FARMING FUTURES

FACT SHEET 25

Climate change: be part of the solution

Focus on: Farm carbon accounting

Land use and agriculture contributes about 7% of the UK's total greenhouse gas (GHG) emissions. Carbon accounting enables farmers and land managers to estimate the emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) produced from farm operations and land, as well as estimate the carbon locked up (sequestered) through soil and woodland management.

A *Farmers Weekly*/RSPB survey in autumn 2008 found that 8% of farmers have completed a carbon audit of their farm, while 19% plan to undertake one in the near future.

This fact sheet runs through some of the principles behind a farm carbon account (also called a carbon audit or carbon footprint), and the steps that you can go through to carry out your own.

Why is carbon accounting important?

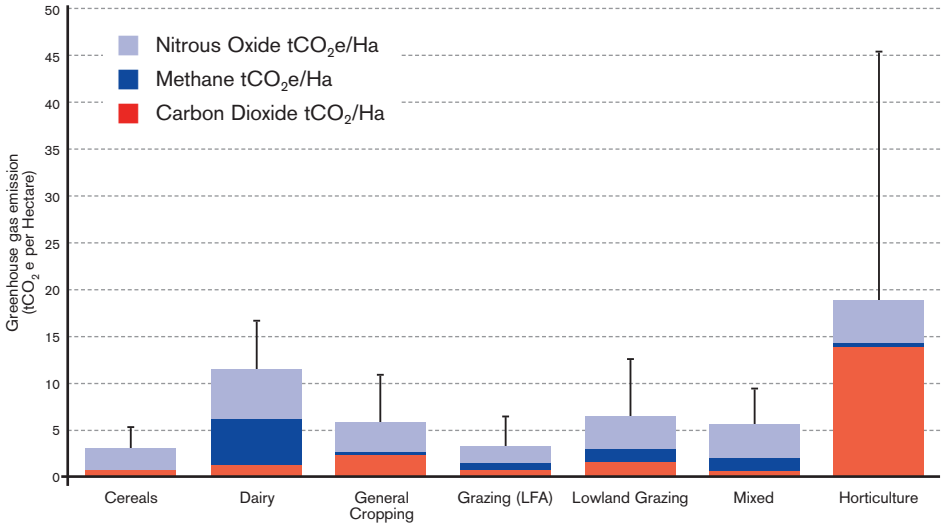
Farming Futures Fact sheet 1: What is climate change? introduces the challenge of climate change and how different farm operations produce GHG emissions.

Understanding the carbon account of a business is a vital first step in thinking about its impact on climate change. Knowing the scale and source of GHG emissions will help you think about ways to reduce them and the extent to which farm woodland and soils are helping to balance them through carbon sequestration. On-farm generation of renewable energy can also contribute to changing your GHG balance.

Opportunities through farm carbon accounting

Carrying out a farm carbon account will enable you to:

- identify GHG emissions on farm and benchmark against other similar farm enterprises in order to identify cost savings, e.g. through improved use of inputs and energy efficiency. See Fact sheet 23 on energy efficiency
- investigate the impact of changing farm practices by running scenarios to see the effect the changes have on your overall GHG emissions. You can also compare how your emissions vary year to year
- understand the amount of GHG emissions present (embedded) in the food and non-food goods you produce on farm. This will enable you to be better prepared for customer requests to report GHG emissions, e.g. as part of carbon labelling initiatives for some products, potentially leading to product differentiation and added value
- understand the principles required to deliver low carbon products



This graph comes from the Natural England Carbon Baseline Survey project which surveyed 200 farms using the CLA CALM tool (see sources of further information below). The graph illustrates the average net GHG emissions by farm type; the lines show the amount of variation in results.

How can farmers and land managers carry out a farm carbon account?

There are two main methods of performing GHG audits or carbon footprinting.

1. Whole-farm approach
This is the approach used for example by the CLA CALM calculator. It is useful for farmers wanting to get a measure of their farm's overall GHG emissions for benchmarking purposes. Doing an audit like this can highlight GHG 'hotspots' (where the main emissions are) and pinpoint where GHG savings might be made. It is important to note that these methods only give estimated emissions from the farm land and on-farm activity.

2. Product life-cycle analysis
This method measures GHG emissions associated with a given product. A functional unit is chosen (e.g. one litre of milk or one tonne of grain) and a calculation is done to show GHG emissions for a typical unit. This method can then be used to pinpoint where along the life cycle the main emissions are. You can then identify ways to minimise them. It can also be useful when comparing different systems of production.

The Intergovernmental Panel on Climate Change (IPCC) has established internationally agreed accounting guidelines for GHG emissions which most carbon accounting tools use.

Standard IPCC emission factors (emissions of a gas in relation to a particular activity) are used to estimate the likely GHG emissions from different farm activities. Some estimates are more accurate than others, e.g. litres of fuel used allows an accurate calculation of the kilograms of CO_2 emitted. Other emissions such as CH_4 from livestock and N_2O from applied fertilisers and manures are affected by many different factors that are not fully understood, so current figures carry much uncertainty.

A number of free GHG auditing tools are available online *(detailed opposite)*. In addition, several consultancies and supply chain groups have developed their own tools.

