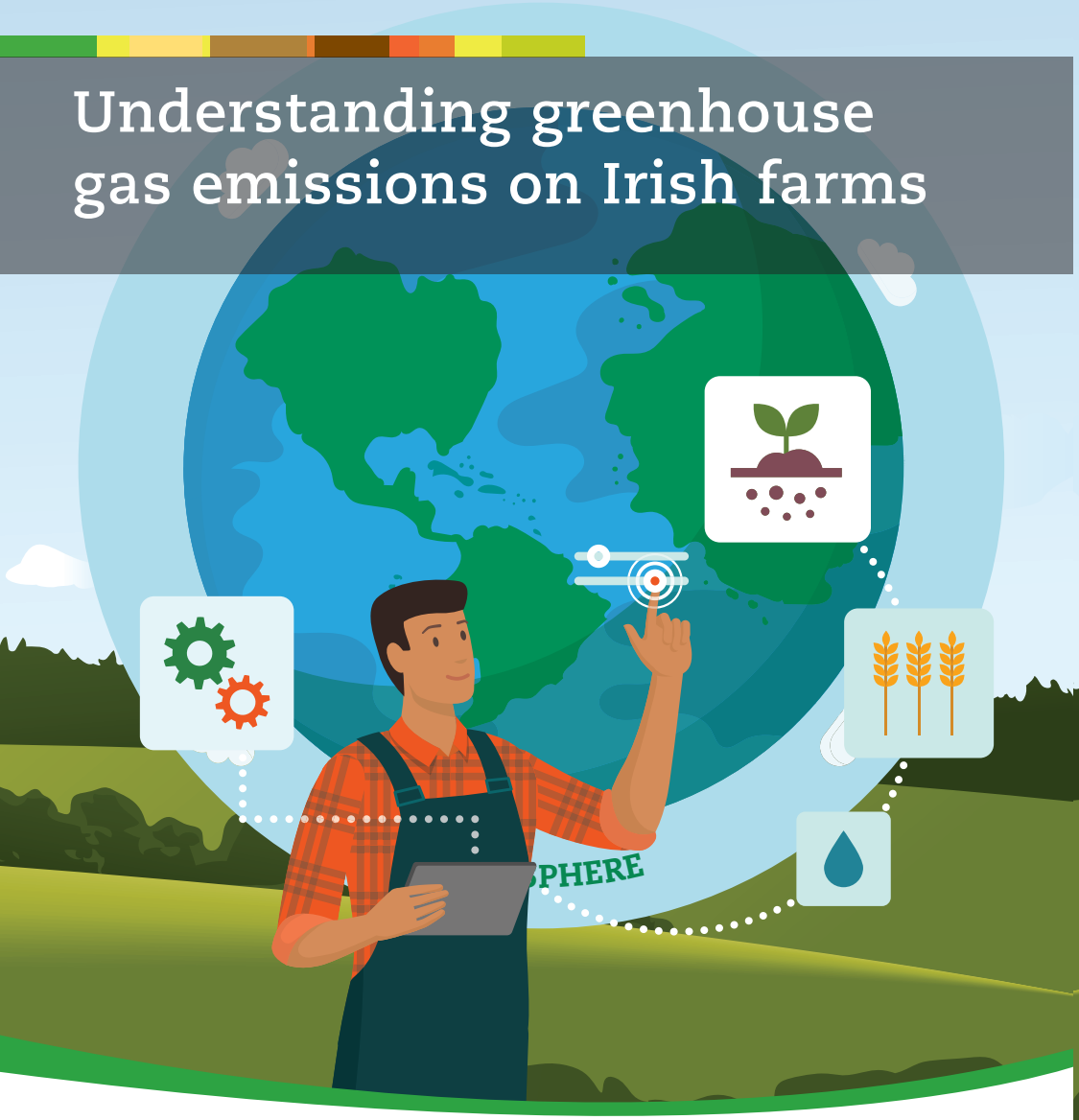
Advisory Programme

Understanding greenhouse gas emissions on Irish farms



Teagasc
Agriculture and Food Development Authority

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What is climate change?

Climate is the average weather in a place over many years. Climate change is a shift in those average conditions. It is driven predominately by an increase in global temperatures caused by emission of greenhouse gases (GHGs) from human activities.

What are the main GHGs relevant to agriculture?

There are three main GHGs: carbon dioxide (CO_2); methane (CH_4); and, nitrous oxide (N_2O). While CO_2 is released mostly from burning fossil fuels, for agriculture, the main GHGs are methane (65%) and nitrous oxide (30%).

