

# DATA DRIVEN DAIRY

HOW CLIMATE CHECKS ARE  
DRIVING ACTION TO REDUCE  
EMISSIONS ON ARLA FARMS



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# FOREWORD



**Jan Toft Nørgaard**  
Chairman



**Hanne Søndergaard**  
Chief Agriculture and Sustainability Officer

## Every business across the world has a part to play in reducing global emissions.

Here at Arla, our farmer owners are committed to reducing the carbon footprint of the milk they produce, alongside protecting the biodiversity and soils on their farms, knowing the important role that dairy plays in northern European food supply, as well as feeding a growing global population. We are dedicated to continuing our progress to meet the world's climate targets.

We knew that the sooner we could start collecting data on our farm emissions, the sooner we could benefit from the insights this data provides and lead change. As a cooperative of nearly 9,000 dairy farmers, we know we already have a lot of the

answers within our membership and have set ourselves an ambitious target to reduce emissions on farm by 30% by 2030 from a 2015 base year. We have now collected two years of carbon footprint data from individual Arla farms and are currently collating and verifying the data for Year Three. What this means is that we now have the largest externally verified dataset on dairy production across seven countries ever collected, and this dataset is growing from year to year.

This data is already helping Arla farmer owners prioritise actions that can make a difference to the emissions produced on their individual farms. The business is also using this data to make reasonable predictions about the potential for the industry to make further reductions and identify areas where investment is required to make change.

This is not a task we can do on our own. Sustainable food production must make sense financially as well as environmentally to survive in the long term. While more climate-efficient methods of farming can sometimes also benefit the bottom line, others require significant investment, testing, trials and innovation. Lenders, government and the wider industry all have a part to play in supporting farmers on this journey.

We're very excited about how far we've come already and what the future holds for dairy farming. The road we take to achieve our goal may change along the way, but our data-led, science-first approach will not.

## CONTEXT

Arla is the world's fourth largest dairy company based on milk intake and the largest organic dairy producer. The business is a farmer-owned cooperative comprising 8,956 farmers from Belgium, Denmark, Germany, Luxembourg, Sweden, The Netherlands and the United Kingdom, who between them look after over 1.5 million cows. Milk from these herds is processed at 60 sites to make a range of dairy products sold in around 140 countries worldwide. Arla's global brands include Lurpak, Castello and Puck as well as the Arla brand.

Delivering healthy, affordable nutrition to a growing population is a key priority for Arla. All food production also comes with a carbon cost. As producers, processors and transporters of its milk, Arla is able to track the carbon footprint of its products right through the value chain from farm to factory. With both the ability and desire to drive positive environmental change, Arla launched its ambitious sustainability strategy in 2019, with an aim of being carbon net zero across its entire value chain by 2050 (by 2045 in Sweden). It has set an interim target of reducing absolute scope 1 and 2 greenhouse gas (GHG) emissions from operations (i.e. production sites, own logistics and energy usage) by 63% by 2030 – a target endorsed by the Science Based Targets Initiative (SBTi) as

consistent with the emission reductions required to keep global warming to 1.5°C.

Arla has also committed to reducing relative scope 3 GHG emissions by 30% per tonne of standardised raw milk and whey intake by 2030 from a 2015 base year. This scope 3 commitment meets the SBTi's criteria for ambitious value chain goals, meaning they are in line with current best practice.

Scope 3 emissions includes those produced at farm level. Here, Arla is in a unique position to drive these carbon reductions because its supplying farmers are also the owners of the business and, therefore, can take real ownership of this challenge.

83% of the cooperative's greenhouse gas emissions come from its farms<sup>1</sup>. In 2019, Arla took the decision to invest in a bespoke 'Climate Check' tool to collate and analyse farm emissions data, in order to identify the best opportunities to drive action in this priority area.

**This report shares some of the insights the Climate Check data gives us about dairy production in Europe and how Arla farmer owners are using this data to drive down their emissions, whilst continuing to look after their cows to the highest welfare standards.**

## DID YOU KNOW?

Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) are the major greenhouse gases associated with dairy production; CH<sub>4</sub> mainly comes from digestion and manure storage and N<sub>2</sub>O from fertiliser and manure usage. To calculate Arla's total carbon footprint, these are converted into carbon dioxide equivalents (CO<sub>2</sub>e) using IPCC<sup>2</sup> calculations.



# HOW DO ARLA CLIMATE CHECKS WORK?

The Arla Climate Check tool uses internationally recognized methodology for carbon footprint calculations at farm level developed by the International Dairy Federation<sup>3</sup> and based on the ISO standard for life cycle assessment/life cycle analysis (14044). Emissions from animals, manure and soils are evaluated based on IPCC (Intergovernmental Panel on Climate Change) guidelines. The tool features over

200 questions on subjects such as feed, energy use and manure management to calculate the carbon footprint of each kg milk produced on individual Arla farms. An external expert then meets with the farmer to validate the quality of the data entered and to provide advisory support on further actions that could be taken to reduce carbon footprint. The entire process is audited by Ernst & Young Global Ltd.

Following a comprehensive pilot phase, the annual data collection began in 2020 and two years of data has now been collected and verified. Participation in the scheme is voluntary for conventional producers and mandatory for organic producers, with farmer owners paid an incentive on their milk price to complete the Climate Check survey.



**ARLA CLIMATE CHECK PARTICIPATION 2020:**

**94%**

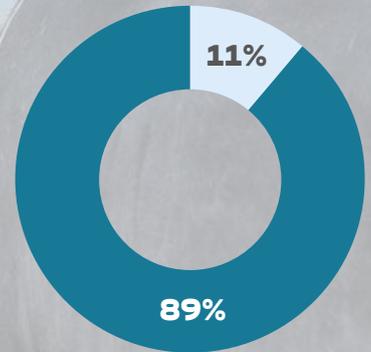
**FARMER OWNERS (96% OF MILK POOL)**



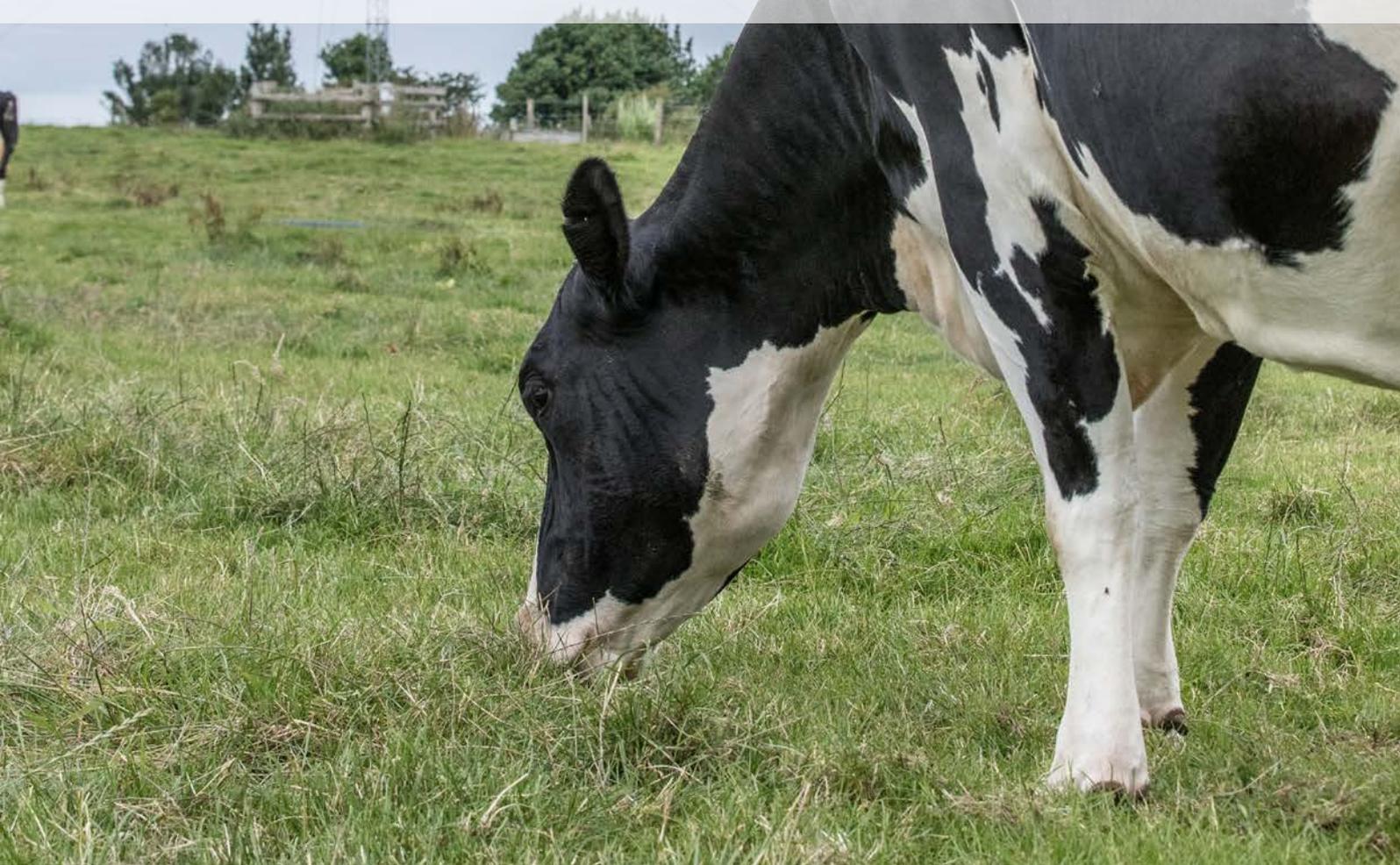
**ARLA CLIMATE CHECK PARTICIPATION 2021:**

**94%**

**FARMER OWNERS (98% OF MILK POOL)**



**CONVENTIONAL PRODUCERS: 89%**  
**ORGANIC PRODUCERS: 11%**



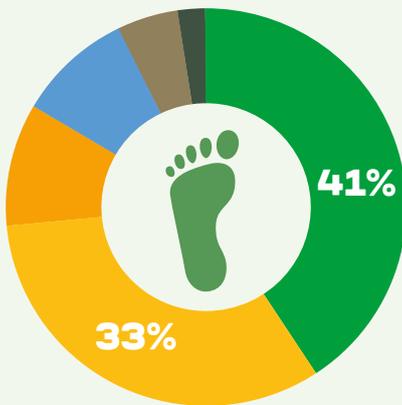
# HEADLINE RESULTS

Based on this extensive data collection, we know that, on average, our farmer owners' milk is made with 1.15kg of CO<sub>2</sub>e per kg fat and protein corrected milk (FPCM)<sup>4</sup>.

