

# Cerealier

No. 02/2022

A magazine from  
Lantmännen  
Research Foundation



NEW STUDY

**The health benefits  
of a Nordic diet**

OPINION

**Making our  
food system  
more resilient**

RESEARCH

**New technology  
may lead to larger  
harvests**

#02

*How can digitalisation  
benefit the food system?*

**THEME**

# DIGITALISATION





## Helena Fredriksson Digitalisation and the Nordic diet

**W**e encounter new digital tools and solutions almost every day – and even if they do not all seem adequate or necessary, many are extremely useful and full of potential.

**IN THIS ISSUE**, we examine aspects of digitalisation – a valuable tool in the creation of a more sustainable food system. The title of the Baby Grain Passport research project speaks for itself, as it uses digitalisation to identify the best grains for baby food even before they are harvested. Digital solutions for agricultural decision-making are also being developed, so the right measures can be taken in the field for optimal results. We also look at the consumer side, where behavioural researchers at the Stockholm School of Economics are conducting a research project that uses big data to understand how to nudge consumers into making more sustainable choices.

**WE HAVE REACHED** part two of our series on Active, a new oat variety. Maria Norén, market manager seed at Lantmännen, takes over the baton from the plant breeders.

We talk about two new research projects studying the benefits of a Nordic diet, and offer a recipe inspired by previous research in this area.

Wishing you a pleasant read!

**Helena Fredriksson**

Lantmännen Research Foundation

“...digitalisation – a valuable tool in the creation of a more sustainable food system.”



PHOTO: ISTOCK

# Digital tools

*In this issue, we investigate how digitalisation can be used in the food system.*

**Pages 7–15**

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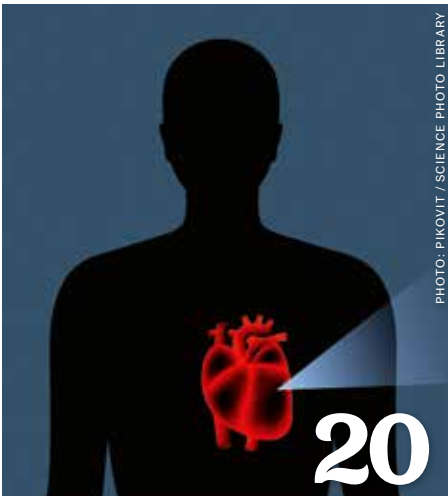
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ILLUSTRATION: LENE DUE JENSEN

## New thesis on gluten proteins

Joel Markgren has received his PhD from the Swedish University of Agricultural Sciences.

His research examined how gluten proteins are aggregated, or joined as clusters, and their absorption potential.

It provided new insights about gluten proteins and may be beneficial for industry, in the future development of absorbents for non-petroleum-based materials. ●

Read more: [www.slu.se](http://www.slu.se)

# 1

## September

is when Lantmännen Research Foundation's annual call opens.

Read more: [www.lantmannen.com](http://www.lantmannen.com)



PHOTO: SHANSICHE / ISTOCK

## Mediterranean diet and fibre help diabetics

**T**he Swedish Agency for Health Technology Assessment and Assessment of Social Services has published a new evaluation of diet and diabetes. Dietary treatment, specific diets and foods,

nutrients and drinks have been evaluated, along with a range of health effects for people with types 1 or 2 diabetes, or gestational diabetes.

One conclusion is that there is an association between eating a Mediterranean diet and a reduced risk of early death

from types 1 or 2 diabetes. The evaluation also shows a correlation between a diet with a greater proportion of dietary fibre or legumes and a reduced risk of early death from both types of diabetes. ●

Read more: [www.sbu.se](http://www.sbu.se)

## Oats as a source of fibre in celiac disease

In her thesis, Salla Laito, University of Turku, investigated how oats, as a source of wholegrains, are tolerated by people on a gluten-free or low FODMAP diet. It comprised three clinical studies in which participants were healthy, had celiac disease or gluten sensitivity, or were oversensitive to legumes. The results showed that oat fibres increased gas release in the guts of healthy and legume

oversensitive people, compared to low-fibre rice, while oat fibres only caused mild gas release in the group with celiac disease or gluten sensitivity.

The conclusion is that oats may be a good source of fibre for people with celiac disease or gluten sensitivity. ●

Source: Laito, University of Turku, 2022. Read more: [www.utupub.fi](http://www.utupub.fi)





ILLUSTRATION: LENE DUE JENSEN

# A Nordic diet has health benefits even without weight loss

A new study shows that a Nordic diet can reduce blood sugar and cholesterol levels, even if no weight is lost. Researchers believe the beneficial omega-3 and omega-6 fatty acids are a probable explanation.

**R**esearch into the Nordic diet often focuses on the health benefits associated with weight loss, but this study shows that it has several health benefits, regardless of any weight loss.

“Most people believe the positive effects on blood sugar and cholesterol are linked to weight loss, but our results show that other mechanisms also have a role to play,” says Lars Ove Dragsted, from the University of Copenhagen.

Over six months, researchers from

Sweden, Denmark, Norway, Finland and Iceland analysed blood and urine samples from 200 participants, all of whom were over 50, had a high BMI and an increased risk of diabetes and cardiovascular disease. Participants were divided into two groups: one that ate a Nordic diet and one that ate their normal diet (control group).

## **NORDIC DIET**

The Nordic diet in the study included fruit, vegetables and fish, as well as wholegrain oats, barley and rye. The fat comes from rapeseed oil, linseeds and sunflower seeds, and has high levels of omega-3 and omega-6.

A Nordic diet is believed to counteract obesity, reduce the risk of cardiovascular disease, type 2 diabetes and high blood pressure, and to reduce levels of bad cholesterol.

