FOOD LOSS AND WASTE

CASE COLLECTION BY DENMARK

FOOD NATION

Solutions of tomorrow
By Denmark

CASES

CONTRIBUTORS

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Supporting the SDGs
How does Denmark contribute?

With the 17 Sustainable Development Goals (SDGs), the United Nations has created a common framework for global challenges. The Danish agriculture and food sector have taken the SDGs on board, alongside many other stakeholders within the Danish food sector.

The SDGs serve as a guiding light for establishing sustainable food production practices, prioritising research and development efforts and identifying innovation targets that will drive us towards a sustainable future. An efficient and sustainable food sector will directly or indirectly contribute to all 17 goals. However, there are some goals where the food and agriculture sector are expected to have a particular impact.

These include **Goal 2**: Zero hunger, **Goal 3**: Ensure healthy lives and promote well-being for all at all ages, **Goal 13**: Take urgent action to combat climate change and its impacts and, especially in this case collection **Goal 12**: Ensure sustainable consumption and production patterns with target 12.3 aimed directly at halving food loss and waste by 2030.

Achieving the ambitious goals of the 2030 agenda requires global support and partnerships. Extensive collaboration throughout the food value chain between industry, academia, organisations and government are an outstanding characteristic of the Danish food sector – accelerating progress with national and international initiatives and directly contributing to **Goal 17**: Revitalise the global partnership for sustainable development.

PRIMARY PRODUCTION

Agriculture, fishing & horticulture

INGREDIENTS INDUSTRY

Producers of enzymes, cultures and other ingredients

PROCESSING INDUSTRY

Producers of food, beverages & animal feed

FOOD TECHNOLOGY

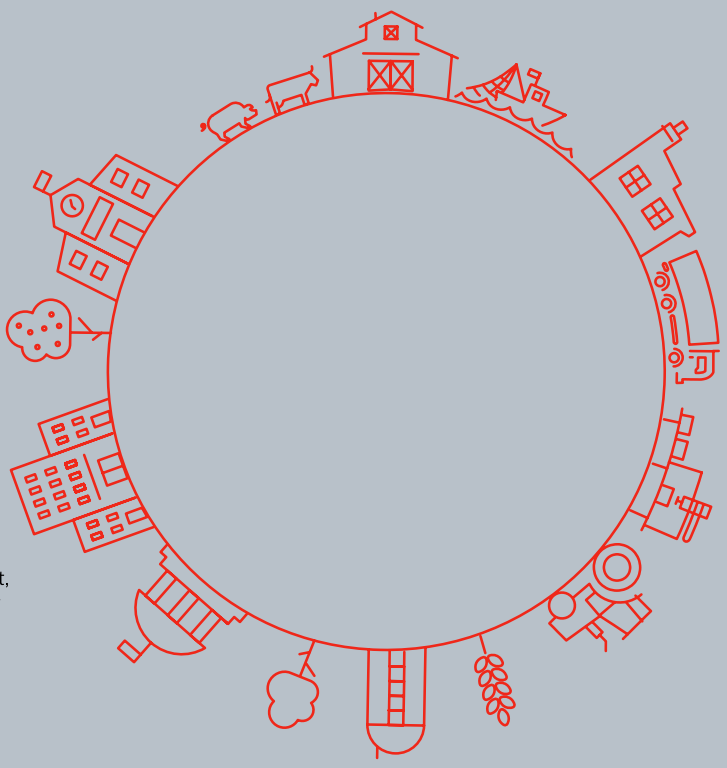
Producers of machines, technology & equipment

GASTRONOMY & THE CONSUMER

Retail, consumers, restaurant, authorities, tourism & other related industries

RESEARCH & INNOVATION

Research, education & counselling institutions



FOREWORD

With one third of all food lost or wasted and nearly 800 million people across the globe going to bed hungry every night, food loss and waste is currently one of our biggest global challenges and calls for immediate action.

By 2030, we need to halve the per capita global food waste at retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

Representing 8% of global greenhouse gas emission, the total amount of lost or wasted food globally corresponds to 1.6 billion tons of food and is altogether worth about $1.2 trillion USD. Therefore, reducing food loss and waste is not only a necessary step to sustainable development, it is also a good business opportunity.

The United Nations has set goals to halve global food loss and waste in 2030 with Sustainable Development Goal 12 and to achieve this goal, all stakeholders must continue take actions that reduce food loss and waste.

Denmark has for many years worked to minimise food loss and waste throughout the food value chain and the Danish government has in 2019 established the think tank One/Third with the purpose of making Denmark a pioneer country within food loss and waste prevention and reduction. By bringing together stakeholders representing the entire food value chain from 'farm to fork', public authorities and the research communities, the think tank will drive the next steps in the fight against food loss and waste.

In this case collection you can find initiatives from the entire Danish food and agriculture sector that contributes to reduce food loss and waste. The case collection can be used to inspire international buyers and professional stakeholders as well as high-level decision-makers to look towards Denmark in search of relevant business partners that presents innovative products, solutions and technologies on food loss and waste reduction solutions.

The case collection is developed by Food Nation in collaboration with stakeholders from the entire Danish food cluster as part of the think tank One/Third's international work.

Lise Walbom
CEO, Food Nation

WELL-MANAGED FEED BOOSTS SUSTAINABLE FARMING

Pig producers around the world face the same challenge: how to reduce waste and improve the sustainability of their production. The barn feeding system is often a good place to start.

Representing the pig farmer's biggest expense, feed accounts for around 50% of the costs on sow farms and up to 80% on farms that focus on raising finishers. So, any opportunity to cut feed waste through better feeding control is also an opportunity to improve profits.

One of Europe's leading developers and suppliers of barn equipment, Danish ACO FUNKI has the efficient feeding systems to make that happen.

Phase feeding ensures lower feed consumption

ACO FUNKI's advanced phase feeding systems are designed to ensure all pigs receive the right feed mixes for their age and, thanks to sensor control, that they get just enough feed to meet their needs. So very little feed is left over in the trough.

In this way, farmers reduce feed waste and as an extra benefit also obtain complete feed traceability and storage control.

From waste to profits

Residual-free liquid feeding also ensures no remnants are left in the feed pipes after feeding. So, the feed distributed to the pigs is always completely fresh, reducing bacteria and infections in the barn and cutting medicine consumption by 50%.