2020: **1.16** kg CO<sub>2</sub>e per kg FPCM

2021: **1.15** kg CO<sub>2</sub>e per kg FPCM

These emissions can be broken down into categories as follows:

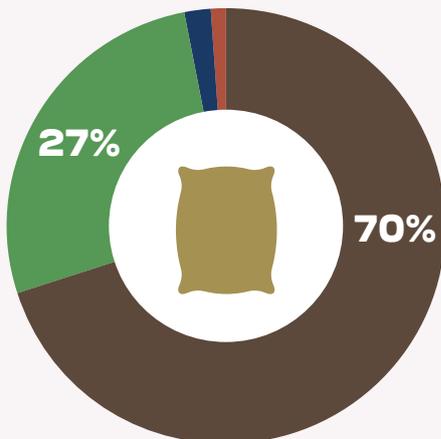


- **ENTERIC FERMENTATION: 41%**
- **FEED PRODUCTION: 33%**
- **MANURE STORAGE: 10%**
- **PEAT: 9%**
- **ENERGY USE: 5%**
- **OTHER: 2%**

*Submission split of carbon footprint, kg CO<sub>2</sub>e per kg FPCM Arla 2nd round Climate Check performed in 2021*

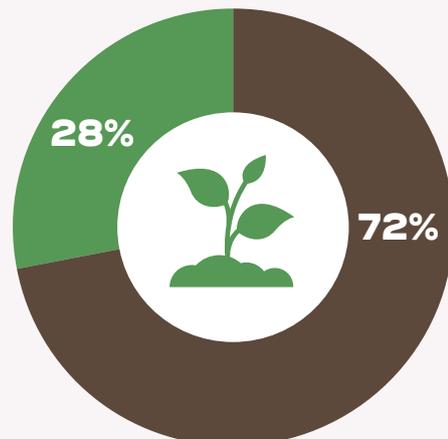
**ENTERIC FERMENTATION** (cow digestion) and **FEED PRODUCTION** account for the majority of emissions and, as such, many of the actions outlined in this report address these areas. Feed production includes emissions from home-grown as well as purchased feed. Home-grown feed includes fertiliser production and field emissions of carbon dioxide and nitrous oxide. Emissions from purchased feed include cropping, processing and transport of feed components such as grain, protein feed and by-products (e.g. from the food industry) but also milk powder and mineral feed.

## 2021 AVERAGE COMPOSITION OF FEED ON ARLA FARMS (% DRY MATTER)



- **ROUGHAGE (GRASS/MAIZE/WHOLECROP/STRAW/FODDERBEET): 70%**
- **CONCENTRATE (HOMEGROWN AND PURCHASED CONCENTRATE, GRAIN, SEEDS AND FAT): 27%**
- **BYPRODUCTS: 2%**
- **OTHER (MINERALS AND MILK REPLACER): 1%**

## 2021 AVERAGE PERCENTAGE OF HOMEGROWN FEED ON ARLA FARMS (% DRY MATTER)

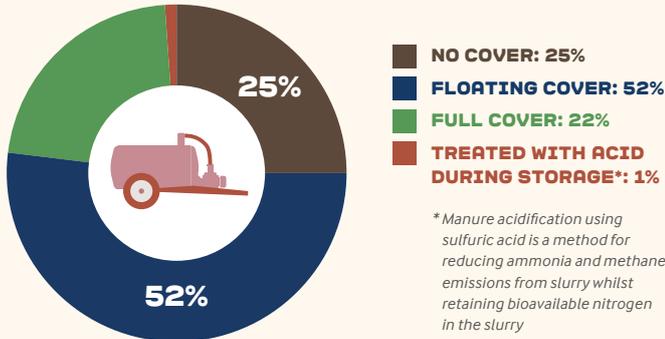


- **HOMEGROWN: 72%**
- **PURCHASED: 28%**

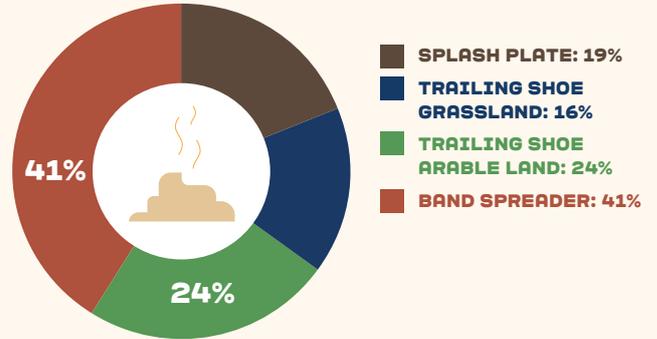
**MANURE STORAGE** emissions vary on how a store is covered and whether the manure is used in biogas production.

The below graph shows the percentage of manure spreading techniques currently being used on Arla farms by milk weight. Splash plate technology which releases the most nitrogen into the air when manure spreading is currently being phased out across Europe.

### SLURRY STORAGE METHODS 2021



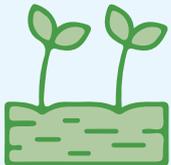
### SLURRY APPLICATION METHODS 2021



The carbon footprint figures that we report externally include emissions from **PEAT** soil. Peat forms when organic material decomposes over thousands of years in wet areas of land. Peat soils have a high carbon content and, with proper drainage, are used for crop production, which can consequently release carbon dioxide and

nitrous oxide. Here at Arla, we calculate a farm's carbon footprint result both with and without peat soil included. This is because peat soil prevalence varies from country to country and a farm has little control over whether their farm has this type of land. It is therefore more meaningful for benchmarking purposes to

look at 'ex-peat' figures so that farms are more comparable against each other. The large difference that peat soils can make to a farm's carbon footprint is highlighted when looking at the milk-weighted carbon footprint averages of our organic farms compared with conventional farms below.

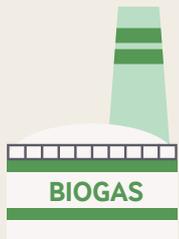


2021	KG CO <sub>2</sub> E PER KG FPCM INCLUDING PEAT SOILS	KG CO <sub>2</sub> E PER KG FPCM EXCLUDING PEAT SOILS
Organic Farms	1.19	0.99
Conventional Farms	1.15	1.06

When calculating the carbon footprint of a farm's milk, Climate Checks take into account the **ENERGY** used to produce the milk and whether it is renewable – this

can be either from energy produced on farm or renewable energy purchased as energy certificates. 2021 data shows that, on average, 21% of the electricity used on

Arla farms was covered by purchased green certificates and 6% was produced on farm using renewable technology.



**791**  
ARLA FARMER OWNERS SEND THEIR SLURRY TO A CENTRAL BIOGAS PLANT (10%)



**171**  
ARLA FARMER OWNERS USE SLURRY IN THEIR OWN BIOGAS PLANT (2%)



**1939**  
ARLA FARMER OWNERS HAVE SOLAR PANELS ON THEIR FARM (25%)



**228**  
ARLA FARMER OWNERS HAVE A WIND TURBINE ON THE FARM (3%)



# TURNING DATA INTO ACTION

## OUR TOP 5 LEVERS

While the data on the previous pages is interesting, to find its true value we have to look beyond the averages and look at the variation between farms. Year 1 data immediately identified the five areas which had the greatest effect on carbon footprint. When we delved deeper, these five areas also accounted for a massive 78% of the variance in carbon footprint (ex-peat) between Arla farms. The good news is, these areas are efficiency 'levers' that farmer owners can work on within their farm management immediately without any external dependencies apart from their normal advisory support. **We have calculated that if our owners manage these five levers with precision, we will deliver almost a third of the reduction necessary to meet our 30% reduction target by 2030** and so these are where we are currently focusing action. At Arla, we are calling these 'The Big 5'.

<p><b>FEED EFFICIENCY</b></p> <p>More milk per feed input</p> 	<p><b>PROTEIN EFFICIENCY</b></p> <p>Reduce protein surplus in feed ration</p> 	<p><b>ANIMAL ROBUSTNESS</b></p> <p>Healthy cows</p> 	<p><b>FERTILISER USE</b></p> <p>Reduce nitrogen surplus from feed production</p> 	<p><b>LAND USE</b></p> <p>Better crop yields</p> 
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# HOW IS CLIMATE CHECK DATA HELPING ARLA FARMER OWNERS TAKE ACTION?

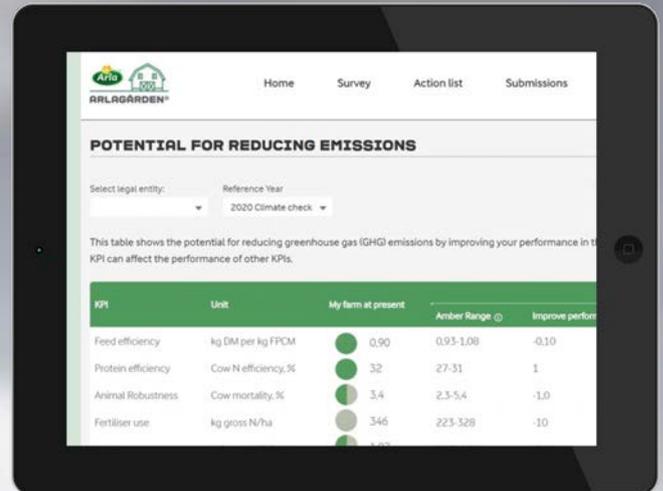
Every Arla farmer owner that completes a Climate Check meets with an expert advisor who, as well as verifying the farm's data, provides bespoke farm advice and an individual action plan. Where possible, the same advisor revisits a farm every year.

The farm scores are then uploaded onto a database so the farm can view its scores and compare them to previous years and to other Arla farms.

## Information provided to farmer owners:

- An individual breakdown of their 'Big 5' results using a colour-coding system to indicate strong and development areas
- Benchmarking information of how their scores sit compared to similar farms in their country in terms of herd size and forage type
- Illustrations of how moving their score on each individual KPI will affect their Climate Check score
- Individual action plan and explanation of why these actions make a difference

There is no one-size-fits-all approach to tackling the 'Big 5'. Every farm will have different variables to consider and sometimes actions to improve one area can affect the performance of another. What's exciting, though, is that the cooperative nature of the Arla business allows farms to share what works with others, for the benefit of all.