The results show that the group on the Nordic diet had lower levels of cholesterol and saturated fatty acids and high levels of unsaturated fatty acids in their blood, and better blood sugar regulation, than the control group. These health improvements were measured in the group on a Nordic diet, even without weight loss.

According to the researchers, the unique composition of fats in the Nordic diet, particularly the levels of omega-3 and omega-6, is a potential explanation for their results.

“Our study shows there are several benefits from a Nordic diet, in addition to weight loss,” says Dragsted.

**Text Åsa Eckerrot**

Source: Gürdeniz *et al.*, *Clinical Nutrition*, 2022. Read more: [www.sciencedirect.com](http://www.sciencedirect.com)



## International conferences

The 20th ICC Conference will be held in Vienna, 5–7 July, under the title “Future Challenges for Cereal Science and Technology”. ICC stands for the International Association for Cereal Science and Technology. This autumn, the ICC is also organising the International Conference on Dietary Fibre, in Leuven, Belgium, 16–18 October. ●

Read more: [www.icc.or.at](http://www.icc.or.at)

## Review of protein intake and BMI in children



PHOTO: ISTOCK

Work is underway on the new Nordic Nutrition Recommendations, NNR. A systematic review on protein intake and the risk of overweight in children was published this spring.

Its results show a correlation between a higher total intake of protein in children up to 18 months and a higher BMI later in childhood. However, there was limited correlation between total protein intake and the risk of overweight.

No conclusions could be drawn depending on whether the source was plant or animal-based protein. The updated NNR will be published in the spring of 2023. ●

Read more: [www.helsedirektoratet.no](http://www.helsedirektoratet.no)



ILLUSTRATION: LENE DUE-JENSEN

# New naming requirements

**A**s of this year, within the EU, products may no longer be named in a way that could be considered to make a nutritional or health-related claim, unless

this can be supported by an approved claim.

**A PRODUCT MAY** not be called anything that can be associated with health or benefit, e.g. power, active or recovery, unless there is an approved

health benefit. These rules already apply to products launched after 2005, and will now uniformly apply to all products. ●

Read more: [www.livsmedelsverket.se](http://www.livsmedelsverket.se) (in Swedish only)



PHOTO: CECILIA EVERS / LANTMÄNNEN

## Investigating whether oat-enriched bread can lower blood sugar

The CarbHealth study is underway at Chalmers University of Technology, Gothenburg, Sweden. PhD student Thérèse Hjorth is investigating whether bread enriched with beta-glucans may have a positive effect on long-term blood sugar and blood lipids in people at risk of developing type 2 diabetes.

Over 16 weeks, 250 subjects will eat three to six slices of bread each day, baked with or without added oat beta-glucans. Previous studies have shown that beta-glucans have a positive effect on blood sugar regulation straight after a meal, as well as on blood lipids, but there are no large-scale studies of how beta-glucan enriched bread affects the risk factors for type 2 diabetes. ●

## EU funding for a major study on alternative proteins



The Giant Leaps research project at Wageningen University in

the Netherlands has recently received EU research funding for the long-term study of new protein sources.

Led by researcher Paul Vos, the team will study which new protein sources are the healthiest and most sustainable, how safe they are and whether their production is economically feasible. ●

Read more: [www.wur.nl](http://www.wur.nl)



## THEME

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# DIGITALISATION

*Increased yields, reduced food waste, safer food handling and greater insight into consumer behaviour are a few of the areas in which digital tools can be helpful. We have spoken to four experts about how digitalisation can revolutionise the entire food system.*

Photo Golden Retriever







Kerstin Eriksson is innovation leader at Sweden Food Arena.



## Reducing the gap between producer and consumer

# via digitalisation

The entire food supply chain must be digitalised if food provision and sustainability are to be guaranteed, says Kerstin Eriksson, innovation leader for Sweden Food Arena.

Digitalisation is key to the transition to increased sustainability.

Text Karin Janson

The food supply chain is complex because there are many process stages and actors, all facing different requirements: food must be produced safely; the rate of production must be high to be profitable; and product should be ethical, tasty and locally produced. At the same time, consumers want new products and flavours.

"This is where digitalisation can be a tool that solves many problems," says Kerstin Eriksson from Sweden Food Arena.

THE LEVEL OF digitalisation currently varies throughout the food supply chain. Farming is far ahead, with innovations like cooperative robotics and precision agriculture, but their use varies from farm to farm. Sixty-three percent of food processing businesses have indicated that they will invest in automation in the future.

"Primary production is already fairly high tech and the Swedish Board of Agriculture is setting up a platform for sharing agricultural data. Investigations are underway as to how these data can

be used in a knowledge hub, which is exciting," says Eriksson.

She states that data sharing is a vital issue in the digitalisation process.

"The industry would benefit from being able to communicate in both directions in the value chain, with producers being able to communicate directly with the market and vice-versa. That way, producers can create products with better precision, ones that correspond to market demand. This would bring transparency, which is important for consumer confidence and, secondarily, their willingness to pay for domestically produced food."

INCREASED DIGITALISATION facilitates flexibility on a large scale.

"The more digitalised production a food company has, the greater the opportunities for profit and applicability. Digitalisation enables better forecasting, helping define the customer, the consumer, and what they want, so you can charge more for unique products and increase profitability. Additionally, if the company can adapt supplies to purchasing patterns, warehousing costs will fall," says Eriksson.

### SWEDEN FOOD ARENA

Sweden Food Arena brings together the food industry with the aim of fulfilling the Swedish Government's food strategy by promoting research calls, building research groups and working to promote business-friendly policies.

Customer data is a huge asset in retail, as it enables the discovery of what customers want and how consumption patterns vary (read more on pages 14–15).