Case by ACO FUNKI

Advanced phase feeding systems reduce feed waste and give complete feed traceability and storage control

Photo: ACO FUNKI

Photo: Fejø Krabber

Invasive species are a growing challenge. But, by working together, companies and universities can turn them into a valuable resource

TURNING INVASIVE CRABS INTO A VALUABLE RESOURCE

Around the world, invasive species are a growing threat with adverse consequences for biodiversity, health and local economies.

About 12 trillion invasive crabs are creating havoc off the coast of Denmark, threatening to outcompete native fish species and damaging the fishermen's catch.

The problem of invasive crabs is so great in Denmark that with every four kilos of eels, 500 kilos of crabs are also caught. Apart from ruining fishing nets with their sharp claws, they damage riverbanks by burrowing into them, lakes and reservoirs and alter the natural habitat of native wildlife.

Now the Danish company Fejø Krabber has laid a plan to tackle the challenge by turning a challenging pest into a 100% useful resource.

A rich protein source

Fejø Krabber has partnered with Danish universities to find ways to turn the crabs into value. One promising idea focuses on using crab protein and other nutrients to improve the diets of elderly people with a small appetite. At an innovation competition hosted by the Technical University of Denmark, a team developed a recipe for a tasty crab bisque. They also proposed to turn the crab by-products from the bisque into flour for use in snacks or pet food.

Better marine environment

The crabs are not just a good source of nutrition. Every time a fisherman pulls a ton of crabs out of the water, they remove about 16 kilos of phosphorus and nitrogen – a cause of oxygen depletion.

This opportunity to improve the marine environment makes Fejø Krabber even more determined to succeed with its mission: to convert invasive crabs into a sustainable business.

Case by Fejø krabber

Whey used to be seen as waste. Today, it is a valuable resource in the production of nutritional and functional food

Photo: Arla Foods Ingredients

THE JOURNEY OF WHEY – FROM WASTE TO FEED TO FOOD

High raw material waste is a long-standing problem in the manufacture of strained dairy products such as Greek yoghurt and cream cheese. As these products have increased in popularity, the issue has grown with implications for the environment as well as manufacturer profits.

The challenge lies in the high-volume waste stream – acid whey – which accounts for around two-thirds of the milk that goes in at the beginning of the strained dairy process.

Added-value upgrade

Today, manufacturers have the opportunity to upgrade acid whey to an added-value raw material. And all with the help of another ingredient which, just a few decades ago, was regarded as a waste product itself: whey protein extracted from the whey by-product of cheese production.

Until the 1980s, whey was either spread on fields as a fertiliser, turned into livestock feed or disposed of by other means. That was when Danish scientists discovered whey's potential as an efficient and natural source of protein. Arla Foods Ingredients and a promising new industry was born.

A powerhouse of benefits

Whey is now known to be a nutritional and functional powerhouse of benefit to consumers right from infancy to old age. Arla Foods Ingredients uses every protein and all other components in whey to help food manufacturers produce more natural, functional and sustainable foods.

That includes the Greek yoghurt manufacturers who can now make 100% use of the milk that goes into their production. Thanks to Arla Foods Ingredients' milk protein-based solution, their acid whey side-stream has become an ideal, calcium-rich base for beverages, dips, desserts and processed cheese.

Case by Arla Foods Ingredients

Reducing food waste in yoghurt with 30% annually would mean 520.000 tons less CO_2

Photo: Chr. Hansen

REDUCING FOOD WASTE WITH NATURE'S OWN RESOURCES

Chr. Hansen's food cultures improves fermentation processes to enhance the quality and fresh flavor at or even beyond end of shelf life, thus supporting the fight against food waste by helping yoghurt stay naturally fresh for longer.

Characterised by high turnover, fragile supply chains and relatively short shelf lives, the dairy products in developed markets are a significant contributor to global food waste and losses. Up to 17% of all yoghurt is wasted every year in the EU, which equals a total of 1.5 million tons of yoghurt. Some of the answers to this challenge can be found in nature.

Extending shelf life with better food cultures Danish bioscience company Chr. Hansen has developed a range of lactic acid bacteria cultures, e.g. FRESHQ®, that reduces the risk of yeast and mould spoilage. These will help make yoghurt stay naturally fresh a little longer, which can reduce yoghurt waste. An impact study reviewed by experts from University of Wageningen and WRAP UK reveals that in Europe alone yoghurt waste could be reduced with 30%.

Quality that goes beyond the best before day

To get even more impact from improving quality and shelf life with Chr. Hansen's food cultures, dairy manufacturers can play a role in guiding consumers on how to reduce food waste. A great initiative is revising the date labels and educating consumers about how to interpret them. More and more dairies in Europe expand the date label to "best before, often good after" to encourage consumers to avoid unnecessary food waste.

Case by Chr. Hansen

ENZYMES KEEP BREAD FRESHER FOR LONGER

Bread is one of the world's most widely consumed foods. The average European citizen eats around 50kg a year and has high expectations of the bread's freshness, taste and elasticity. But, for all its popularity, huge volumes of bread go to waste, after turning dry, hard and unappealing.

According to FAO - Food and Agriculture Organization of the United Nations - in industrialised countries, consumers annually throw away 286 million tons of cereal products, a category that includes bread.

Today, bakers have good opportunities to extend the just-baked freshness of bread as well as enhance its appearance. The answer are enzymes – natural processing aids produced by bacteria, yeasts and moulds.

A natural aid

The Danish ingredient company Novozymes is the world's largest enzyme producer. Its powerful anti-staling bakery enzymes Novamyl®, Sensea® and OptiCake® Excel are specially designed to improve the moistness, crumb softness, elasticity and mouthfeel of a wide range of artisanal and industrial bakery products.

Baking enzymes not only help to reduce food waste. As a natural processing aid, they also extend bread freshness in the most natural way possible – often reducing the need for additives.

Effective against waste

The fresh-keeping enzymes are effective even when bread is exposed to poor storage conditions or a hot and humid climate so consumers waste less and spend less on meeting their bread needs.