**“IT IS IMPORTANT TO ARLA AND ITS OWNERS TO REFLECT AND MAINTAIN THE DIVERSITY OF THE VARIOUS GEOLOGICAL CONDITIONS, FARM SYSTEMS AND SIZES IN OUR COOPERATIVE. FROM OUR DATA, WE SEE THAT ALL FARMING SYSTEMS CAN BE MORE CLIMATE EFFICIENT, SO WE WANT TO SUPPORT EACH FARMER TO REACH THEIR FARM'S TRUE POTENTIAL. RATHER THAN BEING BENCHMARKED AGAINST ALL TYPES OF FARMS ACROSS SEVEN COUNTRIES, THE INDIVIDUAL FARMER IS BENCHMARKED AGAINST A GROUP OF FARMS IN HIS OR HER GEOGRAPHICAL AREA WITH A SIMILAR HERD SIZE AND FEED TYPE. THIS MAKES THEIR RESULTS AND BENCHMARKED SCORES MUCH MORE RELEVANT.”**



Arthur Fearnall, Arla farmer owner -  
Chair of Sustainability Working Group





# A CLOSER LOOK AT THE BIG 5



## LEVER 1

### FEED EFFICIENCY - MORE MILK PER INPUT

**How do we measure it?** Total kg dry matter (DM) feed per kg fat and protein corrected milk (FPCM) produced at herd level

**What results are Arla farmers currently achieving?** On average, an Arla farm uses around 1 kg DM to produce 1 kg of FPCM. This includes feed for replacement heifers.

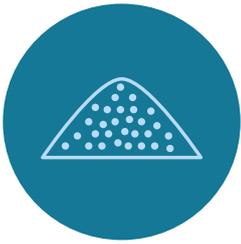
Optimising feed efficiency requires a combination of smaller actions, rather than one clear strategy and will be individual from farm to farm. It's a constant balancing act of feeding not too much and not too little of the right blend of nutrients, to produce the best performance. Therefore, it is no surprise that 'feeding strategy and feed efficiency' was the most discussed topic in the Climate Check advisory visits carried out on farm. Most of what a cow eats is forage, and to convert this to milk effectively, a cow must be healthy, comfortable and able to ruminate!

**What kinds of actions can Arla farmer owners take to address this?**

- ✓ Diet composition – monitoring feed quality and feeding cows in groups according to their dietary requirements (e.g. stage of lactation)
- ✓ Animal health – ensuring cows are healthy and have optimum rumen function to produce milk
- ✓ Minimising feed losses at every stage; from harvesting through to storage and feeding
- ✓ Heifers entering the herd – Having enough youngstock to develop the herd but not more animals than needed

#### EXAMPLE: FEED USED FOR REPLACEMENT HEIFERS

REARING THE NEXT GENERATION OF DAIRY COWS IS AN IMPORTANT JOB FOR EVERY DAIRY FARMER. EACH CALF MUST BE CAREFULLY MANAGED AND PROVIDED WITH THE BEST NUTRITION TO GROW TO AN APPROPRIATE SIZE AND WEIGHT TO JOIN THE HERD AND START PRODUCING MILK. ASSUMING EQUAL FEED USE, FOR EACH MONTH THAT A HEIFER DELAYS CALVING THERE IS AN INCREASE IN EMISSIONS OF APPROXIMATELY 150KG CO<sub>2</sub> PER MONTH PER HEIFER, BECAUSE OF THE ADDITIONAL FEED REQUIRED AND A CONSEQUENT REDUCTION IN FEED EFFICIENCY. IT IS THEREFORE A TOPIC THAT CLIMATE CHECK ADVISORS WILL OFTEN DISCUSS WITH FARMER OWNERS.



# LEVER 2

## PROTEIN EFFICIENCY – REDUCE SURPLUS PROTEIN IN FEED

### How do we measure it?

Nitrogen (N) used for growth, beef and milk as a percentage of total N intake

What range of results are Arla farmers currently achieving? : 24–35%\*

Protein plays a key part in a cow’s diet but is expensive, both economically and in terms of climate. It can also be the limiting factor for milk production, so it is a constant challenge to feed the optimum amount. Some of the best performing protein crops are difficult to grow in Northern Europe, however there is an increasing interest in growing protein crops locally (and making better use of the protein in grass silage) to improve farm robustness and the local N cycle. It takes time to find the best way to grow a new crop, and a certain amount of

risk-taking if you are using land that would otherwise grow a reliable crop such as grass.

Protein is also impactful for the cow to digest, so the higher protein efficiency a cow can have, the better. A cow can only eat a certain amount of forage in a day so homegrown forage and bought-in concentrate feed is an efficient way of delivering additional protein to a cow in a small package. But, this feed comes with a higher carbon footprint, so it’s a balancing act to feed enough to obtain the best yields but not more than the cow can utilise. If this happens then the protein (nitrogen) passes through the cow and out in manure. Some farms will need to reduce their protein level to remove surplus protein being wasted in the system and others will need to increase it to improve yield and subsequently spread the carbon footprint over more kg of milk. Pilot projects have been taking place in 2021 and 2022 on Arla farms across Europe, trialing the

effects of reducing overall crude protein in cow diets and results are now being shared with Arla farmer owners.

### What kinds of actions can Arla farmer owners take to address this?

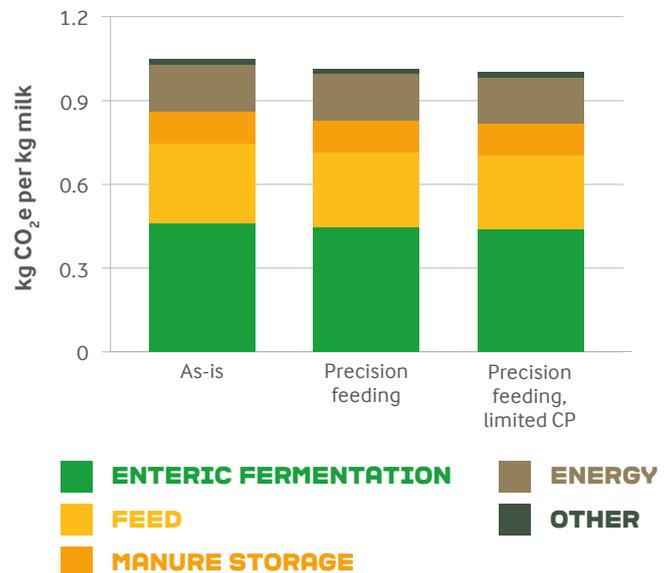
- ✓ Optimising levels of protein in feed and testing N content of animal manure to understand protein utilisation
- ✓ Greater use of protein-rich homegrown feeds
- ✓ Feeding plans tailored for specific groups of cows
- ✓ Ensuring feeding is consistent in terms of quantity and quality.

### EXAMPLE: PRECISION FEEDING

“USING CLIMATE CHECK DATA, WE CAN RUN A SIMULATION ON THE BENEFITS OF PRECISION FEEDING AND REDUCING PROTEIN. THE MIDDLE COLUMN SHOWS THAT FEEDING GROUPS OF COWS ACCORDING TO THEIR NEEDS (RATHER THAN FEEDING THE WHOLE HERD THE SAME DIET) COULD RESULT IN A CARBON FOOTPRINT REDUCTION OF 3.2%. IF WE COMBINE THIS CHANGE WITH ALSO REDUCING OVERALL CRUDE PROTEIN (CP) IN THE DIET, (COLUMN 3) WE SEE AN EVEN GREATER EFFECT ON CARBON FOOTPRINT PER KG FPCM OF -4.3%. TWEAKS LIKE THIS CAN QUICKLY ADD UP TO SIGNIFICANT CHANGES IN OVERALL HERD CARBON FOOTPRINT.”

Maike Brask, Global Farm Sustainability Specialist

### SIMULATION OF GROUP FEEDING ('AS-IS' = WHOLE HERD, 18.7% CP)



\*10th to 90th percentile



# LEVER 3

## ANIMAL ROBUSTNESS - HEALTHY COWS

**How do we measure it?**  
Cow mortality rate (%)

**What range of results are Arla farmers currently achieving? :**  
1.2 - 8.8%\*

Cows that live a long and healthy life will produce more milk over their lifetime, which will spread the carbon footprint – including that of rearing a heifer – over a longer period of time and a larger volume of milk. A healthy dairy cow will also be used in beef production at the end of its life, spreading the climate impact on both meat and dairy. Mortality rates can also be a measure of the herd’s general health, so avoiding serious illness will limit the unproductive periods over a cow’s life. Arla farmer owners know that creating an environment that meets a cow’s every need is key. This includes everything from providing shade on hot days and monitoring cow mobility, to thinking about how cows are grouped to avoid stress from hierarchy. Actions will of course vary from farm to farm.

**What kinds of actions can Arla farmer owners take to address this?**

- ✓ Analysing herd health data and creating actions plans with farm vets
- ✓ Identifying short-term actions like maintaining barns, tracks and grazing areas to support good animal health
- ✓ Identifying long-term actions like breeding for longevity and robustness, reducing the need for as many replacement heifers in the system

### DID YOU KNOW?

**ARLA FARMER OWNERS REGULARLY SELF-ASSESS THEIR ANIMAL WELFARE KPIS AS PART OF ARLAGARDEN QUALITY ASSURANCE PROGRAMME.**



\*10th to 90th percentile



# LEVER 4

## FERTILISER EFFICIENCY – REDUCE NITROGEN SURPLUS FROM FEED PRODUCTION

**How do we measure it?** Gross N, applied per hectare land (manure + artificial fertiliser)

**What range of results are Arla farmers currently achieving?**  
105 - 347 kg N/hectare\*

All Arla farms will generate manure (slurry, solid manure etc.) and most of this will be applied back to the ground as fertiliser. This manure is an extremely valuable resource. How and when it is applied, and how it is stored, can impact its effectiveness, therefore, it is essential to find ways to preserve the nutrients and ensure they are

not lost before the crop can utilise them. Where manure can't provide all of a crop's nutrient requirements, mineral (artificial) fertiliser is then used to supplement the nitrogen and other nutrients required.

**Did you know?**

Every system has opportunities to improve its carbon footprint. Arla organic farms use less fertiliser and grow more homegrown feed than conventional farms, both of which have a positive climate impact. However, on average, protein efficiency tends to be lower and land use is higher. Arla Climate Check advisors support individual farms to identify the most suitable actions for their farms in order to lower emissions.