"My experience is that retail is positive towards cooperation and research into what consumers find important, such as transparency and traceability. At the same time, building trust so that all parties in the chain can share data is a challenge. There is a need for improved trust and coming closer together through mutually attractive business models. Data sharing must be attractive for all parties," says Eriksson.

SUSTAINABILITY IS A parameter that is important both to consumers and to industry. This summer, the European Commission will present a model for food sustainability labelling.

"Once this is in place, we can start integrating sustainability as a factor in digitalisation," says Eriksson, and mentions Coop's sustainability declaration as one example. Shoppers can scan a product in the app and obtain a sustainability score.

"This is an excellent example of transparency for the customer, while the manufacturer can see the areas in which they are better or worse. This builds trust in both directions. I think more shops will take this technological step once the EU sustainability label has been introduced." ●



**THEME: DIGITALISATION** | *Autonomous machines may make it easier to grow crops on small areas and reduce soil compaction. However, there is a long way to go before plant and vegetable cultivation can be fully automated, and more research is needed.* **Text Karin Janson**

## New technology may lead to larger harvests

**A**utonomous machines, or self-driving robots, have several benefits in plant cultivation. One is their weight, as autonomous machines are often light and so do not compact the soil as much as a large tractor. They can also be used in small fields.

“During tillage, soil compaction can entail major financial losses. A lighter machine can also work in different conditions and can cultivate land that is difficult to access, for example. Another benefit is that manual tasks such as hoeing and clearing can be automated,” says Johan Wågstam, technical and digital developer for agriculture at Lantmännen.

“A third benefit is that you can purchase several smaller machines and so spread the risk, as you have the capacity to continue working even if one machine breaks,” says Wågstam.

**AUTONOMOUS MACHINE SYSTEMS** are the subject of detailed study in a research project at RISE’s testbed outside Uppsala. However, for autonomous machines to be financially advantageous, they must be part of a larger automation system, he reasons.

“A farmer makes about 140 critical decisions annually. These include when to sow and harvest, which varieties to choose, how to till the soil and when to sell these commodities. All these decision-making processes build upon data

collection, such as market, weather, yield and harvest data. There is a huge demand for consolidating data points to produce a system that supports decision-making.”

**THIS CAN BE COMPARED** to milk production, where automation is more advanced. Using robotic milking, farmers can collect information about milk quality, yield and animal health. The cows decide for themselves when they want to be milked and, using data collection, the system knows whether a cow needs supplementary feed or a teat massage, for example. Wågstam believes we need a similar system for crop cultivation.

“Then various tasks in a work cycle can be automated, such as a drone investigating the condition of a field and collecting data for a management system, which can then communicate to the field robots that it’s time for a pesticide treatment or other measures.”

Johan Wågstam does not believe that such an automation system will be on the market for at least a decade.

“The major benefit of automation is that resources can be better utilised, because farmers can make well supported decisions and optimise crop growing. This, in turn, can increase yield.”

Lots of research is underway in this area, for example at the Swedish University of Agricultural Sciences and at Agroväst in Sweden. A project



PHOTO: LANTMÄNNEN

**“The greatest benefit of automation is that resources can be better utilised...”**

**Johan Wågstam**





PHOTO: WOLFF / LAN TMÄNNEN

## AUTONOMOUS MACHINES

Autonomous, self-driving machines are robots that can perform a range of agricultural tasks, such as spreading fertiliser, cutting, weeding and harvesting.

Robots' advantages include how they can theoretically be used all hours of the day, and can perform time-consuming manual tasks.

focusing on satellite-based forecasts for protein levels in wheat and barley uses remote analysis, predicting protein levels at harvest several weeks in advance. This builds upon data collection from different sources combined with mathematical modelling. Another initiative by the Swedish University of Agricultural Sciences provides plant breeders with information about how digital pictures can be used to investigate crop resistance to drought and disease.

↑ Autonomous machines reduce soil compaction.

↗ Drones help monitor the fields.

➔ Johan Wågstam, technical and digital developer at Lantmännen.

HOWEVER, THE REGULATIONS on monitoring are currently a barrier to autonomous agricultural machines; currently, all robots must be monitored by a human.

"The issue needs to be tested legally, because it is a question of interpretation. I believe we'll soon see a precedent, whether at a national level or joint EU legislation. Many manufacturers are waiting for this," says Wågstam. ●





# Digital grain project for top quality baby food

Only the very best batches of oats and wheat are used in baby food. The Baby Grain Passport project creates digital systems for facilitating work on production traceability and sustainability.

Text **Ebba Arnborg**

**G**rains for use in baby food, such as porridge, must be of extremely high quality; there are regulations about the levels of heavy metals and mycotoxins (fungal toxins), for example.

A Formas-funded research project, Baby Grain Passport, is creating digital systems and tools to facilitate work on identifying and managing selected batches of grains.

“The aim is to get a better overview of the quality of wheat and oats in baby food manufacturing. We place great importance on producing a way of finding excellent batches and on seeing where we can grow the very best grains for this purpose, so we don’t introduce problems into the chain at the beginning,” says Kristin Piikki, researcher at the Swedish University of Agricultural Sciences (SLU), who is leading the project.

**TRADITIONALLY, SELECTED FARMS** have produced grain for baby food, but the tool could facilitate new ways of obtaining the right quality.

“Instead of selected suppliers, we

could find the right batches, which have excellent quality and are on the market, by keeping an eye on the figures,” says Piikki.

**THE PROJECT IS** a partnership between SLU, Lantmännen, Dataväxt AB and Agroväst Livsmedel AB, all based in Sweden. Artificial intelligence and data extraction technologies are used to transform big data into usable information. From this, decision-making support is being developed, as well as a prototype information system.