Case by Novozymes

Baking enzymes delay the bread staling process, contributing to reduced food waste and more sustainable production

Photo: Novozymes

CULTURES PROVIDE LONGER SHELF LIFE FOR PLANT-BASED YOGHURT

Up to 17% of all milk-based yoghurt is wasted in the EU and mainly because of an expired use-by date, according to the UK Waste and Resources Action Programme (WRAP). As demand grows for non-dairy yoghurts based on plants, the risk of waste could increase even more.

In Denmark, ingredient companies have long worked with natural protective cultures to extend the shelf life of fresh fermented dairy products by delaying yeast and mould spoilage. One of them is DuPont Nutrition & Biosciences.

When plant-based yoghurts started to capture the attention of flexitarian, vegetarian and vegan consumers around the world, DuPont had the right expertise to develop a new line of cultures to help them stay on the shelf for longer.

Up to 30% less waste

In 2018, DuPont developed HOLDBAC® YM VEGE, a new culture line especially designed for fermented plant-based products. HOLDBAC® YM VEGE is based on a formulation of bacteria specifically designed to extend the shelf-life of plant-based fermented food by reducing yeast and mould spoilage.

With DuPont's HOLDBAC® YM VEGE protective cultures, manufacturers can expect up to 10 days of extra shelf life. WRAP estimates that an extra week's shelf life can cut yoghurt waste by 30% in Europe.

As a result, food manufacturers can make plant-based yoghurt and other fresh fermented products with a low environmental impact and much less waste.

Case by DuPont

Deriving full value from Deriving full value from each part of the animal is critical to sustainable growth in businesses and nothing goes to waste at Danish Crown

Photo: Danish Crown

EFFICIENT MEAT PRODUCTION LEAVES NO WASTE

Securing the global food supply while protecting our natural resources are one of today's most pressing challenges. That includes maximising value and reducing food loss in the production of pork and beef.

The cooperative meat processing company Danish Crown is a good example. In its slaughterhouses, every pig is cut into as many as 150 pieces, which are exported all over the world.

Value in every part

The pork loin is popular in Europe and the United States, the ham is exported to Italy, France and Poland and the head, tail and toes are delicacies enjoyed in China. The intestines are used for sausage casings while the blood and other by-products are valued for medicine. Other protein products are used in food and pet food production.

A lifetime of production

Milk and beef production are a similar story. A Danish dairy cow is a source of products throughout its life, producing on average 25 litres of milk a day. Once slaughtered, every part of the animal goes into food, lifestyle products and medicine. Each cow also has around 90kg of bones, tallow and fats, which can be used in bioenergy production.

Deriving full value from each part of the animal is critical to sustainable growth in businesses and nothing goes to waste at Danish Crown.

Case by Danish Crown

Photo: Haarslev

By breaking down meat, poultry and fish waste, rendering draws out useful proteins, minerals and oils for reuse – reducing a significant environmental burden

MEAT SCRAPS SHOW THEIR HIDDEN VALUE

As the global population heads towards 10 billion people by 2050, reutilisation capabilities will play a vital role in relieving the pressure on the world's resources.

At the Danish rendering company Haarslev, this has been a speciality for more than a century. It is here that by-products from meat, poultry and fish production are delivered and valuable components extracted using today's most sustainable processing technology.

Upcycling by-products

The rendering industry is one of the oldest recycling industries on the planet. By breaking down meat, poultry and fish waste, the process draws out useful proteins, minerals and oils. These can then be used in other products such as fuel, soap, rubber, plastic and animal feed.

At the same time, rendering solves what would otherwise be a significant economic and environmental burden in industrial scale slaughtering.

Reducing greenhouse gas emissions

Haarslev helps slaughterhouses and independent renderers all over the world turn meat by-products into valuable co-products. Through the use of specialist equipment and knowhow, a safe and healthy rendering process is ensured.

Minimal carbon dioxide and methane emissions also make rendering a far preferable alternative to landfill, incinerators and other means of waste disposal reducing a significant environmental and economic burden in the process.

Case by Haarslev

Photo: Jalm&B

INNOVATIVE PARTNERSHIPS MAKE THE BEST OF SURPLUS FOOD

Avoiding food waste is not just about eliminating quality issues and overproduction. It's also about seeing the opportunities in residual products. Danish organic bakery company Jalm&B is exploiting this potential through inspiring partnerships and innovative craftsmanship.

In collaboration with other food companies, Jalm&B has launched several exciting initiatives to avoid food waste. One of them is called 'Genbrød' – which roughly translates to Re-bread.

From beer to bread and back again

Here, the company receives surplus golden roasted hazelnuts from the Jacobsen brewery, which are then recycled in bread. At the same time, the brewery uses surplus bread from Jalm&B to produce its new beer called BRØL.

In another collaboration with Amass Restaurant in Copenhagen, Jalm&B's unsold bread has been upcycled in a recipe for bread ice cream.

High-quality reuse

Jalm&B is constantly looking for new partnerships to reuse raw materials in everyday foods and beverages. The goal is always to create tasty, high-quality products that make good sense – commercially and sustainably.

Case by Jalm&B

Jalm&B focuses on everyday opportunities to reuse raw materials that would otherwise go to waste

COOL TECH KEEPS FRUIT FRESH IN TRANSIT

A third of all food loss occurs post-harvest - on the journey from the producer to market. Primary causes include poor storage facilities and transport delays. The varying storage requirements of perishable foods are another complicating factor. Fruits such as bananas and blueberries, for example, require quite different conditions to stay fresh in transit.

The Danish company Maersk Container Industry (MCI) has the solution to all needs – in the shape of refrigerated containers and refrigeration machines for food transportation by road or sea.

Controlled ripening and ageing

Using MCI's Star Cool CA (for high respiring produce) and Star Cool CA+ (for low respiring produce) technology, shipping companies can secure optimal conditions for all kinds of fruit and vegetables during transport. The controlled atmosphere inside the containers manages ripening and ageing, slowing fruit metabolism and delaying the onset of decay.