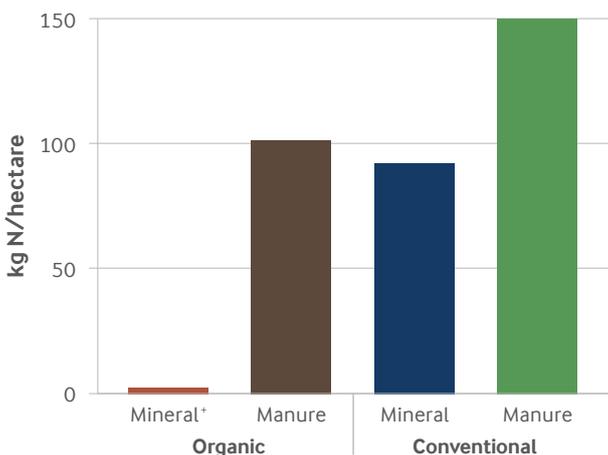
**What kinds of actions can Arla farmer owners take to address this?**

- ✓ Analysing nutrient content in slurry to ensure precise dosage
- ✓ Timing and methods of storage and application, to optimise utilisation of nutrients and therefore reduce artificial fertiliser requirements
- ✓ Directing slurry to biogas plants and spreading the nutrient rich digestate by-product as fertiliser

### EXAMPLE:

**IF 144 TONNES OF CATTLE MANURE WERE APPLIED PER HECTARE VIA A SPLASHPLATE SPREADER OR BANDSPREADER, A SUPPLEMENTATION OF ARTIFICIAL FERTILISER WOULD BE REQUIRED TO MEET THE NITROGEN NEEDS OF THE CROP. IF SLURRY WAS ACIDIFIED, OR TRAILING SHOE OR INJECTION WAS USED, THE SAME AMOUNT OF MANURE WOULD SUPPLY THE FULL NITROGEN REQUIREMENT BECAUSE OF AN IMPROVED UTILISATION RATE.**

**AVERAGE FERTILISER USE BY SYSTEM AND SOURCE (KG NITROGEN/HECTARE)**



\* 10th to 90th percentile

† Fertiliser certified for organic use, which consists typically of concentrated, dried chicken manure. Due to processing, it has a carbon footprint similar to that of mineral fertiliser and is therefore registered as such in the Climate Check tool.



# LEVER 5

## LAND USE – BETTER CROP YIELDS

**How do we measure it?** m<sup>2</sup>/kg fat and protein corrected milk (FPCM) allocated to milk production - all feed (homegrown + purchased)

**What range of results are Arla farmers currently achieving?**  
0.84 - 2.12 m<sup>2</sup>/kg FPCM\*

Land use takes into account the land used for purchased feed as well as homegrown. In terms of homegrown feed and forage, levers 4 and 5 require a balancing act. Crops need nutrients to grow – if fertilisation is low then

yields will be lower and more land is needed to produce the same amount of feed. More fertiliser means, to a point, that less land is required. But if fertilisation is exaggerated, nutrients are lost as emissions and run off.

The aim is to find the ‘sweet spot’ where fertiliser use is optimised, adjusting according to crop demand, soil nitrogen content and yield potential. One way to do this is to use precision farming to make the most of productive soils and direct the fertiliser where it can achieve the most payback. Another is to choose crop varieties that provide the best yields and/or nutritional value.

**What kinds of actions can Arla farmer owners take to address this?**

- ✓ Precision farming for better crop yields per hectare
- ✓ Grassland management for high quality homegrown forage
- ✓ Choosing crop varieties with higher nutritional yields
- ✓ Careful harvest and storage of harvested crops to avoid feed losses

### EXAMPLE: SWITCHING VARIETIES

USING THE BEST VARIETIES GIVES ON AVERAGE A 10% HIGHER YIELD FROM THE SAME AREA WITH THE SAME QUANTITY OF APPLIED NITROGEN. THEREFORE, THE CARBON FOOTPRINT OF THE FEED IS REDUCED BECAUSE THE SAME AMOUNT OF FERTILISER RESULTS IN A GREATER YIELD.



\*10th to 90th percentile

## WHO CAN HELP ARLA FARMER OWNERS IMPROVE IN THE FIVE LEVERS?



**VETS** **FARM CONSULTANTS**  
**COW NUTRITIONISTS** **OTHER ARLA FARMERS**  
**AGRONOMISTS** **SEED SUPPLIERS**  
**MACHINERY CONTRACTORS** **GENETICS ADVISORS**  
**SLURRY TESTING PROVIDERS**  
**FEED TESTING LABORATORIES**



## HOW CAN INDUSTRY PARTNERS AND GOVERNMENTS HELP ARLA FARMER OWNERS ACCELERATE CLIMATE ACTION?



**INCENTIVE SCHEMES AND FUNDING FOR ON-FARM RENEWABLES**



**CLOSER COLLABORATION BETWEEN ACADEMIA AND INDUSTRY AS WELL AS FUNDING SUPPORT**



**ATTRACTIVE LENDING OPTIONS FOR EMISSIONS-REDUCING TECHNOLOGY**



**AGRICULTURAL POLICIES THAT ENSURE THE ECONOMIC SUSTAINABILITY OF DAIRY AND INCENTIVISE CARBON REDUCTION ACTIVITY ON FARM**



**INCREASED ADVISORY SUPPORT FOR FARMERS ON FEED, FORAGE, NUTRIENT AND ANIMAL MANAGEMENT**



**SUPPORT FOR INNOVATION THAT DELIVERS EMISSIONS REDUCTIONS ON ALL SIZES OF DAIRY FARMS**



**SUPPORT FOR SCALING UP BIOMETHANE PRODUCTION AND UTILISATION - DIVERSIFYING A COUNTRY'S ENERGY MIX AND REDUCING RELIANCE ON FOSSIL FUELS**



# DENMARK RESULTS

**ARLA FARM BUSINESSES  
SUBMITTING 2021  
CLIMATE CHECK DATA:**

**2021**

**DENMARK AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):**

**1.01**  
KG CO2E PER KG FPCM

As well as having its global headquarters and some major production sites in Denmark, approximately 90% of Danish milk production is from Arla farmer owners, who between them care for around 20% of the agricultural land in the country. Danish farms have the largest average herd size (238) of all Arla markets and the highest average kg milk per cow (10,326kg). The uniform carbon tax proposals being discussed at government level are challenging to implement as CO<sub>2</sub>e calculations may change significantly over time as science and calculation methods develop, especially when looking at complex areas such as biogenic emissions (carbon cycle from natural sources such as feed production and cow digestion). Through Climate Checks, Arla can use KPIs to monitor resource use and guide farmer owners on their individual climate journey, benchmarking themselves on relevant KPIs for their farming system. These KPIs can be used to calculate emissions according to the latest verified methods.

As well as reducing methane emissions and using them more efficiently, Arla farmer owners are increasingly harnessing

the methane from slurry and creating renewable energy in biogas plants. 2021 Climate Check data shows that 30% of Arla farm slurry<sup>5</sup> in Denmark was used in biogas plants in 2021, compared to 24% the previous year (the average across all the nations was 17% in 2021). There is an expectation that by 2030, 65-75% of manure in Denmark will go into biogas plants, and this estimate is increasing further since the war in Ukraine. Legislation in the country is also positively supporting Arla farmer owners to manage their emissions with 100% slurry on Arla farms in Denmark being covered and all slurry application taking place with a drag hose, trailing shoe or injection technology. Also, farmers can only apply a certain amount of artificial fertiliser in addition to manure depending on crop, soil type and previous crop which incentivises the optimization of the nitrogen in manure and slurry.

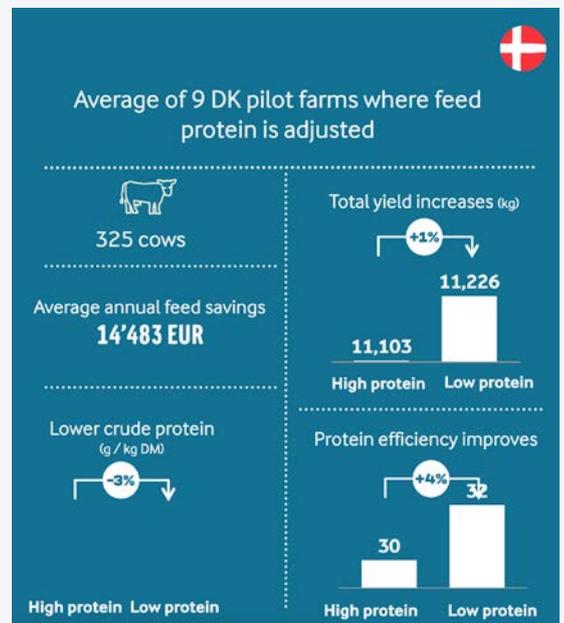
Climate Check data shows that the feed and protein efficiency 'Big 5' results are particularly good on Danish farms with little variation between farms.

Arla farmer owners know there are opportunities to further improve protein efficiency and here the business has been carrying out on-farm trials with SEGES Innovation looking at reducing the surplus protein in feed and therefore nitrogen losses on farm. Lowering the crude protein by 3% improved protein efficiency by 4% and actually increased milk yields by 1% creating both carbon and costs savings. The results from these trials are now being shared with fellow Arla farmers with similar trials already being planned for other 'Big 5' levers.

**Feed efficiency (kg DM/kg FPCM)**

**0.99**  
Global Average  
**0.89**  
Denmark average

**Protein efficiency (N eff %)**  
**30%**  
Global average  
**32%**  
Denmark Average



**“IT IS AN EXCITING TIME FOR DAIRY IN DENMARK. TO REACH OUR CLIMATE GOALS WE MUST INCENTIVISE AND CREATE OPPORTUNITIES FOR FARMERS TO CONTINUALLY IMPROVE RATHER THAN LEGISLATING AND RESTRICTING ACTIVITY. ARLA FARMERS ARE PROUD TO LEAD THE WAY IN DECARBONISING DAIRY AND WE MUST WORK TOGETHER TO CREATE A SUSTAINABLE INDUSTRY FIT FOR THE FUTURE.”**

**Poul Pettersson, Agriculture Director, Denmark**



# CASE STUDY

## THE HANSEN FAMILY

**270**  
ORGANIC COWS

CC 2021 SCORE:

**0.95**

KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)

Mogens and Anne Grethe Hansen farm near Give, central Jutland, together with their son, Christian. The family's herd of 270 organic cross-bred cows are milked twice a day, averaging just under 10,000kg milk/cow/year. The farm's 'Big 5' score for animal robustness is particularly good, which the family attribute to the 'ProCROSS' genetics they use and their focus on high health standards and biosecurity. "Alongside trying to breed robust animals, we have a great bunch of people helping us take care of the cows and we have worked hard to implement biosecurity measures that protect our herd from disease challenge," explains Anne Grethe.

The farm switched to organic production in 1997 and grows a high proportion of the



herd's diet on the farm, with an ambition to reach 100% self-sufficiency.

"We have a wide crop rotation on the farm which incorporates lupins, barley, oats, maize, peas and beans", continues Mogens. "This year we are also trying to grow our own rapeseed to provide a homegrown source of feed fat for the cows and reduce our need for bought-in equivalents. About 70% of the herd's diet is grass - we rotate our cows around paddocks to maximise

grazing during the summer and total mixed ration (TMR) feed in the barn all year round. We have also used technology to measure exactly how much home-grown forage and crops we are harvesting and what we are feeding to the cows."