In Ireland, agriculture currently contributes 37% of the total GHGs emitted. GHG emissions on Irish farms come primarily from methane belched by cattle and sheep, fertiliser use, animal excrement and diesel (**Figure 1**).

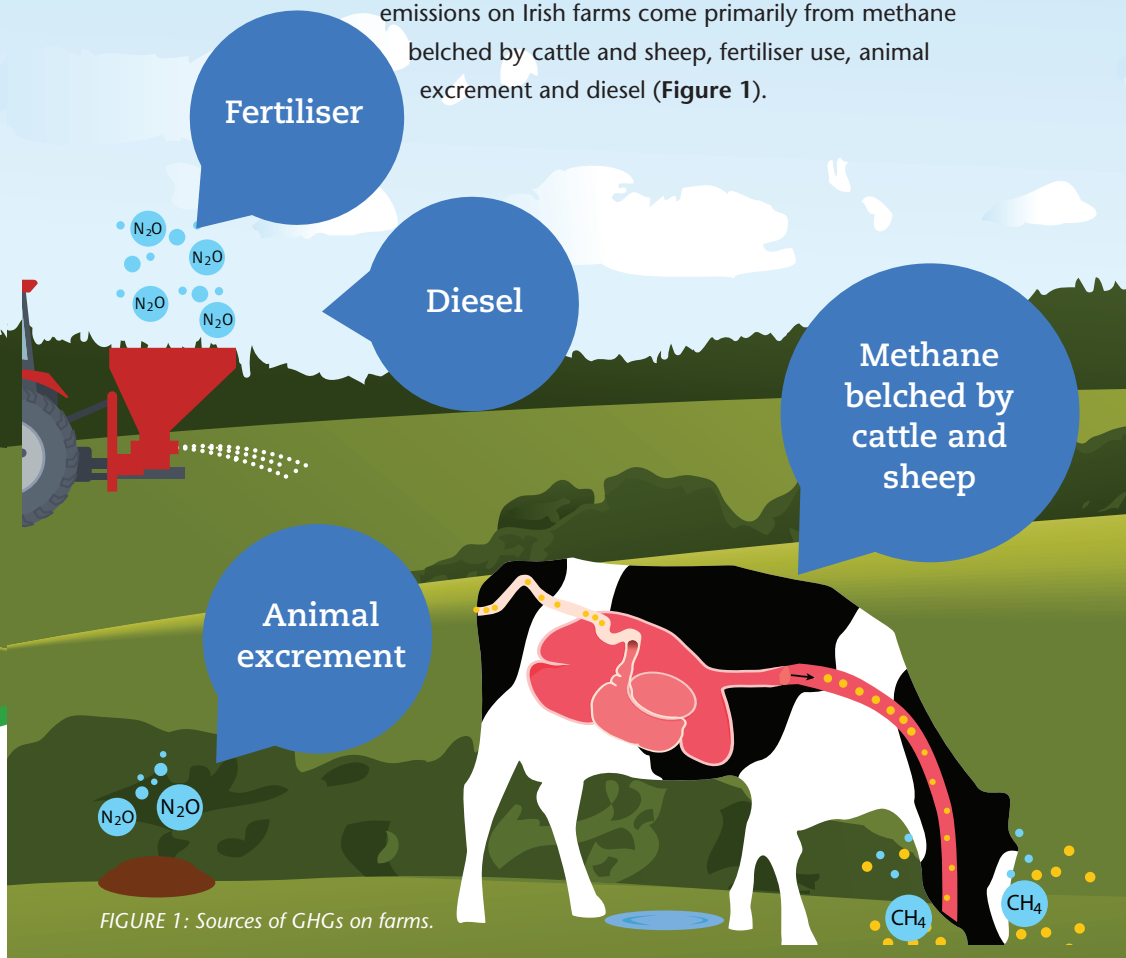


FIGURE 1: Sources of GHGs on farms.

How do the GHGs cause an increase in temperature?

GHGs act like a blanket around the Earth. That's because heat from the sun reflects off the Earth and is trapped by layers of these gases in the atmosphere. Without this, the Earth would be frozen. Increased amounts of GHGs in the atmosphere in recent decades have meant that more heat is trapped within the atmosphere, leading to the so-called greenhouse effect. This has caused global temperatures to rise, which causes climate change.