“We are building a digital tool that will primarily be used internally. It will give us a slightly better handle on the knowledge we already have in our systems. Additionally, we will be able to make more dynamic connections to external knowledge,” says CG Pettersson, Lantmännen R&D, responsible for work on grain quality. He adds:

## DIGITAL TERMINOLOGY

**Big data** – massive amounts of data that can be analysed to reveal patterns, trends and correlations.

**Data extraction technology** – technology for searching for patterns, trends and correlations in large amounts of data.

**Information systems** – systems that are used to gather, store, process and distribute information.

**Decision support system** – a tool for managing and analysing information that supports effective decision-making.

“It will be an extra toolbox for something we already have, a decision support system primarily for people who plan and trade grain flows. If the data is there, it could also be used to control cultivation.”

There are many important parameters for baby food in the production part of the chain, such as good flavour, good fat composition and good protein quality.

“We focus on the quality of the baby food we produce, that is the most important,” says Katarina Hallne from Semper, adding, “We follow ordinances, directives and guidelines from the EU and the Swedish Food Agency, so that risk substances are avoided. We also want a high microbiological standard, as our target group is vulnerable. In general, we want to reduce general environmental impact. Increasing the amount of soluble fibre and lowering phytic acid levels in our products could also potentially be of interest.”

**EVEN IF ALL THESE** parameters are not in the initial stage of the system, they could possibly be added in the future.

“First and foremost, there are standard requirements that we must meet, primarily very low levels of unwanted substances. Even if we’re not working directly on other quality parameters just now, it is a small step to start looking at and working with them once we have the infrastructure in place,” concludes Pettersson. ●





## CUSTOMER DATA REFLECTS

Can we predict how consumers change their values and thus their food choices, such as their choice of protein sources? Researchers from the Stockholm School of Economics are investigating this, using years of data from a grocery store.

Text Linda Swartz

Every day, grocery stores collect enormous amount of data about their customers' purchasing habits. These data are a research goldmine and, thanks to many years of close cooperation with retailers, researchers at the Center for Retailing at the Stockholm School of Economics can access them.

"It's generally very difficult for researchers to get hold of store data, because they're seen as business secrets, so few projects examine actual purchasing behaviour," says Emelie Fröberg, researcher at the centre.

Her field is behavioural economics, and she uses quantitative methods to investigate sustainable consumption.

"Traditionally, sustainable consumption is investigated using questionnaires and experiments, but the problem with asking questions about sustainability is the gap between attitude and behaviour: people say they want to buy sustainable products, but they don't actually do it."

To find clues about how values relating to sustainability are manifested

in actual purchasing behaviour, the research team uses customer data from a store in a medium-sized Swedish city. The store is part of a chain that has a loyalty card. The customers have consented to their data being kept and, in turn, researchers receive data that cannot be linked to identifiable individuals. Over several projects, the researchers have had access to almost 140 million transactions from 50,000 households.

DATA FROM ABOUT 3,500 households is being used in a recent study on protein sources: 70 million transactions over a four-year period. Thanks to the products' bar codes (EAN) and their PLU codes (see inset), researchers can categorise purchases by household.

"Next, we apply statistical models that estimate probabilities that customers will buy something. We observe what's visible to estimate what's hidden," says Fröberg.

In this case, what is hidden is the values relating to sustainability, and what



**Emelie Fröberg**  
Researcher, Stockholm School of Economics

"...people say they want to buy sustainable products, but they don't actually do it."



PHOTO: ISTOCK

# SUSTAINABLE IN-STORE CHOICES

is visible is the choice of protein source. Researchers divided the customers into two segments: people who buy all sources, such as red meat, pork, chicken, fish, eggs, dairy products and legumes, and flexitarians, who reduce the amount of red meat. The statistics do include vegans, but they are few. The researchers have assumed that purchasing fish, beans and lentils reflect more sustainable health and environment values than purchasing red meat.

“Naturally, how the meat is produced matters in terms of sustainability, but red meat is often linked to health issues and higher greenhouse gas emissions,” says Fröberg.

SO FAR, THE RESEARCH GROUP has been able to see that customers appear to adopt sustainability values in a particular order. First they start to think green by choosing organic or eco-labelled, then they buy Fair Trade to contribute to social sustainability. The data analysis

also shows that before flexitarians become vegans, they are most likely to choose a diet with dairy, eggs and fish as sources of protein. The people who eat

## PRODUCT CODES – EAN AND PLU

Every product sold in a Swedish grocery store has either a printed bar code that is scanned or a four-figure code that is entered in the till.

The first one is the EAN (European Article Number) and the second is the PLU (Price Look-Up). A PLU, which is used for items such as fruit, veg and bread, is often unique to that store.

These codes make it possible to see exactly what each customer purchased. The research project’s store is a member of a chain that has 20,000 different products that are protein sources, and a total of 150,000 products in its range.



PHOTO: ISTOCK

the most red meat are the least likely to change their diet. These ‘hidden conditions’, which build upon the researchers’ assumptions, are fairly constant over the four years of the study, and Fröberg hopes to examine longer periods of time and, in particular, data from more stores.

THE LONG-TERM AIM of the research is to help grocery stores to better understand the way consumers move on the value scale, making it easier for them to adapt their offer and their marketing.

“Consumers who buy Fair Trade, eco-labelled products or ones with lower climate impact, buy products that are more expensive. They have a higher willingness to pay; store owners can get more out of this.”

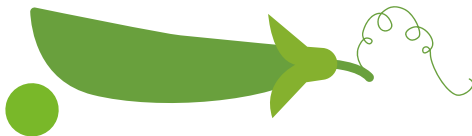
One of the researchers’ theories is that store owners who approach the customer at the right time can nudge them in a more sustainable direction. Fröberg also highlights how a sustainability-aware consumer is a more profitable consumer. ●



# Studying how meat can be partially replaced by legumes

A Finnish research consortium, Leg4Life, is studying the effect of a diet with a reduced intake of red meat and increased proportion of legumes. In The Bean Man study, men replaced some of their meat consumption with legumes for six weeks.