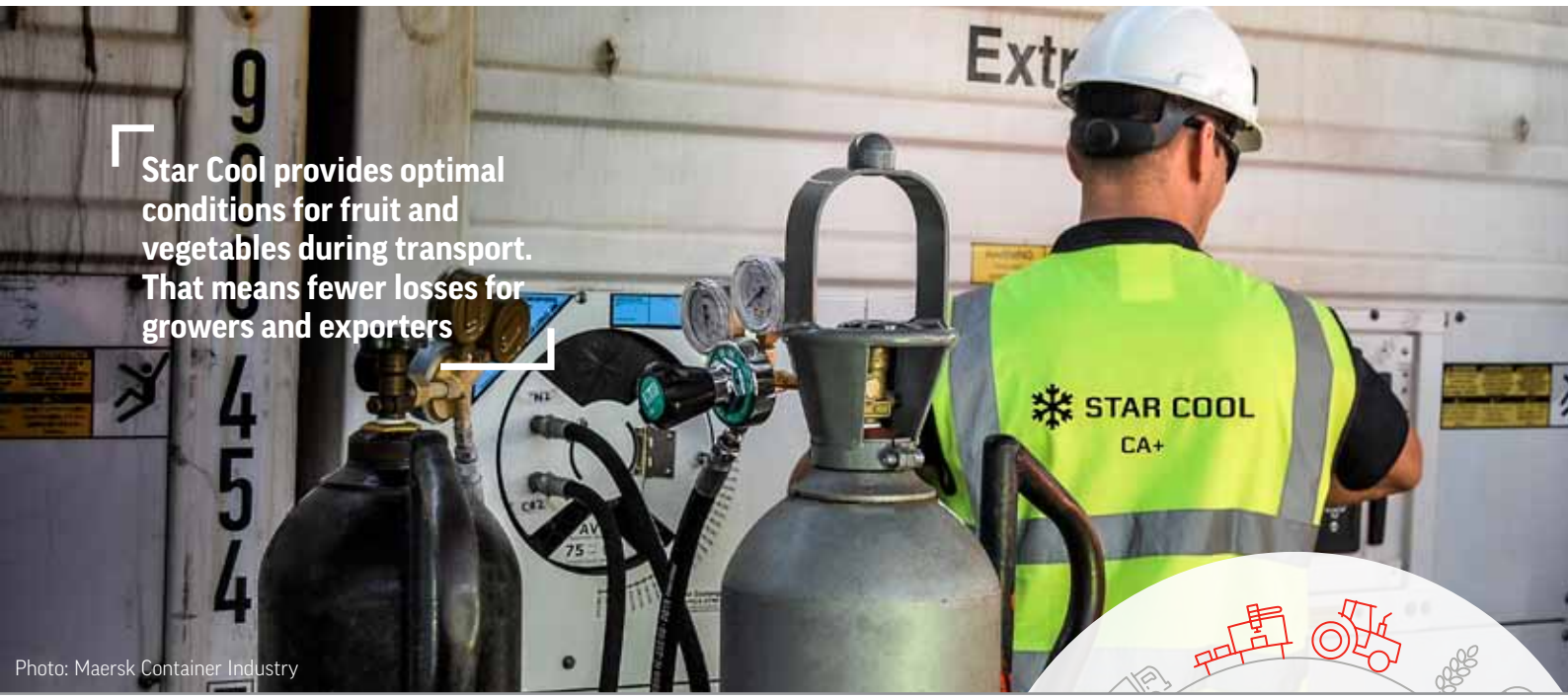
The internal atmosphere of the containers is monitored and controlled during transit to optimise the ripening process and ensure cold treatment protocols are followed. So, when the products arrive at their destination, they are still in peak condition. That means fewer losses for growers and exporters alike.

New market opportunities

Furthermore, MCI's new remote monitoring solution Sekstant™ Global Guidance gives shipping companies direct access to data about conditions inside the container during transport, without having to rely on a third-party provider.

The Star Cool CA and CA+ technology is adding up to 34 days to transit times, without damaging the quality of the perishables increasing the opportunities to reach new markets.

Case by Maersk Container Industry



Star Cool provides optimal conditions for fruit and vegetables during transport. That means fewer losses for growers and exporters

Photo: Maersk Container Industry

BANANAS LAST LONGER WITH COLD CHAIN TECHNOLOGY

Every third banana on the planet is produced in India. A third of them – nine million tons a year – are produced in Tamil Nadu. For many years, though, high post-harvest losses on the farms were the reason why only around six million tons of the nutritious fruit actually reached consumers.

Since the Danish engineering company Danfoss launched a task force with the Confederation of Indian Industry, things have changed.

The task force was set up to address the challenges of food loss, with a particular focus on bananas. An investigation of the banana supply chain revealed three major issues: a lack of agricultural practices at the pre-harvest stage, poor post-harvest management and a disconnect with the market.

Global cooling expertise

Danfoss used its global cooling expertise to develop two interventions: pre-cooling the newly harvested bananas to extend their life and quality and ripening chambers to keep the bananas at the right temperature on their way to consumers.

The introduction of a cooling technology has proven to be a game changer for Indian banana farmers. Not only has it reduced banana wastage by almost 20%. Farmer incomes have also more than doubled.

And, because the bananas keep fresh for longer, the farmers have now started an export adventure to Europe.

The value of knowledge transfer

Before the task force got to work, farmers were not aware of the need for post-harvest care. Their main priority was to increase their production. Today, they are using post-harvest management techniques to reduce losses and get better prices for their crop. The benefits of knowledge transfer are great.

With their cooling technology, Danfoss does not only contribute positively to counteract food loss and waste in the value chain, but also on ensuring safe access to food for all.

Case by Danfoss

The cold chain keeps the bananas at the right temperature so they stay green for longer. The bananas can then be released when the market needs them