The farm has already put into practise some of the recommended advice from last year's Climate Check advisor meeting and now transports all their slurry to a central biogas plant. The nutrient-rich digestate produced as a by-product from this energy production is then spread back on their land as fertiliser. Some of the farm's land is peatland, which is used for grazing heifers to minimise soil disturbance and carbon release. Here, the farm is taking part in a government project to look at re-wetting of peat soils.

"There is always more we can do to reduce our climate impact," concludes Mogens. "We generate ideas together and then go out and seek concrete advice on a certain topic. The next project for us is to reduce the amount of tillage we undertake on our fields. Further out, we are considering whether maize still belongs in our rotation – it doesn't add much protein to the diet but it uses less diesel to grow, as with everything in farming it's a balancing act!"





# GERMANY RESULTS

**ARLA FARM BUSINESSES  
SUBMITTING 2021  
CLIMATE CHECK DATA:**

**1309**

**GERMANY AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):**

**1.07**

**KG CO2E PER KG FPCM**

In Germany, climate protection in agriculture is high on the political agenda. The German Climate Protection Act has led to a range of measures taken by the German government, from reducing nitrogen surpluses and reducing greenhouse gas emissions in livestock farming, to preserving permanent grassland and protecting peat soils. These are all areas that the Arla Climate Check also addresses.

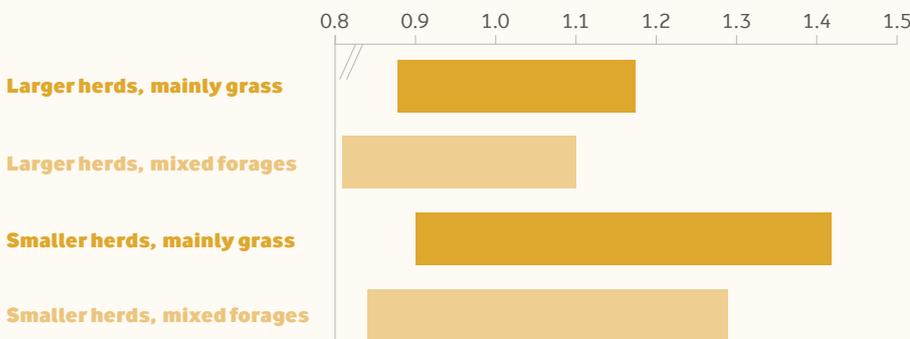
### High share of homegrown feed

German farmers have a long tradition for using “milk from forage” as a KPI. This

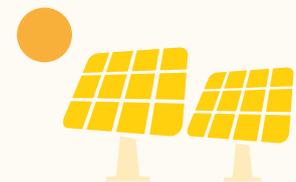
requires good focus on forage quality and well-balanced rations, which is reflected in a high share of home-grown feed (74% vs Arla average of 72% dry matter grown on farm).

Arla farmer owners in Germany also farm in a diverse range of systems thanks to the varying geographical conditions. For all of the ‘Big 5’ levers, the variation of scores between farms of similar system is greater than the variation between systems, meaning there are opportunities on every farm to improve (below left).

## RANGE OF FEED EFFICIENCY (KG/DRY MATTER/ KG FPCM) SPLIT BY FARM TYPE IN GERMANY\*



\*10th to 90th percentile



**58%**

**OF ARLA FARMS  
IN GERMANY ARE  
PRODUCING POWER  
ON FARM USING  
SOLAR PANELS.**

A huge 58% of Arla farms in Germany are producing power on farm using solar panels, (probably in part thanks to the government incentives to invest in this technology) compared to an Arla global average of 25%. 8% are using slurry to generate power in their own biogas plants on farm, and another 9% are diverting slurry into central plants. To continue to grow the amounts

of renewables on farm and improve energy security in Germany, attractive funding models and framework conditions for solar and biogas are required.

Making the most of manure is important for both climate and business profitability. 2021 Climate Check data shows that on conventional farms in Germany, 62% of

nitrogen applied/hectare on Arla farms came from manure and 38% was mineral (artificial) fertiliser. Around 73% of slurry is already being spread via the more efficient and climate-friendly application methods (e.g. injection and trailing shoe), so as splashplate technology is phased out, the nitrogen efficiency delivered to crops via manure should continue to improve further.

**“OUR FARMER OWNERS HAVE ALREADY MADE MANY CHANGES ON THEIR FARMS TO BECOME MORE CLIMATE EFFICIENT. WE WILL BE SUPPORTING THEM ON THIS JOURNEY BY PROVIDING TRAINING AND ADVICE AS WELL AS INCENTIVISING THEM TO FUND FUTURE INVESTMENTS. FOR THIS TRANSFORMATION, WE ALSO NEED SUPPORT FROM RETAILERS , INDUSTRY CUSTOMERS AND FROM POLITICS THROUGH COOPERATIONS AND GOVERNMENT INCENTIVE MODELS.”**

Dr. Josef Goos, Agriculture Director, Central Europe



Approximately 1400 farmers belong to Arla in Germany and their farms are concentrated in two regions: Region West with most farmers in North Rhine-Westphalia and Rhineland-Palatinate and Region North with the majority of the farmers in Schleswig-Holstein and Mecklenburg West-Pomerania. Due to this widespread geographical distribution, the farmers have very different farming conditions in their regions, e.g. much more peatland in the North.



# CASE STUDY KEVIN ANHAMM

**211**  
COWS

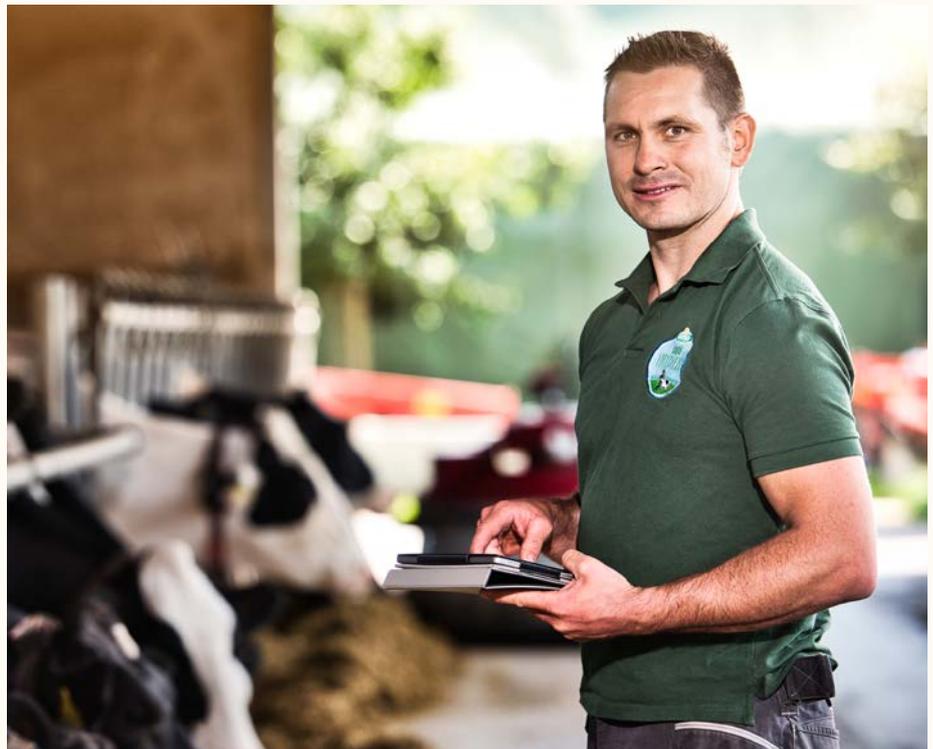
**CC 2021 SCORE:**  
**1.03**  
KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)

Kevin Anhamm’s 125-hectare farm is in North Rhine-Westphalia in the far west of Germany. His herd of Holstein-Friesian cows are milked via a robotic system, producing around 11,700 kg milk/cow/year.

Growing highly digestible homegrown feed is a key priority and currently grass, cover crops, maize, lucerne and some grain wholecrop are produced on the farm for the cows. “We constantly monitor the feed we put in and the milk we get out to ensure our feeding strategy is as optimal as possible,” explains Kevin. “Our Climate Check survey showed us that we could reduce our emissions further if we replaced some of the additional maize we buy in with high-quality grass from our own fields. We are now expanding the amount of protein-rich forage we grow on the farm, such as clover grass and lucerne, to try and achieve this.”

“This area of the country is great for growing high yields of forage. However, 85% of our arable land is located within nitrogen sensitive areas where we must reduce nitrogen by 20%. Our concern here is that we will not be able to fully fertilise our crops to achieve their potential yields. We are trying to mitigate this by using slurry application techniques that deliver more nitrogen to the ground and by using catch crops to fix nitrogen in the soil.”

The effort in these areas is reflected in the farm’s above-average performance in the ‘Big 5’ areas, where ‘feed efficiency’ and ‘protein efficiency’ score particularly highly. “In the past, I haven’t specifically



tried to get a good carbon footprint score, but I do try and run an efficient business,” concludes Kevin. “In many cases, actions that improve your business financially also improve your climate score but we cannot rely on this happening by chance. To make the transformation towards more sustainable practices truly successful, farmers need to be incentivised to make business decisions that are based on climate action.”

Every farm will have different ways of improving its climate impact. The table below shows Kevin’s ‘Big 5’ and

homegrown feed supply scores for 2021 compared to his peer group (similar herd size and forage type). Farm Sustainability Manager, Ricarda Camillus, explains: “Feed management on Kevin’s farm is extremely strong. However, compared to his peer group, Kevin is purchasing more feed which is why there are opportunities to look at different options for feed sourcing. However, higher self-sufficiency can be a challenge as crop yield and quality may fluctuate a lot between years. This is an ongoing learning process to find the best solution and it’s great to see him trying new approaches.”

KEY PERFORMANCE INDICATOR (KPI)	Peer group	Kevin Anhamm
Feed efficiency (kg DM per kg FPCM)	0.95	<b>0.88</b>
Protein efficiency (cow N efficiency %)	31.7	<b>37.2</b>
Animal Robustness (Cow mortality %)	4.6	<b>1.9</b>
Fertiliser use (kg N/hectare)	252	<b>213</b>
Land use (m <sup>2</sup> /kg FPCM)	0.93	<b>0.81</b>
Homegrown feed (% of DM)	67	<b>56</b>
Homegrown feed (% protein)	54	<b>40</b>



# SWEDEN RESULTS

**ARLA FARM BUSINESSES  
SUBMITTING 2021  
CLIMATE CHECK DATA:**

**1827**

**SWEDEN AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):**

**1.01**

**KG CO2E PER KG FPCM**

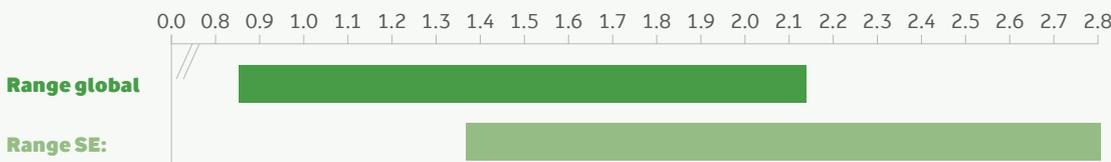
## What does the 2021 data tell us?