Text Karin Janson



**S**eventy-nine per cent of Finnish men eat more than 500 grams of processed or red meat every week, which is the maximum recommendation in the Nordic Nutrition Recommendations. This figure is lower for women, at 26 per cent, according to the FinDiet study from 2017.

**THIS LED TO LEG4LIFE**, a consortium that aims to replace some meat consumption with legumes, choosing to conduct a study that only targeted men.

“It wouldn’t be realistic to say that Finnish men should entirely stop eating meat, but we believe it’s realistic to think they can reduce their meat consumption and replace the amount that exceeds 500 grams per week,” says Essi

Päivärinta, postdoc in food and nutrition at the University of Helsinki.

The randomised intervention study included 101 men. Half ate 760 grams of meat each week, while not eating large amounts of legumes. The other half ate 200 grams of meat and the equivalent amount of protein from legume-based products, primarily peas and fava beans, but also from lupins and clover.

“They all completed the study, which we believe is because we delivered the food to the participants’ homes every week, and they didn’t eat out because it was during the pandemic,” says Päivärinta.

The overarching purpose of the study was to investigate how the intake of vitamins and minerals, protein, fat, carbohydrates and fibre is affected by replacing some meat consumption with legumes, and whether risk factors for chronic diseases such as type 2 diabetes, cardiovascular disease and bowel cancer are affected by the change in diet.

**ALL THE STUDY** participants provided urine, blood and stool samples at the start and end of the study.

“We also asked them to write a detailed food diary in the four days prior to the intervention period, so we could analyse their food consumption,” says Päivärinta. The preliminary results show that the group that ate less meat consumed lower

saturated fats than the other group, and that they had a significantly lower level of the bad LDL cholesterol in their blood.

“We also had a hypothesis that iron intake would fall in the group that ate less meat. It is more difficult to absorb iron from legumes, but because the total amount of iron was greater in the legume group it compensated for the poorer uptake,” says Päivärinta.

**THE LEG4LIFE PROJECT** is now continuing at the Finnish Institute for Health and Welfare, which is conducting simulation studies of how partially replacing meat with legumes would impact nutritional intake in Finland’s adult population. It is based on data from the 2017 FinDiet survey, which covered 1,655 Finnish adults aged 18 to 74.

“We want to find out whether replacing some meat with legumes increases the risk of an insufficient intake of some nutrients, which also gives us a chance to prove the nutritional benefits at a population level,” says Niina Kaartinen, senior researcher at the Institute for Health and Welfare.

Upcoming work at Leg4Life will investigate the environmental, societal and economic aspects of replacing meat with legumes. ●

Read more: [www.leg4life.fi](http://www.leg4life.fi)

# Study design

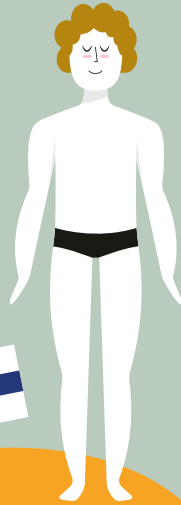
*102 men participated.*

*The average age was 38.*

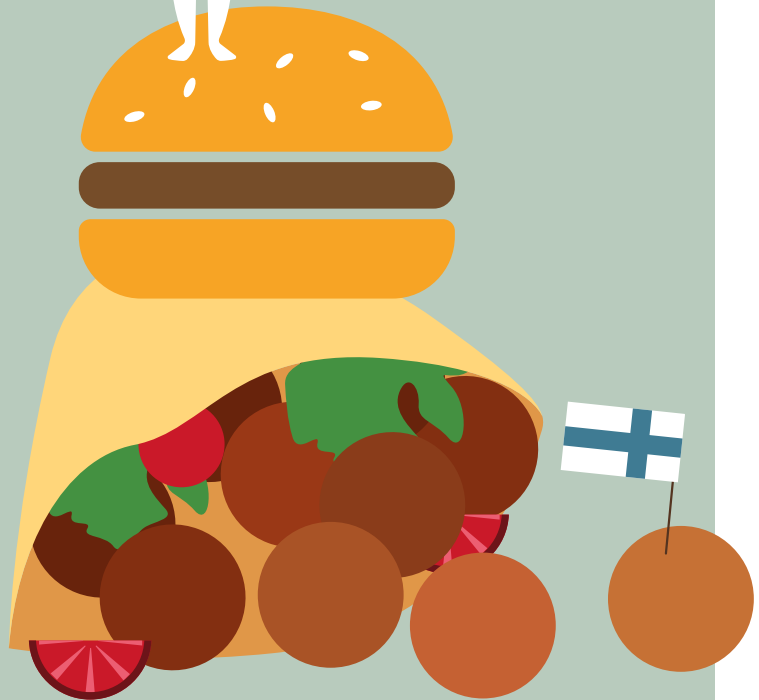
*All participants were healthy  
and had a BMI of 25.5.*

*The study lasted six weeks.*

**The meat group**  
ate 760 grams of  
processed or red  
meat every week.



**The legume group**  
ate 200 grams of  
processed or red  
meat every week, as  
well as legume-based  
products equivalent  
to the protein content  
of 560 grams of meat.







↑ Forty hectares of the Active oat variety will be grown this summer.

# First generation of Active will grow this summer

This year in Cerealier we are covering a new oat variety, Active. Active has higher levels of protein and beta-glucan than other oat varieties. Following the plant breeding work, it is time for propagation.