Photo: Danfoss

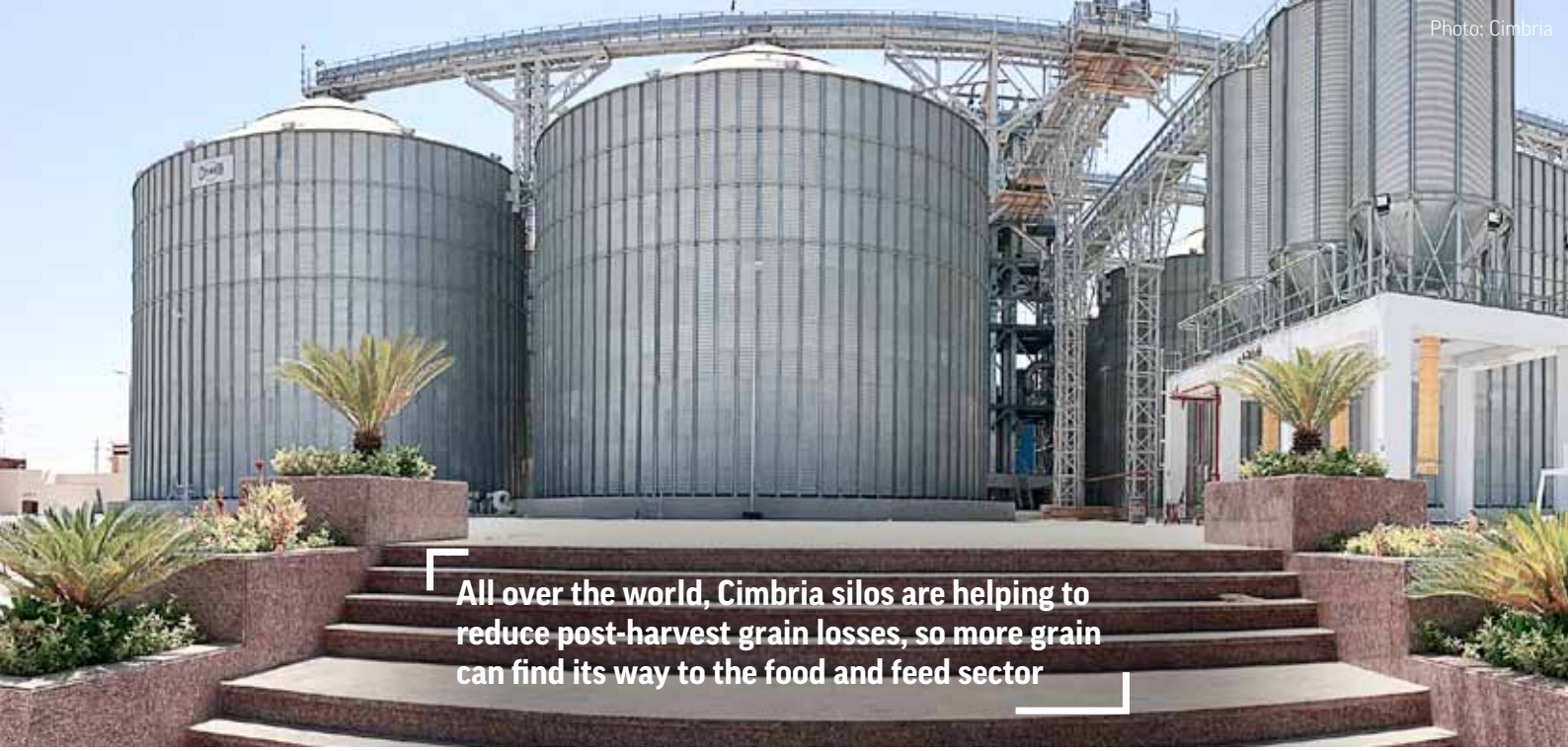


Photo: Cimbria

All over the world, Cimbria silos are helping to reduce post-harvest grain losses, so more grain can find its way to the food and feed sector

SILO STORAGE REDUCES GRAIN LOSS AFTER HARVEST

Global wheat production is expected to drop by a third over the next 30 years due to the impact of climate change. That means global grain producers must increase production by 70% if they are to satisfy the demand of the world's growing population. But, with too little land available for cultivation, they face an impossible task.

Therefore, innovative minds at the Danish manufacturer of solutions for grain processing, handling and storage, Cimbria has turned it's attention to reducing the amount of grain that go to waste post-harvest.

Take Egypt for example – a high grain-consuming country that produces 23 million tons of grain every year and imports around 17 million tons, making it one of the world's biggest grain importers. Previously 20 – 30 % of Egyptian grain was lost in storage.

Keeping grain safe in silos

Cimbria has developed enclosed silos that effectively reduce grain loss.

The silos are specially designed to maintain the quality of the grain by temperature and moisture control. In addition, the silos are equipped to protect against insects and remove impurities such as weed seeds. An inventory management system, which monitors all grain movements, provides further security against theft.

400,000 tons saved in Egypt alone

Today, Cimbria's silos saves up to 400,000 tons of grain from going to waste in Egypt every year – enough grain to meet the needs of 1.6 million Egyptians.

And that is just Egypt. All over the world, Cimbria silos are helping to reduce post-harvest grain losses, so more grain can find its way to the food and feed sector.

Case by Cimbria

EARLY ERROR DETECTION KEEPS PACKAGING PERFECT

A combination of cameras and advanced software identifies errors on the line at an early stage. The vision technology shows flaws in food products, packaging or labels are immediately detected and production can be adjusted. The result is significantly less food waste, not least because product recalls are avoided. Manufacturers can then resolve the problem before expensive damage occurs. At the same time, the technology collects data, allowing food companies to optimise production and make it much more sustainable.

One of the many causes to the staggering amounts of food lost and wasted globally is flawed packaging. When a fault catches the consumer's eye, food products are often rejected – right at the end of their value chain. The top 5 packaging failures are migration/leaching, contamination, adhesion/sealing, material defects and labelling failures.

TriVision in Denmark is solving the problem with vision technology. Every year, the technology saves 10,000 tons of food waste across more than 25 countries by detecting packaging defects such as leaching, contamination, faulty seals, material defects and incorrect labelling.

Fewer stops with vision technology

One of the companies that uses TriVision's vision technology is Arla Foods. The objective is to ensure flaws in butter packaging, for example, do not hamper the quality of the butter inside. After implementing the technology, Arla has experienced fewer and shorter quality-related production stops. Customer complaints have fallen at the same time.

Immediate detection of product, packaging and labelling faults results in reduced processing waste and fewer product recalls. At the same time, the technology collects key performance data, which food companies can use to optimise their production and the sustainability of their business.

Case by TriVision

Vision technology helps food manufacturers keep packaging quality in check, reducing processing and retail waste

Photo: TriVision

APP CONNECTS CONSUMERS WITH SURPLUS RETAIL FOOD

A third of the world's food is wasted – and the costs get higher at every step along the food value chain. That means, food waste by retailers and consumers are the most expensive of all.

It also used to be the most difficult waste to reduce as it requires a change in consumer habits.

Danish company Too Good To Go has found a way to help consumers change their behaviour easily – by developing a user-friendly app that connects consumers with unsold food from shops and restaurants.