Arla farmers account for around two thirds of the dairy farms in Sweden<sup>6</sup>. The average Arla farm size in Sweden is 208ha, the largest of all the Arla markets and, in contrast to most other Arla markets, farms tend to have many more hectares of extensive permanent pasture than intensive permanent pasture, and many hectares of nature pasture. It is no surprise, then, that in terms of 'Big 5' KPIs, land use is comparatively high per kg milk and fertiliser use comparatively low. This is because animal manure (and animals) can be distributed over a larger area as land, especially grassland, is not a

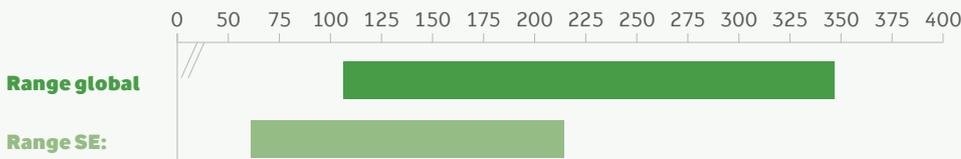
limiting factor. Furthermore, Swedish farms have the highest percentage of feed that is homegrown out of all the Arla markets (by dry matter).

Over the past 20 years, Swedish farmers, organisations and authorities have worked together to reduce the loss of nutrients from livestock and crop production. The systematic approach developed in this initiative has been instrumental in the development of the Arla Climate Checks.

## LAND USE RANGE (M<sup>2</sup>/ KG FPCM)\*



## FERTILISER USE RANGE (N/HECTARE)\*



**75%**

**OF FEED  
USED ON  
SWEDISH ARLA  
FARMS IS  
HOMEGROWN  
(BY DRY  
MATTER)**

## Focus on Grassland

Grass is Sweden's largest crop and important for many ecosystem services like carbon sequestration, soil health and structure. Cattle play a key role in maintaining the biodiversity of semi-natural grassland on which many red listed species are dependent, utilising this grass to produce meat and dairy, to strive to become self-sufficient in these products in Sweden.

## DID YOU KNOW?

**ARLA OPENED AN INNOVATION FARM IN SWEDEN IN 2021 TO RUN RESEARCH PROJECTS ON METHODS THAT INCREASE THE POSITIVE ENVIRONMENTAL IMPACT OF MILK PRODUCTION, AND ACT AS A HUB FOR INDUSTRY COLLABORATION.**

**"FARMERS IN SWEDEN ARE GREAT AT GROWING THEIR OWN SUPPLY OF FORAGE AND PROTEIN. TO IMPROVE THE CARBON FOOTPRINT OF THESE FARMS EVEN FURTHER IN SOME OF THE 'BIG 5' AREAS, MAKING THE MOST OF GRASSLAND WILL BE KEY. WE MUST ENSURE WE SUPPORT FARMERS WITH THE APPROPRIATE ADVISORY SERVICES TO OPTIMISE THEIR EFFICIENCY IN THE FUTURE, TO REDUCE ON-FARM EMISSIONS AND CREATE A SUSTAINABLE FUTURE FOR SWEDISH DAIRY."**



Lisa Ehde, Agricultural Director, Sweden

\*10th to 90th percentile



# CASE STUDY

**THESE CASE STUDIES DEMONSTRATE HOW DIFFERENT FARMS FIND DIFFERENT WAYS OF BEING CLIMATE EFFICIENT.**

## THE GUNNARSSON FAMILY

**17**  
COWS

**CC 2021 SCORE:**

**0.88**

**KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)**

Jan-Gunnar and his son, Filip, milk 17 Holstein and Swedish Red-and-White cows on their 24-hectare farm in southwest Sweden.

The Gunnarssons believe in taking a holistic approach to dairying, with a focus on breeding healthy, calm animals who can graze well and live longer. They also do not use any mineral fertilisers or pesticides

on the farm, instead relying on the solid manure produced by the herd to feed their crops. The small herd rotationally grazes for a prolonged season on 20 hectares of permanent grasslands, which is also used for grass silage plus 4 hectares of land is used to grow oats and barley for wholecrop silage. Electricity is bought on a renewable energy contract.

The farm's 2021 Climate Check identified their calving interval and forage quality as areas where there was potential to improve carbon footprint further. To address both issues, they hired a feed advisor who monitors their grass silage more closely and has readjusted their feeding rates to make better use of nutrition. These steps have also helped maintain better body condition in lower yielding cows, to drive better fertility.

Moving forward, the Gunnarssons are exploring ways to further improve forage quality, including reseeded their older pastures and introducing new grass variants along with nitrogen fixing plants. They are also looking into fully transitioning their farm to organic.



## BENGT SVENSSON, ANTON NILSSON AND MELKER KELLSTRÖM - TÖRLAN LANTBRUK AB

**280**  
COWS

**CC 2021 SCORE:**

**0.87**

**KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)**

Törlan Lantbruk is an organic dairy farm milking 280 Holstein and ProCROSS (Swedish Red x Montbeliard x Holstein) cows on the west coast of Sweden.

To improve on its Climate Check score, the farm has developed their monitoring of forage and cereals quality in order to build their understanding of what they feed the cows and better optimise their herd nutrition. As a result, fat and protein corrected milk yield has improved by 300kg compared to 2020 with production



around 11,800 kg FCPM/cow/year.

The cows make the most of the abundant grasslands and permanent pastures, which in turn supports biodiversity in an ecologically rich area. Other homegrown feeds include maize, wholecrop, straw, barley, wheat and field beans. To help

replace bought-in protein, the farm is also trialling lupins and homegrown soybeans for the first time in a project with the Swedish University of Agricultural Sciences.

The farm also makes good use of slurry, with 30% going to a local biogas plant and returned in the form of bio-slurry, the nutrients of which are more easily accessible by plants. It also doesn't smell as much. Remaining slurry is stored under a floating cover and spread via band spreader and injection. To further future-proof the business, slurry pumps and satellite tanks are being installed throughout the farm to minimise compaction on fields and reduce fuel usage.

"By making the most of what we have here and being thoughtful about the resources we use, we are not only more environmentally sustainable, we ensure that the business is financially resilient and that our cows have long productive lives too!" concludes Bengt.



# UK RESULTS

**FARM BUSINESSES  
SUBMITTING 2021 DATA:**

**1942**

**UK AVERAGE CARBON  
FOOTPRINT 2021  
(EX-PEAT):**

**1.11**

**KG CO2E PER KG FPCM**

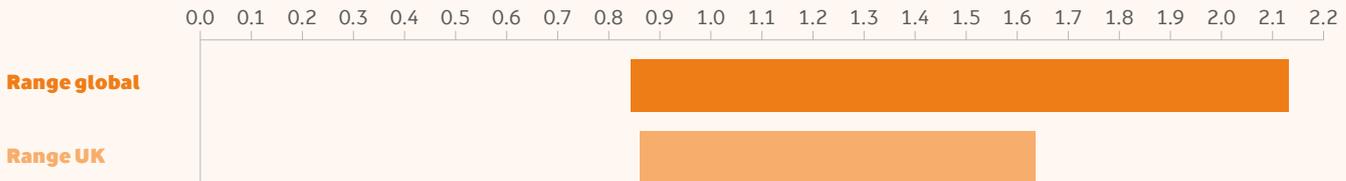
In the United Kingdom, nearly 1 in 3 dairy farmers are part of Arla. The UK business has taken a leadership position in the UK dairy industry in the area of sustainability and officially opened Arla's first dedicated Innovation Farm in 2021, which serves as a hub to host trials and test a wide range of emerging technologies as part of the Arla UK 360 programme.

**What does the data tell us?**

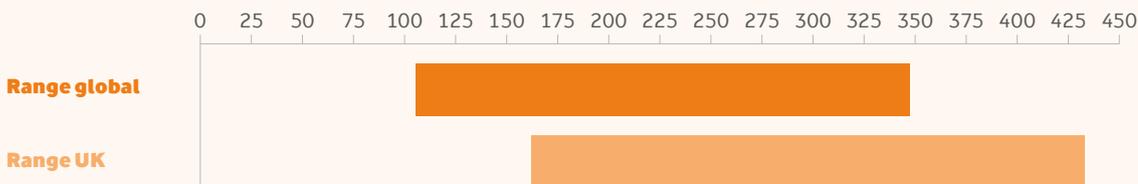
Climate Check data shows the United Kingdom has relatively low land use per kg

milk compared to the other Arla markets but, perhaps unsurprisingly, fertiliser use is relatively high, especially on grassland. More interesting is that the fertiliser use on UK Arla farms varies more than any other Arla markets, reflecting the diversity of farming systems producing milk and also perhaps highlighting opportunities to finetune this area through precision farming.

**LAND USE RANGE (M<sup>2</sup> / KG FPCM)\***



**FERTILISER USE RANGE (KG N/HECTARE)\***



Cows already do a great job of converting grass into nutritious milk but some play an additional role in the food production cycle by making use of the co-products of food production. UK Arla farms use a wide range of these feedstuffs, which often otherwise would go to waste. These include brewers' grains, apple pulp and waste bread, which contribute up to 20% of the diet in some herds (as a % of dry matter).

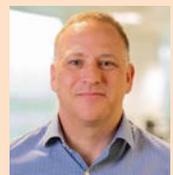
**Turning resources into energy**

The number of Arla farmer owners producing energy via wind is higher in the UK than in any other Arla market with 5% of farms producing energy via a wind turbine. However, Climate Check data shows that on average, 15% of slurry from Arla farms across the cooperative was used in biogas plants in 2020, increasing to 17% in 2021.

In contrast, the UK figures stand at just 2% with 17 Arla farms producing energy from anaerobic digestion plants on their own farms and a further 7 transporting slurry to a central biogas plant.