Text Karin Janson

**T**he Swedish Board of Agriculture approves new grain varieties for cultivation. Approval means that the new variety is described and its characteristics are registered, so it can be differentiated from other varieties.

“For a seed to get permission to be sold in Sweden, every batch must be certified and fulfil requirements placed at the level of the EU. These include not carrying any disease, the seed having a specific germination rate

and water content, as well as a specific purity, which means other varieties cannot be mixed into the seeds. These requirements also apply at the next stage, propagation, so it takes several years to propagate a variety,” says Maria Norén, market manager seed at Lantmännen.

LAST SUMMER, Lantmännen grew one hectare of Active in ‘elite cultivation’ in Svalöv. The seeds must not only be pure, with no other varieties or impurities, but propagation fields must also be carefully controlled.

“We examine the variety carefully and ensure it corresponds to the description of its appearance and character. We also check that there are no weeds or other varieties mixed in the field,” says Norén.

After the first propagation, the variety can be cultivated for five generations before it is necessary

**“We hope that Active will be on the market in two years’ time.”**



**Maria Norén**  
Market manager seed, Lantmännen

PHOTO: LANTMÄNNEN

to start over. This summer it is time to grow the first generation, where two farms will grow a total of around 40 hectares. The ‘elite cultivation’ in Svalöv will also produce a new hectare of Active for propagation.

“We hope that Active will be on the market in two years’ time. Because it is a speciality variety, it will be grown for the industries and customers where it is in demand, so production will be much smaller than if we had launched a new variety that was less unique,” explains Norén ●

## ACTIVE

Active is a new variety of oats, developed by Lantmännen. It has higher levels of beta-glucan fibre and a more protein than other oat varieties.



RECIPE

# Pasta salad with spring greens

*A delicious wholegrain pasta salad with Nordic ingredients – perfect for early summer. Tasty salmon and dill vinaigrette are a wonderful combination that guarantees success on the buffet table or in the picnic basket.*

## **Pasta salad with asparagus, smoked salmon & dill vinaigrette**

Serves: 4

Time: 20 minutes

340 g wholegrain fusilli  
1 bunch young asparagus  
1 bunch spring onions  
16 radishes  
200 g cold smoked salmon, sliced  
1 head romaine lettuce

### *Dill vinaigrette*

3 tbsp mustard  
5 tbsp rapeseed oil  
4 tbsp apple cider vinegar  
Juice of ½ lemon  
100 ml chopped dill  
100 ml chopped chives  
1 tbsp honey  
Salt & black pepper

### **INSTRUCTIONS:**

1. Cook the pasta according to the instructions on the packet. Rinse until cold.
2. Vinaigrette: Combine the mustard and half the vinegar in a bowl. Then add the oil drop by drop, stirring continually, until you get a wonderfully thick vinaigrette that will stick well to the pasta. Stir in the rest of the ingredients and season with salt and black pepper.
3. Combine the pasta with half the dressing.
4. Rinse the vegetables and lettuce. Cut the asparagus in half, the radishes into quarters, rip the lettuce into pieces and cut the spring onions into thin circles.
5. Combine the vegetables with the pasta. Cut the salmon slices into smaller pieces and scatter over the salad. Pour a little more dressing on top, season with salt and pepper. ●

↑ Recipe from Kungsörnen.

PHOTO: SANDRA GUNNARSSON / LANTMÄNNEN





# Can a Nordic diet reduce the risk of cardiovascular disease?

*A new research project at Uppsala University is investigating whether a healthy Nordic diet can slow atherosclerosis and reduce the risk of cardiovascular disease.* Text Åsa Eckerrot



**T**his three-year project, led by Professor Ulf Risérus and funded by Formas and the Swedish Heart Lung Foundation, hypothesises that a Nordic diet may be good for people who have had a heart attack or have cardiovascular disease.

Previous studies have shown that the level and composition of blood lipids can improve if saturated fat, such as butter and palm oil, are replaced by polyunsaturated fats, such as rapeseed or sunflower seed oil. These results also showed that a Nordic diet can help reduce several important risk factors for cardiovascular disease, including LDL cholesterol and triglycerides. Better blood sugar regulation, reduced blood pressure and possibly reduced low grade inflammation in the body are other potential effects of a Nordic diet.

“We believe that rapeseed oil, wholegrain rye, barley and oats, almonds and sunflower seeds

are particularly important components in the Nordic diet, as well as fatty fish, fruit, berries, kale and legumes,” says Risérus.

Reducing plaque in the blood vessels is especially important for people who have already had a heart attack, because otherwise a vessel may rupture and causing a new heart attack. The current project includes 150 men and women aged 40 to 80, who have recently had a heart attack or who have chronic cardiovascular disease. The participants are randomised, either spending 18 months on a tailor-made Nordic diet, or on a diet based on the dietary advice usually given by healthcare services.

**THE DIFFERENCE IS** that a Nordic diet has a greater focus on Nordic foods and is more plant-based; it includes foodstuffs (such as oats and rapeseed oil) that can lower blood pressure, blood lipids and inflammation, and hopefully improve gut flora. To increase motivation, participants on the