A marketplace for surplus food

The app is a total win-win. Consumers can buy surplus food that would otherwise go to waste at a discount price. Retailers can reduce their waste and gain access to potential new customers, who try their food.

The surplus food ranges from the fresh bread that bakeries have not sold during the day to unsold supermarket groceries or restaurant food. All perfectly edible.

29 million meals across Europe

Since Too Good To Go started up in Denmark in 2016, 1.7 million people have downloaded the app and collected 4.5 million meals from shops and restaurants all over the country. Instead of wasting the food at retail level, Too Good To Go makes is possible to connect the surplus food to consumers.

Today, the concept has expanded to 13 European countries and this summer it is launched in the USA, with more countries in the pipeline. The almost 19 million users across Europe have already collected 29 million surplus meals.

Case by Too Good To Go

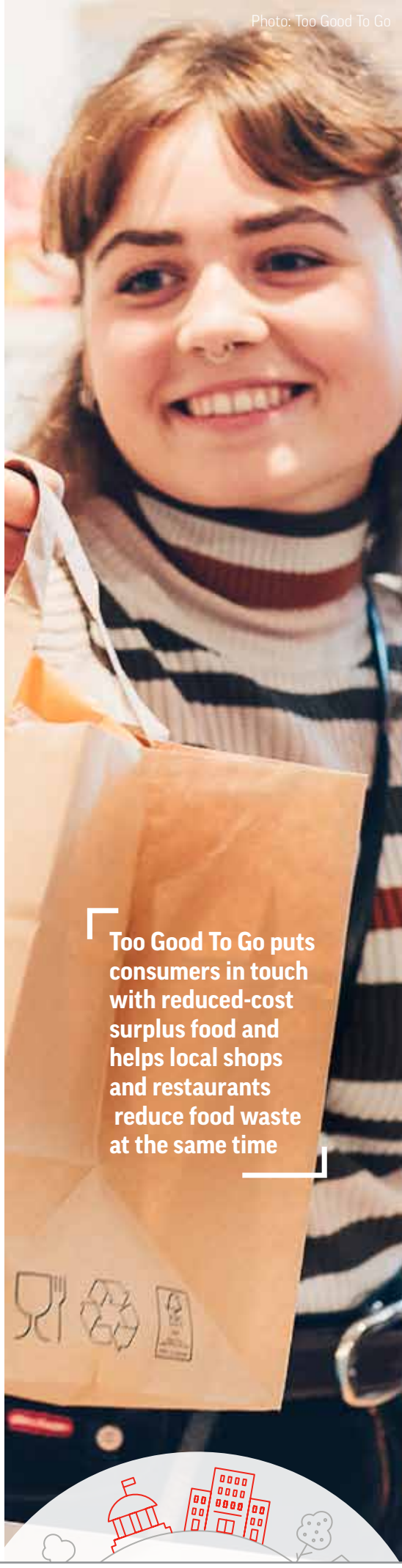


Photo: Too Good To Go

Too Good To Go puts consumers in touch with reduced-cost surplus food and helps local shops and restaurants reduce food waste at the same time

RESTAURANTS JOIN A CARBON REDUCTION MISSION

Restaurant waste is not just about food. It is also about CO_2 emissions. For instance, when searching for 'the sustainable restaurant' many consumers are focusing on less meat and organic – not on CO_2 emissions. Therefore, there is a need for more knowledge on how restaurants, through food waste reduction, can reduce their CO_2 emissions. But that is about the change.

Through a pioneering project, the Restaurateurs' Guarantee Association (REGA), a part of the Danish restaurant and hotel industry trade association DRC (Denmarks Restaurants & Cafees) together with Global Compact Network Denmark (GCDK) aim to help restaurants reduce their carbon footprint by cutting back on waste.

A value chain approach

A three-year project brings industry, knowledge institutions and restauranteurs together to raise sustainability standards across the restaurant industry and its value chain.

From waste to resource

Food waste is one of the main sustainability challenges that will be addressed by the project's four value chain groups. The objective is to identify, test and market new guidelines and solutions that will enable restaurants to transform their food waste into a valuable resource. This can only be done in partnerships with actors from the value chain.

Ultimately, REGA aims to bring the strongest ever focus on sustainability to restaurants at home and abroad so restaurants also play their part in achieving a carbon neutral future.

Case by REGA

Restaurants need new systems for transforming food waste into a resource – and raising their sustainability standards

Photo: REGA

SELLING SURPLUS FOOD TO FIGHT WORLD HUNGER

Supermarkets often have to throw good food away. All it takes is an incorrect label, damaged packaging or an expired 'best before' date. That is not sustainable when nearly 800 million people in the world at the same time go hungry to bed every night.

Since 2016, supermarkets in Denmark have had another way to dispose of unsaleable products. They can donate them to Wefood, the supermarket chain for surplus food.

Initiated by the Danish charity DanChurchAid, Wefood has grown out of a close collaboration between large retailers, food manufacturers and a network of around 200 volunteers, who run the stores. Today, more than 40 companies deliver surplus food to the Wefood supermarkets.

Open to everyone

The difference from similar surplus supermarkets in Europe is that Wefood is open to everyone, whether they want to support the fight against food waste or are simply interested in buying groceries at a discount. All prices are 30-50% less than in regular supermarket chains.

New products from by-products

Wefood also works with food manufacturers to reduce waste in production. In 2019, this led to the launch of a broken rice product with Nordic Food Partners. The by-product of commercial whole rice production, broken rice used to be discarded. Now consumers can buy it at Wefood. Compared to whole rice, the nutritional value and taste are the same.

Supporting the fight against hunger

In 2019, Wefood sold more than 250 tons of surplus food that otherwise would have been discarded – 40% more than the previous year. DanChurchAid puts all profits towards the fight against hunger and poverty around the world.

Case by DanChurchAid

Photo: WeFood

The Danish supermarket chain, Wefood, opened in 2016 and now has four stores spread across Denmark, with many more to come

DATE LABEL INITIATIVE CUTS CONSUMER FOOD WASTE

Better date labels reduce food waste. That is why a number of Danish manufacturers now add 'often good after' to products labelled 'best before'

Photo: Too Good to Go

Consumer confusion about the 'best before' date on food products is a major cause of food waste in Europe. In Denmark alone, consumers are responsible for more than half of the 700,000 tons of food that are thrown out every year. Quite often, the food they put in the bin is still safe and good to eat.