**"ENERGY REPRESENTS A SIGNIFICANT COST AND SOURCE OF EMISSIONS FOR MOST DAIRY FARMS BUT CAPITAL INVESTMENT REQUIRED FOR RENEWABLES MAKES IT NON-VIABLE FOR MANY. FROM USING ROOF SPACE FOR SOLAR TO HARNESSING METHANE FROM SLURRY, WE BELIEVE THERE ARE HUGE OPPORTUNITIES TO INCREASE RENEWABLE ENERGY PRODUCTION ON UK FARMS WITH THE RIGHT TECHNOLOGY AND SUPPORT."**

Paul Savage, Agriculture Director, UK



\*10th to 90th percentile



# CASE STUDY

## NEIL RIDGWAY, FARM MANAGER, STOWELL FARMS



**480** HOUSED  
HOLSTEIN FRIESIAN

CC 2021 SCORE:

**1.0**

KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)

Stowell Farms, located in south west England is a 1200-hectare mixed farm focussed on improving efficiency and making the best use of resources. At the heart of the business are 480 Holstein Friesian cows that are milked twice a day and yield 10,700 kg/cow/year, and a 500 kW anaerobic digester (AD) that powers every aspect of the dairy, plus exports enough energy to the grid to power nearly 2,000 homes in the local area.

Since the 2021 Climate Check, improving feed quality and efficiency has been a primary focus, with regular visits from a nutritionist, plus silage sampling and data monitoring informing decisions. All forage is grown on the farm which in previous years included forage maize, Italian

ryegrass and triticale. This year the farm is growing hybrid rye wholecrop, to replace the triticale, and has shifted to more clover-rich leys and lucerne in their grass for additional homegrown protein.

“We found that we were using far too much concentrate and not making enough use of what we could produce ourselves,” explains Neil. “Those adjustments will help in several ways like driving more milk from forage, reducing our bought-in protein and directly lowering carbon emissions through the crop rotation.”

The higher-quality forage will also help to improve the cows’ fertility, which was highlighted as a contributor to the farm’s carbon footprint via the Climate Check process. “We knew this was a KPI that we needed to address, so we have worked hard to improve our heat surveillance and post-calving checks. Fertility is now outsourced to experts - a worthwhile investment as improvements here will trickle down to other aspects of the business,” Neil continues.

More big changes have begun at Stowell Farms that are expected to further contribute to the farm’s overall sustainability and grow the milking herd by a further 50%.



“We have purchased 12 milking robots, as well as seven robotic scrapers and two feed pushers, and are in the process of building a new shed, then refurbishing our existing two,” says Neil. “We are confident that the new setup will bring benefits throughout the business in terms of milk yield, efficiency, cow health and welfare. We won’t need to increase staff and the energy will still be fully supplied by the AD. Our aim is to create a sustainable dairy business that performs well in business terms, but is equally a great place to work, is climate-friendly and continues to support the natural environment.”



# BENELUX RESULTS

## NETHERLANDS

FARM BUSINESSES  
SUBMITTING CLIMATE  
CHECK 2021 DATA:

**56**

AVERAGE NUMBER OF  
COWS:

**112**

NETHERLANDS AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):

**1.00**

KG CO<sub>2</sub>E PER KG FPCM

## BELGIUM

FARM BUSINESSES  
SUBMITTING 2021  
DATA:

**535**

AVERAGE NUMBER OF  
COWS:

**115**

BELGIUM AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):

**1.11**

KG CO<sub>2</sub>E PER KG FPCM

## LUXEMBOURG

FARM BUSINESSES  
SUBMITTING 2021  
DATA:

**162**

AVERAGE NUMBER OF  
COWS:

**115**

LUXEMBOURG AVERAGE  
CARBON FOOTPRINT  
2021 (EX-PEAT):

**1.15**

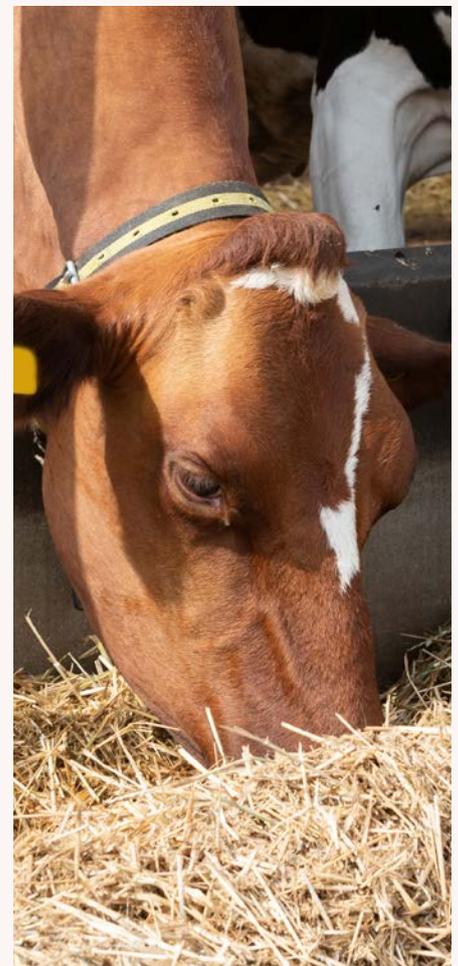
KG CO<sub>2</sub>E PER KG FPCM

*The Benelux region contains smaller number of farms than the other Arla areas so one must be careful when drawing conclusions from the data.*

What is interesting is that while the sizes of farms across the Benelux area are similar, their systems vary depending on the land available. For example, farms in the Netherlands have the lowest average land use at 0.92m<sup>2</sup>/kg milk, compared to an Arla average of 1.35m<sup>2</sup>/kg milk, probably owing to the limited, but fertile, farmland available. Climate Check data shows these farms are also the highest for nitrogen efficiency (average protein efficiency cow of 32% vs Arla average of 29.6%) showing that nutrients are managed carefully to ensure crops and cows only receive as much nitrogen as they need. Belgium has the highest average % of homegrown protein (N) produced on farm - 70% compared to an Arla average of 62%.

In July 2022, The Netherlands government agreed ambitious goals to reduce nitrogen excretion around more than 200 Natura2000 areas. In many parts, nitrogen emissions must be reduced by up to 95%. This means there is currently a lot of uncertainty for farmers.

In Belgium, Arla farmer owners are situated in Flanders in the North-East (mainly an intensive area with larger farm sizes and intensive crop production) and the region of Wallonia (more extensive with grazing in most parts). In Summer 2022, the Flemish government developed PAS (Programmatische Aanpak Stikstof), to reduce nitrogen excretion in sensitive areas until 2030. For dairy farms, the goal is to reduce N-excretion up to 15%, depending on area. Some of our members might directly be affected, however, final implementation plans are still under discussion.



## DID YOU KNOW?

**ARLA IS MARKET LEADER IN THE ORGANIC SECTOR IN THE NETHERLANDS. DUTCH ARLA FARMER OWNERS' MILK IS ALSO USED TO PRODUCE THE MELKUNIE RANGE AT OUR NIJKERK PRODUCTION SITE. OWNERS' MILK FROM LUXEMBOURG AND BELGIUM IS PROCESSED AT ARLA'S PRONSFELD DAIRY, GERMANY.**

# CASE STUDY

## FRANK AND JUDITH VAN DE VEN - HALSEBROEK MELKVEE

**90**  
COWS

CC 2021 SCORE:

**0.91**

KG CO<sub>2</sub>E PER KG FPCM  
(EX-PEAT)

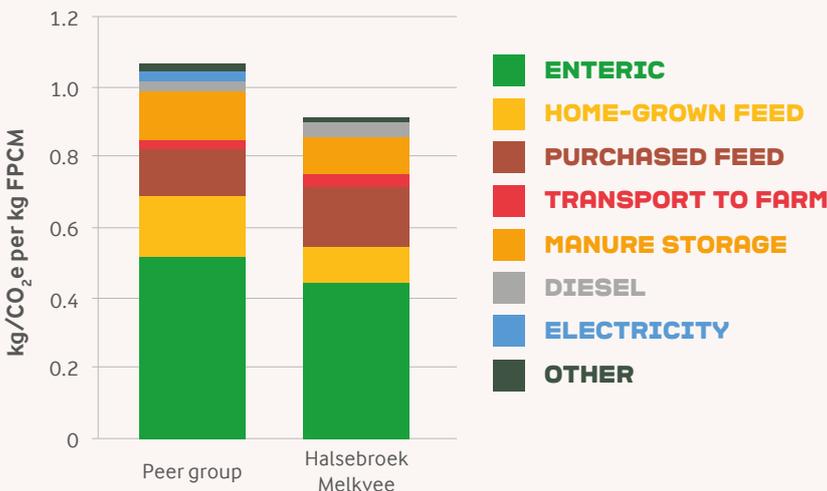
Frank and Judith in Esch, Noord-Brabant, Netherlands started their dairy farm in 2018 and now milk their herd of Holstein Friesian cows via robots, averaging 11,000kg milk/cow/year on their 89-hectare farm. In addition to the dairy enterprise, the couple keep wagu cattle and grow sugar beet to sell plus a range of crops to feed to the cows.

Frank also works as a cattle consultant and plans the herd's diet himself, carefully balancing bought-in feed with what he can grow on the farm. "Our low carbon footprint is mainly due to the combination of high milk production and good feed efficiency. We are also growing protein-rich crops such as clover and alfalfa, which saves on the purchase of protein, in addition to making maize and grass silage and hay. We then purchase brewers' grains and concentrate feed. I prepare the ration myself monitoring feed efficiency using the technical indicators from the feed supplier.



"We are in an area with a lot of variation in soil quality. Having the arable land gives us space to spread manure where it is needed in the spring, bringing nutrients to where they are needed and maintaining yields. We are also participating in projects to encourage biodiversity on less productive areas, which fits in well with the vision of the estate on which we farm.

"There is always more you can do to improve your carbon footprint. This year we are trialling growing barley for the first time and invested in solar panels which means we are now 100% self-sufficient in electricity. We currently raise young cattle outside and know that this impacts our score when you look at comparable farms – so this is an area we will look to improve on in the future."



The chart on the left shows the make up of emissions for Halsebroek Melkvee compared with the average emissions for farms in its peer group. Halsebroek is clearly offering a highly digestible diet with good milk yields resulting in a lower enteric emission per kg FPCM.

The emissions from transport of feed to the farm is larger for Halsebroek Melkvee, but this is compensated for emissions-wise by its renewable energy production.