**“...we believe spending more time on dietary advice is important.”**

**Ulf Risérus Professor,  
Uppsala University**

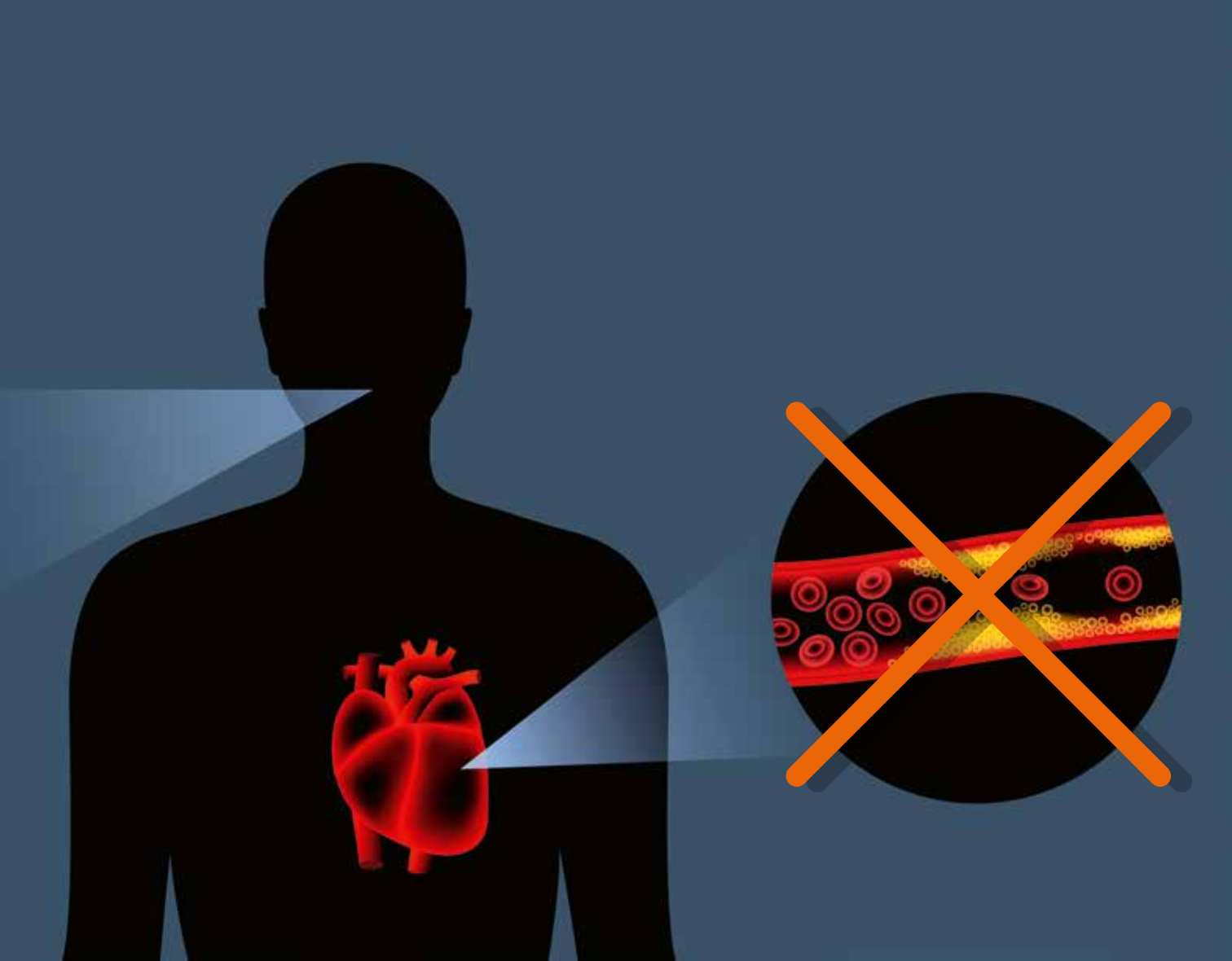


PHOTO: PIKOVIT / SCIENCE PHOTO LIBRARY

Nordic diet will be allocated specific foods and researchers will provide more advice on what to eat. Throughout the study, dietary biomarkers will be measured in the blood, giving objective information about what participants have actually eaten.

“For there to be a beneficial dietary change, with clinically observable effects, we believe spending more time on dietary advice is important. The intensity and frequency of dietary advice to this patient group is therefore higher than is usual in healthcare,” says Riséerus.

**AMONG OTHER THINGS**, the researchers will use a new imaging technique and a new fat index to track changes in both groups.

“We measure the plaque in the heart’s vessels using photon-counting computed tomography, a new technique that can reveal small changes in the plaque’s size and calcium content. The level of inflammation in the plaque is also measured



↑ Ulf Riséerus, professor.



↑ Susanna Larsson, associate professor.

PHOTO: CATARINA OLSSON

PHOTO: HJÄRT-LUNGFONDEN

using a new fat index, developed in cooperation with cardiologists at Oxford,” says Riséerus.

One aim of the study is that the group on the healthy Nordic diet will have a higher intake of polyunsaturated fat and fibre than the control group.

**THE HEART LUNG FOUNDATION** has also awarded funding to Associate Professor Susanna Larsson at Uppsala University, who will investigate the importance of factors concerning diet, physical activity, sleep and stress for the risk of developing cardiovascular diseases.

“We expect that these results will contribute to scientific knowledge that increases the understanding of risk factors for cardiovascular disease, as well as medical treatments and preventive measures,” says Larsson. ●

Read more: Adamsson *et al. Intern Med* 2011

Adamsson *et al. Nutrients* 2014

Schulze *et al. Lancet Diabetes Endocrinol* 2020



# FROM MY PERSPECTIVE

*Food provision is currently a hot topic, and many people want to increase the level of Swedish self-sufficiency. However, product chains are interdependent, so we risk unintended consequences somewhere else. We must approach the issue from another angle, writes Lena Lind, contingency officer at the Swedish Food Agency.*

## Resilience in our food supply chain


**I** am probably not the only person wondering how Sweden's food supplies would function in circumstances like those Ukraine is facing. Could we put food on the table? Keeping extra food at home, to give the system a chance to help the most vulnerable first is vital, but then what? We are told that Sweden must become more self-sufficient, and we must have stockpiles to get us through. I do not believe this will work.