Danish company Too Good To Go decided to take up the battle against food waste. By working with leading food and beverage manufacturers, the goal was to change the way dates are labelled so consumers are in no doubt about whether food is safe to eat or not.

Two labels, different meanings

Manufacturers currently use two types of date label in Denmark. The 'best before' label is applied to foods that worsen in quality and become unfit for consumption long before they pose a health risk. In other words, the 'best before' date simply indicates the food's minimum durability. But, if the taste, smell and look are fine, the food can easily be eaten after that date.

The 'last date of usage' label is used on foods that may pose a risk to human health if eaten beyond their shelf life. This means consumers must respect the date as the absolute end of shelf life. Beyond that, a product may be unsafe to eat even though its quality has yet to worsen.

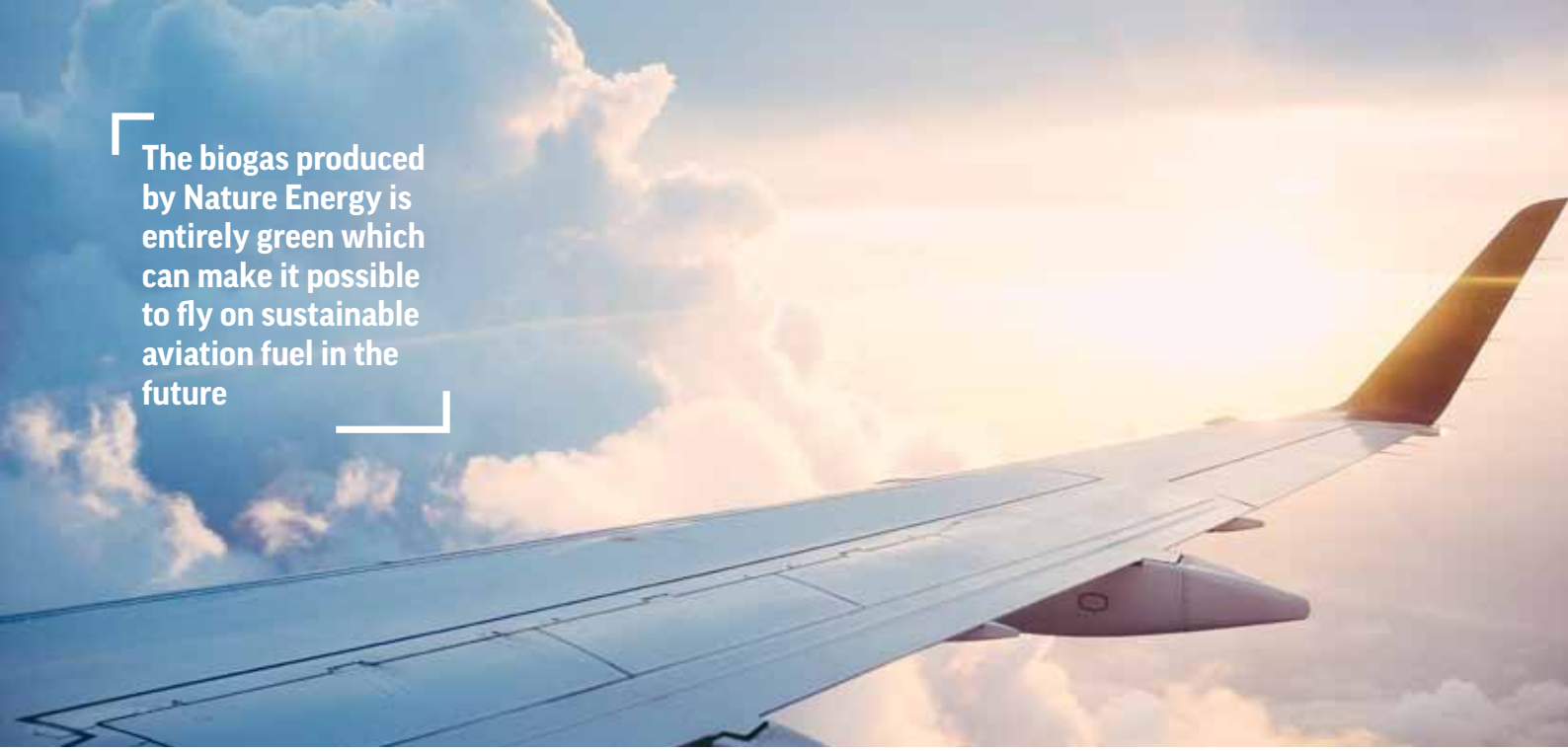
Around a third of Danish consumers believe these two labels are identical – resulting in unnecessary food waste. In Europe, more than half of consumers do not know what 'best before' means.

Best before, often good after

Thanks to the Too Good To Go initiative, Arla Foods, Thise, Carlsberg, Unilever, Orkla Foods Denmark and many others have changed the date label on a wide range of products from 'best before' to 'best before, often good after'. The idea is to help consumers think twice and trust their own senses before they throw food away.

According to the results from a survey, the campaign has made a difference. Almost 70% of respondents said they will throw less food away because they now know it may still be edible after the 'best before' date.

Case by Too Good To Go in collaboration with Carlsberg, Urtekram, Unilever, Arla Foods, Toms, COOP, Løgismose Meyers, Thise, Orkla, Mikkeller, Letz Sushi, Emmerys, Tenax Sild, KageButikken and Carl B. Feldthusen



The biogas produced by Nature Energy is entirely green which can make it possible to fly on sustainable aviation fuel in the future

TURNING FOOD WASTE INTO TOMORROW'S AVIATION FUEL

Air traffic is expected to double by 2050 due to the growing middle class. As air traffic is one of the biggest contributors to CO_2 emissions, the race is now on to find green alternatives to today's aviation fuel.

Danish biogas company Nature Energy has taken up the challenge in collaboration with NISA, Nordic Initiative for Sustainable Aviation, the consulting engineering company NIRAS and researchers from the University of Southern Denmark (SDU). Their aim is to make sustainable aviation fuel made from biogas, CO_2 and hydrogen. Food waste is a key ingredient.