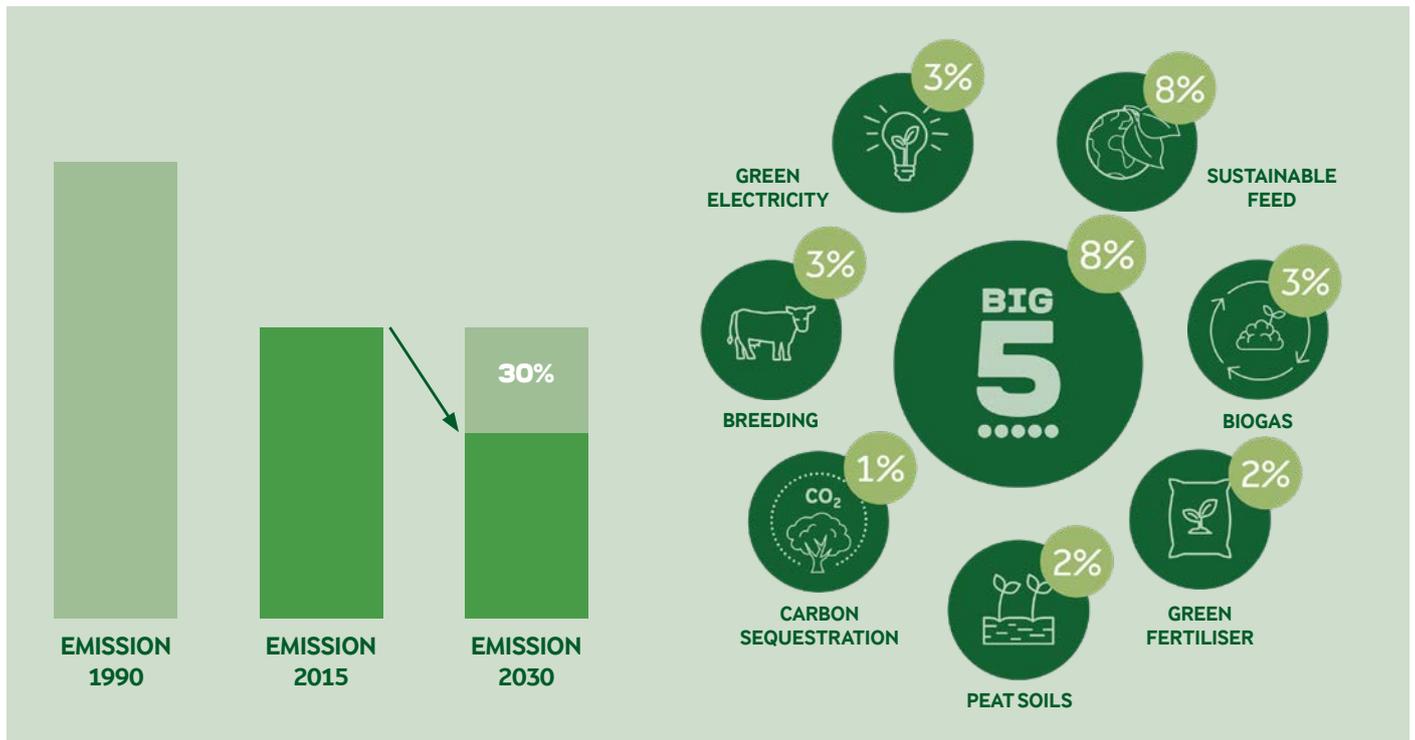
# THE FUTURE

We knew when we started Climate Checks that this was a long-term project. Weather and market forces can impact year-on-year emissions and statistically significant trends cannot be drawn from just two data points (i.e. Year 1 and Year 2). In addition, with data entered retrospectively at the year end, there is a lag in seeing the impact

of the action plans from this data as they are created part way through the next data period. The first few years of Climate Checks are all about understanding the base line, but the data does tell us clearly where to focus our efforts and this is why our pilot projects are so important. During 2022 we have run 'Big 5' pilots on 26

farms across 4 countries with further trials planned for 2023.

The 'Big 5' is our current focus on farm but we know **there are many levers that we will activate to meet our 2030 target.** The diagram below shows our current thinking of how we will reach this target.



# WHAT'S NEXT?



## Carbon sequestration

Arla is proud to be part of the international project C-Sequ alongside other food companies, working to develop an internationally recognised and globally adopted carbon sequestration calculation method to be used in Carbon Footprint assessments at farm level. Arla will not incorporate estimates on this into the Climate Check tool until a science based and ratified model exists, that has been trialled and tested by farmers and approved by the International Dairy Federation. This does not however, stop us looking at ways to measure and increase carbon capture in our soils. For example, much of the activity in our regenerative pilot programme

is looking at improving soil quality and carbon storage in a dairy system.

## Methane-reducing feed additives trial

With 41% of on-farm emissions coming from cow digestion, Arla is closely following the development of a wide range of feed additives that promise to reduce methane production. As part of this, Arla is currently leading large-scale farm testing of the Bovaer additive from DSM, in Denmark, Sweden, Germany and Benelux. Initial trials suggest that on average the product has the potential to reduce total carbon footprint by 10%. The testing will help to determine how best to feed Bovaer on farm and how its use can be incorporated into the Climate Check tool.



### Biochar

The application of biochar to soil can rapidly increase soil carbon stocks and can remain stored in the soil for hundreds to thousands of years. A group of UK Arla farmer owners are part of a government-funded project to trial the creation of an integrated system of sawmills, farmer and investors, working together to produce biochar at scale and find the best ways of utilising the product on farm.

### Ammonia

Ammonia itself is not a greenhouse gas, but parts of ammonia emissions are oxidated to nitrous oxide, which then is a very potent greenhouse gas. We also know that gaseous ammonia emissions and nitrate leaching can be problematic for the environment and these will be addressed by Arla in the future.

### Reporting of emissions

Carbon footprint calculations and reporting are under constant development and we are following research closely and, where it makes sense, participating in development of analyses and new guidelines. In September 2022, a briefing note from Global Dairy Platform was published concluding that GWP\* is a more accurate methodology to evaluate the global warming impact of methane compared to the commonly used GWP100, however there is limits to its applicability on less than a global scale. There are also new FLAG (forestry, land and agriculture)

guidelines and a GHG protocol for AFOLU (agriculture, forestry and other land use) on the horizon. As the science in this area evolves, so will our tools. Going forward we expect to start measuring emissions from direct land use change (e.g. deforestation for growing soy), as well as emissions and removals (carbon sequestration) from land use on farm, always following the latest guidance.

### Biodiversity

Addressing climate change must go hand in hand with tackling biodiversity loss – both are crucial for our planet's future survival. Arla is committed to maintaining and enhancing the nature and biodiversity on farm. New organic standards are helping to lead the way in this important area with farmers taking baseline soil health measurements, assessing the

biodiversity on their farm and committing to implementing a minimum number of conservation practices to support ongoing improvements. This is in addition to ensuring 100% of their electricity comes from renewable sources or purchase is supported by REC (renewable electricity credits).

Arla recognises that regenerative farming practices are being promoted as a way for all farmers to consider how they encourage the regeneration of soil health and biodiversity for the benefit of the ecosystems and the key services they provide (including sequestering carbon, maintaining water cycles, and ensuring ongoing food production and security for a growing population).

In September 2021, Arla launched a pilot project on 24 farms across UK, Germany, Netherlands, Denmark and Sweden to research the impact of so-called regenerative farming methods. The farms include a mix of both organic and conventional systems.

The first phase of the pilot programme will run for four years and aims to build data and insights around these practices that can be shared with all Arla owners to support their sustainability journey.



**“THIS IS THE START OF A HUGE TRANSFORMATION IN DAIRY FARMING. WE SEE BIG 5 AS THE BEGINNING AND ARE EXCITED TO BE USING OUR DATA TO DRIVE POSITIVE CHANGE. WE MUST ENSURE THAT KEY STAKEHOLDERS CONTINUES TO PROVIDE SUPPORT AND CREATE OPPORTUNITIES FOR OUR FARMERS, AS THEY IDENTIFY THE ACTIONS THAT WILL HELP THEIR INDIVIDUAL BUSINESSES TO REDUCE EMISSIONS.”**

Hanne Søndergaard, Chief Agriculture and Sustainability Officer



# INTRODUCING THE ARLA SUSTAINABILITY INCENTIVE MODEL

In what is a significant step for the dairy industry, Arla's Board of Directors has decided to introduce a Sustainability Incentive model to clearly reward and fund the actions our farmer owners are taking in this area. The first incentive will be paid with the milk price in August 2023 for the milk delivered in July 2023 and is designed to motivate farmer owners to accelerate the transition to sustainable dairy farming.

The Sustainability Incentive model is points-based and rewards actions with the biggest improvement potential. Climate Check data is at the heart of the model, with points awarded using a farm's validated survey results. Actions that have the biggest impact on sustainability (i.e. activity in the Big5 areas) attract the most points and therefore also the biggest financial incentive.

**“OUR FARMER OWNERS KNOW THAT TO CREATE A TRULY RESILIENT AND SUSTAINABLE DAIRY BUSINESS, WE NEED TO REWARD, AND HELP FUND, THE ACTIONS THAT MAKE A DIFFERENCE. WE KNOW THAT INCENTIVISATION MOTIVATES OUR FARMER OWNERS TO TAKE ACTION – THE HIGH LEVELS OF COMPLETION OF OUR CLIMATE CHECK SURVEY DEMONSTRATE THIS. IT IS ALSO IMPORTANT THAT THE MODEL TO CALCULATE THESE INCENTIVES IS ROBUST. OUR DATA SCIENTISTS HAVE WORKED INCREDIBLY HARD TO CREATE A MODEL THAT IS ROOTED IN SCIENCE AND MAKES BEST USE OF THE CLIMATE CHECK DATA. IT REWARDS EXISTING ACTIVITY AND IS STRETCHING ENOUGH SO THAT ALL ARLA FARMS HAVE THE POTENTIAL TO IMPROVE FURTHER AND ATTRACT MORE POINTS IN THE FUTURE. THIS IS A SUBSTANTIAL STEP OUT OF THE ORDINARY FOR THE DAIRY INDUSTRY AND WE ARE PROUD TO HAVE REACHED THIS IMPORTANT MILESTONE.”**



Jan Toft Nørgaard, Chairman and Arla farmer owner

## END NOTES

- 1) 83% of Arla's total emissions comes from raw milk production at farm level, both from owner milk and suppliers (from farm to distribution, as defined in Arla's corporate reporting and Science Based Targets).
- 2) The IPCC (Intergovernmental Panel on Climate Change) is the United Nations' body for assessing the science related to climate change.
- 3) International Dairy Federation's guideline for the carbon footprint of dairy products (IDF 2015)
- 4) The previously reported 2020 figure was based on approximately 90% of the Climate Check records and averaged 1.15 kg CO<sub>2</sub>e per kg milk. This final 2020 figure includes all validated results.
- 5) All references to slurry are milk-weighted.
- 6) <https://www.statista.com/statistics/563225/number-of-milkproducers-in-sweden/>









[www.arla.com/sustainability](http://www.arla.com/sustainability)