shorten the time from idea to practice in three theme areas: Cultivation, Water and Wildlife. In Living Lab West drone, an environment is created where new technology and data-driven precision diagnostics with drones are tested and developed in collaboration with farmers, academia and knowledge organizations.

The project is led by the Hushållningssällskapet i Halland. Project partners were Nudgd AB, Munkagårdsgymnasiet / Region Halland, Skyforest AB, Together Tech, Flox Robotics AB, HH Innovation AB, Trönninge Plantskola, Lonfield AB, Unius Subtilitas AB. Agtech Sweden at Linköping University is associated. The project is co-financed by the EU through the Strategic Plan for the Common Agricultural Policy 2023-2027.

Budget: 11,500,000 SEK
Duration: 2025-01-01 – 2027-01-01
Project number: Not defined.

Epilogue

As previously stated, this project catalog is a snapshot of the project palette at a certain point in time. The emphasis is on projects initiated in 2019–2025, while projects in 2026 cannot be described at the time of writing, as the year is ongoing. Agtech Sweden continuously initiates new projects. Strong positive pressure is driving various initiatives to create new projects within agtech. After almost 8 years of operation, Agtech Sweden has clearly created momentum that now has a kind of magnetic effect. More people are aware of the platform, and more and more are motivated to believe it is possible to change what is to what should be. This is part of the mindset in Agtech Sweden: "What is now is not enough". This expansion of project initiatives is positive because our world fundamentally needs new concepts in agriculture to meet different types of sustainability challenges.
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Kristian Petersson, Innovation Block Leader in Smart Energy at Agtech Sweden (as well as energy specialist in the Swedish Farmers’ Association), has worked hard to realize several exciting innovation projects and tests of new technology that have been initiated within Agtech Sweden. He is an example of a real hero in an innovation program like Agtech Sweden.

Experienced people in practical innovation know that innovation project management is not only about “content” such as inventing new technology. One also needs professional administration and administrative support. One must never underestimate the need for holistic innovation management.

Catharina Alwall Svennefeldt (at Swedish University of Agricultural Sciences, Alnarp campus) has two important roles in Agtech Sweden. First, she continuously monitors and evaluates the progress of Agtech Sweden. Second, she at as a helping hand for administrative handling of projects. Through this close connection to our innovation projects, Catharina has firsthand information of what is happening in the platform.