Target GHG mitigation measures for agriculture

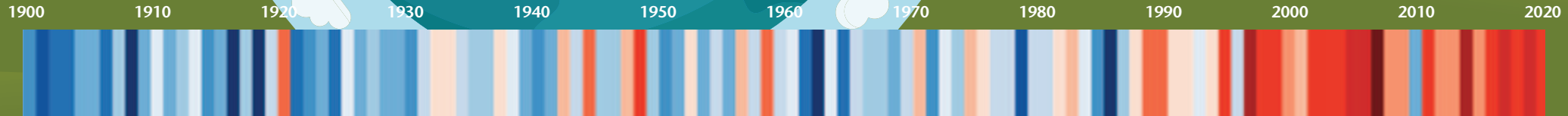
(Source: Climate Action Plan 2021)

- **23Mt CO_2 Eq** — *baseline agricultural emissions (2018)*
- **22-30%** — *target reduction in agricultural emissions by 2030*
- **20%** — *reduction in chemical N use*
- **65%** — *of CAN replaced by protected urea*
- **90%** — *of slurry spread by low-emission slurry spreading*
- **90%** — *of dairy herds milk recording*
- **70%** — *of suckler herds weight recording*
- **3 month** — *reduction in age at slaughter*
- **5 fold** — *increase in land area under organic farming*
- **1.6Twh** — *biomethane injected into gas grid*
- *Diversification*
- *Carbon farming*

Temperature change in Ireland over the last 120 years

Figure 2 is a visual representation of the change in temperature in Ireland as measured over the past 120 years. Each stripe represents the average temperature over a year. The blue indicates cooler than average annual averages, and red warmer than average. Similar to most nations, the warming being observed for Ireland has intensified in the past two decades. Ireland's average air temperature in 2019 was around 10.5°C, which was 0.9°C above the 1961-1981 long-term average.

FIGURE 2: Temperature warming stripes (1901-2020). (Source: Met Eireann, 2021.)



Climate change

Climate change is perhaps the greatest challenge facing the world right now. There are a number of reasons why Irish farmers need to take climate action now.

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Social responsibility

We are fortunate to live in a beautiful and diverse part of the world. Our children, and all future generations of farmers, local communities and the wider society, deserve the same opportunity.

Policy

We are bound by international agreements, EU and national policies to reduce GHG emissions. These policies will lead to the implementation of regulations in the coming months and years to achieve the targets set.

Protect our markets

Climate change is central to our licence to farm and to supply our quality food products onto international markets.

Climate change will impact how we farm

We will have wetter winters, drier summers, more extreme weather events as well as increased risk of pests and disease.

Improved farm profitability

Many of the technologies farmers are being asked to implement to reduce emissions will also reduce costs and improve profitability. Farmers are part of the solution to emissions; this will create opportunities for income generation.

Know your number

As farmers, you are being asked to reduce GHG emissions from your farming system to control global warming. To do this you need to know the current carbon emissions for your farm. Over 54,000 dairy and beef farmers nationally have a carbon emissions figure available to them through their Bord Bia Farmer Feedback Report. You will have received your report after the most recent audit or you can access it at https://farm.bordbia.ie, or call the help desk at 01-524 0410.

What is a carbon footprint?

A carbon footprint refers to how many GHGs are emitted from an activity, such as the production of milk or meat or driving a car or taking a flight.
The emissions of all GHGs (including CH_4 and N_2O) are expressed as carbon dioxide equivalents (CO_2 Eq.) for reporting and comparison purposes. In farming, the production of every kg of milk or meat or grain has a carbon footprint.

How important is the carbon footprint figure?

Knowing your carbon footprint is just the start. Ultimately, farmers are expected to reduce total emissions by 22-30% by 2030. Reducing the carbon footprint of your farm has to be tied to reducing total emissions to help address climate change.

Where do I get my carbon footprint?

After each quality assurance audit, all certified dairy and beef farmers receive a Farmer Feedback Report from Bord Bia with their farm's carbon footprint using a model developed by Teagasc.

Steps to getting the most from your number

Step 1 Completing the sustainability survey

In advance of a quality assurance audit, dairy and beef farmers must complete a sustainability survey which includes information on turnout and housing, manure management, concentrate feeding rates and fertiliser application data.

Keep good records throughout the year to make it easier to complete the survey.

When you get your **Farmer Feedback Report**, check the accuracy of the information in it. Inaccurate data will result in an inaccurate carbon footprint. If there are issues call the help desk at 01-524 0410.