Farm carbon accounting and carbon labelling

If the lifecycle approach is used on specific products, the information can then be used to label the GHG emissions of a given product. For example, The Carbon Reduction label is coordinated by the Carbon Trust and is currently used on some food products including crisps, orange juice and sugar. Some retailers and manufacturers are keen to use the label more extensively to help consumers make decisions that will reduce their carbon impacts. Farm-based carbon calculators such as the CLA's CALM tool use similar methodology to PAS2050 (see opposite). PAS2050 is also the method used by the Carbon Reduction Label.

Steps in farm carbon accounting

Chose a calculator based on what you wish to measure. In general, the more information that is available, the more accurate the carbon account will be.

1. Boundaries: You need to establish the boundaries of what you are trying to measure, e.g. geographical area and length of accounting period. Make sure that you only input relevant figures, e.g. for the actual land area for which you are calculating emissions. It may be practical to base this on a financial year, and you may want to look at enterprises separately rather than the whole farm.

General carbon accounting tools

CALM www.calm.cla.org.uk
The CLA CALM tool is a detailed carbon calculator for farmers and land managers providing a balance between annual emissions and carbon sequestration of the key GHGs associated with the activities of land-based businesses. It was produced by the Country Land and Business Association (CLA), and is available for anyone to use. The CLA CALM tool allows you to save information to return to it at a later date.

Cplan GHG calculator www.cplan.org.uk
Cplan is a quick to use web based calculator which will give farmers and land managers a rapid estimate of the greenhouse gas emissions of their business. The Cplan calculator was developed by Drew and Jan Coulter, farmers in Central Scotland, who rent a mixed hill farm.

Life cycle greenhouse gas analysis of goods and services

Publically Available Specification 2050 PAS 2050 has been developed by the British Standards Institution (BSI), the Carbon Trust and Defra. It is a method to calculate the total emissions of GHG emissions in carbon equivalents per unit of a specific product across its lifecycle.

HGCA Biofuels GHG calculator
www.hgca.com/biofuelcalc
This tool calculates GHG emissions arising from production of UK-derived bioethanol and biodiesel using UK grown wheat and oilseed rape as feedstocks. It measures the relative impact of differing elements of production such as inputs, and how the grain is harvested and stored. Although designed with biofuels as the end product, this tool can be used to estimated GHG emissions embedded in wheat and oilseed rape for other purposes.

You could include or exclude land that is contracted out, depending upon how your contracting works. The key thing is to be consistent from year to year to ensure that you compare like with like, and to make sure you have access to the relevant information for the areas you want to cover, e.g. electricity bills.

2. Data gathering: The basic information required will be along the following lines, the tool used will give further detail on how to input the figures:

Electricity
- kWh of electricity used – from bills for the relevant time period. Make sure that the total is just for farm enterprises; you may want to look at housing or any let buildings separately. If possible use actual meter readings, rather than estimates

Fuel
- Litres of fuel used – to include diesel, petrol and LPG. You may wish to focus just on fuel used for farm operations, and leave out fuel used for other purposes
- If you use contractors for any of your field operations, account for or estimate of the number of hours they worked and the sizes of tractors used (horsepower, or an estimate of this)

Livestock
- Average number of head on farm over the year
- Average number of grazing days per head (for lambs the % time at grass)
- % of manure (while housed) that is stored as slurry, spread daily or stored as FYM

Crops
- Tonnes of crop harvested
- Tonnes of straw moved off farm or estate to another business
- Hectares of grass & soft/top fruit crops

Nutrients
- Tonnes or cubic metres of nutrients applied to land and % N
- Tonnes of lime applied
- Tonnes or cubic metres of animal manures or slurry that is brought onto or leaves the farm and % N

Land use change
- Hectares of land where use has changed, e.g. from grass to arable or woodland to arable or vice versa – this will estimate carbon sequestration as well as emissions

Woodland
- Total hectares of woodland on the farm, broken down between broadleaved and conifer, leaving out hedgerows and orchards.

3. Input figures into a calculator.

4. Results: You can use the output from the calculator to compare with other farms, explore how different management practices can reduce greenhouse gas emissions, and see where there may be energy or input saving measures.

Sources of further information

Carbon accounting

Our video case study on carbon accounting is a useful first place to start to hear more about practically applying the principles on farm.

The CLA CALM website has a number of supporting documents and detailed guidelines on using the tool www.calm.cla.org.uk

C-Plan has produced a discussion document which examines the issues around applying the IPCC 2006 methodology at the farm scale which is downloadable from their website www.cplan.org.uk

For a list of all fuel and electricity conversion factors see the Carbon Trust Energy and carbon conversions – Action Energy (from the Carbon Trust) (2004) www.carbontrust.co.uk/energy

The 2006 IPCC Guidelines for National Greenhouse Gas Inventories is useful www.ipcc.ch

The final report from the Natural England Carbon baseline survey project is available here www.naturalengland.org.uk/Images/calmreportfinal_tcm6-10148.pdf

Carbon labelling and lifecycle analysis

More information on the carbon label is at www.carbon-label.com

There is also potential to use PAS2050 to support a carbon label

FARMING FUTURES

For news, events, and links to stories about how other farmers are managing climate change on their farms, please visit: www.farmingfutures.org.uk

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