**MODERN FOOD PRODUCTION** is specialised and complex. However much we grow, there would be no food on plates without elements such as packaging, fuel and spare parts. Storing all these is impossible. We are, and will continue to be, dependent on goods that, at some stage, come from other parts of the world, such as fuel and power supplies, semi-conductors or chemicals. This is a lesson we are learning now, when we are only slightly touched by the consequences of war.

**WE HAVE ACCESS** to food in Sweden – we export grain, for example – but the challenges we encounter are often due to a

reduced supply of specific components, such as Adblue (a fluid that reduces nitrous oxide in diesel engines). Adblue is a by-product from commercial fertiliser manufacturing, and a good example of how production chains are a complex web of interdependencies. Removing one thread from the web has unintended consequences somewhere else.

**INCREASED STOCKPILES** of some critical items may be one way of dealing with supply problems, but is probably inadequate for ensuring that the Swedish population will have enough food on the table in a long-term crisis or war. So, as we build up Sweden's food preparedness, we must bear two things in mind: supplying goods in bulk while ensuring that food flows continue. We therefore need to change our approach and start talking about Sweden's ability to provide, rather than self-sufficiency.



**Lena Lind**

**“We are, and will continue to be, dependent on goods that come from other parts of the world...”**



PHOTO: MÅRTEN LIND

**Lena Lind**  
Contingencies officer,  
Swedish Food Agency

Want to feature in “From my perspective”?  
Email us at: [tidskriftenc@lantmannen.com](mailto:tidskriftenc@lantmannen.com)  
Cerealier is not liable for submitted materials.



PHOTO: INFERNØ / LANTMÄNNEN

↑ Arabinoxylans in wheat bran can be used to produce paler fibre-rich bread.

## New research in focus on Foundation Day

At our annual Foundation Day, Lantmännen Research Foundation offered exciting lectures on current Swedish research.

**Helena Fredriksson** Head of Research at Lantmännen Research Foundation

This year's Foundation Day was all about healthy foods, innovative ways of using side streams and how image analysis is helping farming.

**Rikard Landberg**, researcher at Chalmers University of Technology, is working on projects about wholegrains and individual nutrition, partially funded by Lantmännen Research Foundation. Rikard began by stating that wholegrain intake reduces the risk of early death from diseases such as diabetes, bowel cancer and cardiovascular diseases. However, the effects differ hugely between individuals, and can only be minimally explained by genetics. Studies are now looking at how gut flora composition affects the impact

of wholegrains. If some gut bacteria provide more benefit from wholegrains, we may be one step on the way to individualised dietary advice.

**Francisco Vilaplana**, researcher at KTH Royal Institute of Technology, highlighted how side streams such as wheat bran can be better utilised in foodstuffs. Valuable ingredients can be produced by separating the bran into its components. Arabinoxylan fibre, for example, can be used to make fibre-rich bread lighter in colour. Lantmännen's PhD student, Solja Pietiäinen, is contributing to this work.

Three researchers from the Swedish University of Agricultural Sciences talked about imaging and new farming technologies.

**Aakash Chawade** described how image analysis can be used in plant cultivation. Analysing daily images over a long period can provide statistics about biomass, disease or the growth of individual

plants in test fields or greenhouses. Mats Söderström provided an overview of how different light wavelengths can be used for field measurements, by drone or satellite. Models are made using light bands and can predict protein levels at harvest. This technology is now used when fields are almost ready for harvest, but studies are underway that may allow even earlier assessments. The aim is to control actions in different parts of a field, resulting in higher, more even protein levels, for example.

**Anna Hesse** concluded with a review of digitalised monitoring in animal husbandry. Virtual fences are one such area, where a collar on livestock "fences in" an area. If an animal approaches the "fence", the collar emits a warning sound and, if it attempts to continue, it receives a weak electric shock. Sweden does not yet permit this technology. One of the remaining research questions is whether animals understand there is a fence when it is not visible. ●



## NEWS FROM LANTMÄNNEN RESEARCH FOUNDATION



PHOTO: RICKARD FORSBERG / LANTMÄNNEN

# New projects



### Lots of happy pigs

There is great interest in raising

pigs in large groups, but what is necessary for success and what are the pitfalls? Researchers at the Swedish University of Agricultural Sciences will examine this, focusing on feed and animal health. The main aim is to develop advice for building and designing feed systems, and the optimal group size. ●



### Plastic from gluten and fibres

Researchers at KTH Royal

Institute of Technology, Sweden, are working on a gluten-based component for injection moulded plastic, which can compete with the most-used petroleum-based plastics, polyethene (PE) and polypropene (PP). To achieve equal or better mechanical properties, a composite of gluten and fibres will be tested. ●



### Irrigation for better harvests

After years of extremely varied

weather during the growing season, our climate is in focus. Irrigation may be a way of ensuring harvests in drought conditions. A new research project aims to produce cultivation strategies and identify plant materials that provide optimal harvests when irrigated. The project is run in close cooperation with Lantmännen plant breeding. ●

## About the research foundation

Lantmännen Research Foundation supports research in the entire chain, from field to fork. It grants up to SEK 25 million to research annually, focusing on three areas:

- Agriculture and machinery
- Bioenergy and green materials
- Food and packaging

The goals of this research funding include increased agricultural production with minimised

environmental impact and establishing how agriculture can contribute to the development of a biobased society. In the area of food, we want to increase knowledge of grains and legumes as a natural element of sustainable future food.

The foundation holds an open call every autumn, starting in September. See:

[www.lantmannen.com/researchfoundation](http://www.lantmannen.com/researchfoundation)

Applications are assessed on

their newsworthiness, scientific quality and business potential. Decisions are announced in December. ●

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