The green transition

Nature Energy is a major contributor to the green transition and already produces biogas at 10 plants in Denmark and two abroad. Several of the plants are selling the gas as fuel for trucks and buses. In addition, Nature Energy invests heavily in research, some of it, at its own laboratory in Odense.

In Denmark, biogas comes from manure and food waste – e.g. coffee grounds, potato peels and chicken wings. Once produced, the gas is fed into the gas network, where it is used for household heating or by industry. The residual degassed slurry then goes to farmers, who uses it to fertilise their fields.

Promising progress

Since the sustainable aviation fuel project kicked off in April 2019, the pre-feasibility study has shown promising results. If all goes to plan, the first production facilities for 100% green aviation fuel could be ready as early as 2025.

The project is supported by Scandinavian Airlines (SAS), Copenhagen Airports, ARC Amager Resource Centre, Nordic Energy Research, Dansk Luftfart and Danish Energy.

Case by Nature Energy, NISA, NIRAS and the University of Southern Denmark (SDU)

Made from 100% plant-based materials and produced in a CO_2-neutral production plant, the coating could hardly be more sustainable.

Photo: Palsgaard

ANTI-FOG COATING KEEPS FRESH FOOD PACKAGING AT ITS BEST

All too many of the fresh salads, ready meals and sliced vegetables displayed in supermarket chiller cabinets never reach consumer households. Inadequate packaging is one of the reasons. Because, when a fog of condensation appears on the clear film wrap, food products rapidly lose their appeal.

According to the UK organisation WRAP, up to 40% of all green convenience food is thrown directly in the bin, partly due to condensation in the packaging. The world's only full-service emulsifier and stabiliser company, Palsgaard has used its expertise in polymers to come up with a solution: a water-based, anti-fog coating that keeps condensation transparent.

Rather than accumulating as large drops, the coating ensures that the condensed water forms a thin, transparent film. That means the chilled food under the film wrap stays looking as fresh and desirable as ever – so much less goes to waste.

Sustainable credentials

Made from 100% plant-based materials and produced in a CO_2-neutral production plant, the coating – called Einar® 1122 – could hardly be more sustainable. With its properties, the anti-fog coating is a new opportunity to cut global food waste.

Case by Palsgaard

The Greenland halibut is a truly versatile fish. Almost everything can be used. As a result, Royal Greenland comes close to zero waste in its production

Photo: Royal Greenland

VALUABLE FISH FROM HEAD TO TAIL

Fish and shellfish are Greenland's most important natural resource. To keep stocks in balance, sustainable fishing is essential, along with ensuring minimal waste of the caught fish.

At Royal Greenland, the production and innovation team continuously explore new opportunities to optimise yield.

Taking part in research projects, the fishing company has successfully reduced waste from its catch of Greenland halibut – a fish highly appreciated for its snowy-white meat and high content of omega-3 fatty acids.

Many options, low waste

As the world's largest supplier of Greenland halibut, it is particularly important to Royal Greenland that as much as possible is utilised for human consumption. Today, there are many options for consumers to choose from.

The fish are either sold whole or cut into fillets, loins or portions. As for the heads, tails and frills, these are sold mainly to Asia, where especially the frills are a delicacy in Japanese sushi. Greenland halibut is also smoked and marinated.

The Greenland halibut is also a fish with high utilisation as it contains very few bones and all the meat is distributed where it is appreciated the most.

Case by Royal Greenland

LAB WILL RETHINK THE FUTURE OF FOOD WITHOUT WASTE

A consortium of Danish universities and companies are behind a new open innovation food and health lab, which is to rethink food production and consumption and develop new systems for a more sustainable food supply with much less waste.

Called FOODHAY, the 13.8 million Euro research centre is jointly funded by the Danish Education and Research Ministry and the consortium partners – Aarhus University, Copenhagen University, Danish Technology University, Arla Foods and Danish Technological Institute.

From raw material to consumer

The whole food value chain is in focus: to deliver new knowledge and solutions for utilising the side streams of food production; develop processes that increase the nutritional value of foods; identify new, healthier ingredients; create more sustainable packaging solutions, reduce food waste during distribution and consumption; and ensure food products match consumer needs and preferences.

In the years ahead, the FOODHAY partners will support research initiatives with a direct impact on Denmark's ability to deliver new knowledge, technology and food and ingredient solutions to the global consumer.

The ultimate goal is to facilitate the production of innovative, healthy and more sustainable foods. Strengthening business, creating more value for consumers and reducing the negative impact of today's food systems on the climate.

Case by Aarhus University

FOODHAY will lead the way in delivering healthier foods and increasing the sustainability of our food systems

FOOD LOSS AND WASTE CASE COLLECTION

The massive amounts of food lost and wasted is a huge global challenge. Guided by the Sustainable Development Goals, the Danish food cluster continues to take the lead in minimising food loss and waste along the food value chain while creating business opportunities at the same time.

If we are to halve food loss and waste by 2030, as stated in SDG target 12.3, there is a need to understand precisely how and where food loss and waste occur – and what solutions to bring in to play to address this.

The Danish food and agriculture sector are working actively to innovate and develop products and solutions to reduce food loss and waste throughout the food value chain, and the food cluster sees great opportunities for further collaboration across nations.

Food Nation

Food Nation is a non-profit partnership established by the Danish government and leading private organisations and companies. It is your gateway to information about the Danish food cluster and know-how that can accelerate the growth of international businesses through better solutions, innovative products and trusting cooperation.

The Danish food cluster encompasses everything from primary production in agriculture and the fishing industry to the food products consumers buy in stores and online. Companies, universities, research institutes, local and national authorities and other private and public organisations belong to the extensive, collaborative network. Together, they work with international partners to minimise food loss and waste along the value chain while creating new business opportunities.

Take an interactive tour

In central Copenhagen, Food Nation welcomes international delegations, providing them with an introduction to Danish capabilities within food and agriculture. An interactive installation at the centre gives visitors an up-to-date overview of the food value chain based on their individual interests. It is the ideal starting point before visiting Danish food producers and production facilities.

Find out more about Food Nations services, the Danish food arena and arrange a visit to the Food Nation Visitor Centre at www.foodnationdenmark.com.

The Danish food sector's commitment to minimise food loss and waste provides a solid basis for sharing experiences with like-minded countries

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