Step 2 Check the carbon footprint figure on your farmer feedback report

Your most recent carbon footprint is displayed on the first page of the report, alongside your previous audit result (where available), and the typical carbon footprint of farms within your category (**Tables 1** and **2** show sample beef and dairy carbon footprints). This will allow you to track your progress and benchmark your farm against similar systems nationally. The carbon footprint for beef animals is expressed as carbon dioxide equivalents per kg of beef liveweight.

The carbon footprint for dairy cows is expressed as carbon dioxide equivalents per kg of milk.

Table 1: Sample carbon footprint report for a beef farm.

Parameter	Unit	Current assessment (production year 2020)	Percentage change from previous (production year 2018)	Average suckler to weanling store farms
Carbon footprint	kg CO_2/kg beef live weight	11.75	-5%	13.28

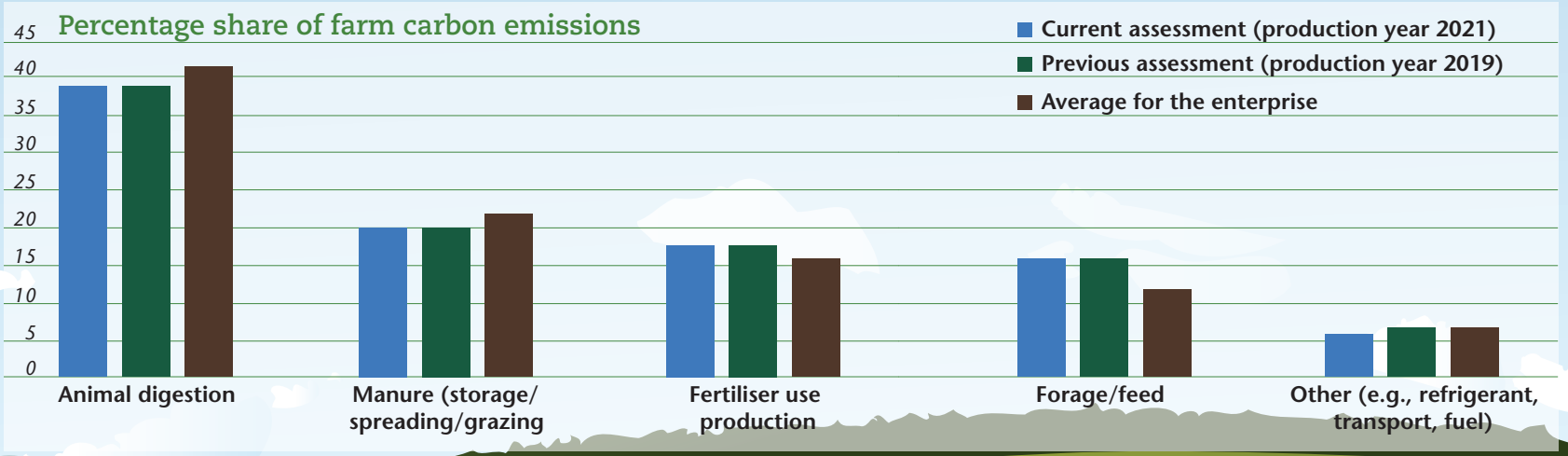
Table 2: Sample carbon footprint report for a dairy farm.

Parameter	Unit	Current assessment (production year 2020)	Percentage change from previous (production year 2018)	Average for 125-150 cow farms
Carbon footprint	kg CO_2/kg FPCM*	0.95	-5%	0.99

**FPCM = Fat and protein corrected milk.*

Step 3 Decide on an action plan for your farm

Examine the percentage share of the carbon emissions for your farm. **Figure 3** highlights where the emissions are coming from on an individual farm, as well as the key actions that will help reduce emissions. The main sources are the animal, organic manures, chemical fertiliser, forage and feed, and energy. Talk to your advisor to identify three/four actions that would suit your farm. The first step for farmers should be to improve their efficiency of production, while also adopting climate mitigation actions.



Animal digestion	Manure	Fertiliser use	Forage/feed	Other
■ Improve animal productivity ■ Improve genetic merit ■ Improve grass quality and dry matter ■ Improve herd health ■ Reduce days to slaughter	■ Aim for 70% manure application in spring ■ Utilise low-emission technologies ■ Reduce housing period	■ Use protected urea ■ Apply lime ■ Identify phosphorus (P) and potassium (K) requirements through soil tests ■ Use clover in swards	■ Improve grass utilisation and grazing season ■ Reduce concentrate feeding	■ Renewable energy installation ■ Service milking machine to ensure optimum efficiency

FIGURE 3: Actions to reduce carbon emissions.