The Farm Management Handbook

SRDP Farm Advisory Service

Carbon

The UK reference for farm business management

SAC CONSULTING

Part of Scotland's Rural College (SRUC)

Updated June 2024

This document is an updated section of the Farm Management Handbook. It was updated on 28th of June 2024. You can find the complete handbook, as well as other updated sections, on the FMH section of the FAS website.

Climate change, carbon, and the environment

It is now widely accepted that all businesses, including farms will have to take action to reduce greenhouse gas emissions responsible for driving climate change.

Scottish Government have set the target of achieving net zero emissions by 2045, and while they announced in April 2024 that the interim target of a 75% reduction by 2030 (from 1990 levels) has been scrapped, a system of greenhouse gas (GHG) reporting will be implemented every five years.

Agricultural production is underpinned by natural biological processes, which in turn give rise to greenhouse gases. With around 7.8 $MtCO_2e$ (million tonnes CO_2 equivalent) of greenhouse gases attributed to the agricultural sector in 2021, in terms of contributions to total Scottish greenhouse gas emissions it is now the second largest contributor by industry sector, behind transport (10.9$MtCO_2e$) (Scottish Government, 2024).

Agricultural greenhouse gas emissions

There are three main greenhouse gases produced through routine agricultural activities:

- Carbon dioxide (CO_2) is produced by burning fossil fuels such as coal, oil, and diesel.
- Methane (CH_4) is produced as a natural by-product of enteric fermentation during ruminant digestion and, to a lesser extent, from management of organic manure.
- Nitrous oxide (N_2O) which is released during the application of synthetic and organic fertilisers to the soil, from urine deposition by grazing animals, soil cultivation and changes in land use and vegetation.

Greenhouse gases, their global warming potential (GWP) and contribution to Scotland's GHG emissions, 2021

Greenhouse gas	**GWP** (over 100 year period) per kg emitted	**% of Scotland's net GHG emissions in 2021 (in MtCO2e)**
Carbon dioxide (CO_2)	1	66.0%
Methane (CH_4)	25	24.5%
Nitrous oxide (N_2O)	298	7.2%

Greenhouse gases are typically quantified in terms of CO_2 equivalents (CO_2e) based on their relative global warming potential (GWP) over a 100-year period. The table above provides an approximate assessment of the GWP of the main three greenhouse gases and includes their percentage contribution to Scotland's net greenhouse gas emissions in 2021.

By expressing emissions in terms of CO_2 equivalents, it allows groups of greenhouse gases to be quantified as a single number allowing cross sector and year-on-year results to be easily compared.

Agriculture as part of the solution to climate change

As other sectors cut their emissions, it is anticipated that the contributions from farming activities will gain more prominence. However, the agricultural sector has the potential to be part of the solution to climate change.

Through ongoing improvement of technical efficiency and using new technologies and techniques, alongside implementing land management practices which can store or 'sequester' carbon removing it from the atmosphere and locking it into soils, vegetation and trees, the agricultural sector has a key role to play.

More information on practical mitigation measures and steps farmers are taking to reduce emissions and sequestrate carbon is available on the Farm Advisory Service website (www.fas.scot) (see below).

Preparing for Sustainable Farming

Against the backdrop of biodiversity losses and a changing climate, Scottish Government aims to support farming and food production to be a global leader in sustainable and regenerative agriculture through a twin track approach. Under Track 1 of the National Test Programme,Preparing for Sustainable Farming (PSF) programme provides funding for soil sampling, carbon audits and animal health and welfare interventions. The scheme will run until March 2025.

For more information visit the rural payments page.

From 2025, a four-tier support system is proposed, with tier 1 providing base support (with environmental conditionality), tier 2 providing enhanced support including additional payments for climate, nature and biodiversity outcomes, and tiers 3 and 4 providing support for a range of additional and targeted environmental, social and business initiatives (see the rural payments route map).

FAS Carbon and Climate

This updated section of the Farm Advisory Service website provides a range of information and resources on carbon management on farms and outlines what climate change means for agriculture in Scotland. The website hosts a range of practical guides, podcasts, videos, and farmer case studies showing how other farmers are reducing their farm carbon footprint. Topics covered include optimising enterprise productivity, managing energy and fuel use, increasing carbon sequestration, carbon markets, how to complete a carbon audit, use of technology and tools to support decision-making, and a new 'carbon calendar' with reminders of relevant deadlines and actions throughout the year.

The section also now incorporates guidance and case studies from the Farming for a Better Climate programme, funded by the Scottish Government and delivered by SAC Consulting. The programme worked with farmers to find practical and profitable solutions, tips, and ideas to improve business efficiency, reduce greenhouse gas losses from the farm and help farmers and land managers adapt to a changing climate.

Farm carbon calculators and carbon footprinting

Farm carbon calculators are highly useful business tools, not only for understanding carbon management within the business, but also helping determine relative resource use and efficiency across the business. Often the farms with the lowest carbon emissions are also the most productive and profitable within their sector, so carbon footprints can help a farm to save money and improve performance.

Typically farm carbon calculators will ask for information on:

- Crop areas and yields
- Livestock numbers and productivity
- Input use (feed, fertilisers, bedding, pesticides etc.)
- Electricity and fuel use
- Manure and fertiliser management

Some tools also ask for information on land use and farm practices to provide a soil carbon sequestration figure.

A farm carbon assessment involves:

1. Calculating an initial carbon footprint measurement.
2. Benchmarking
3. Identifying mitigation (positive change) measures.
4. Monitoring and reviewing.

1. Calculating an initial (baseline) carbon footprint

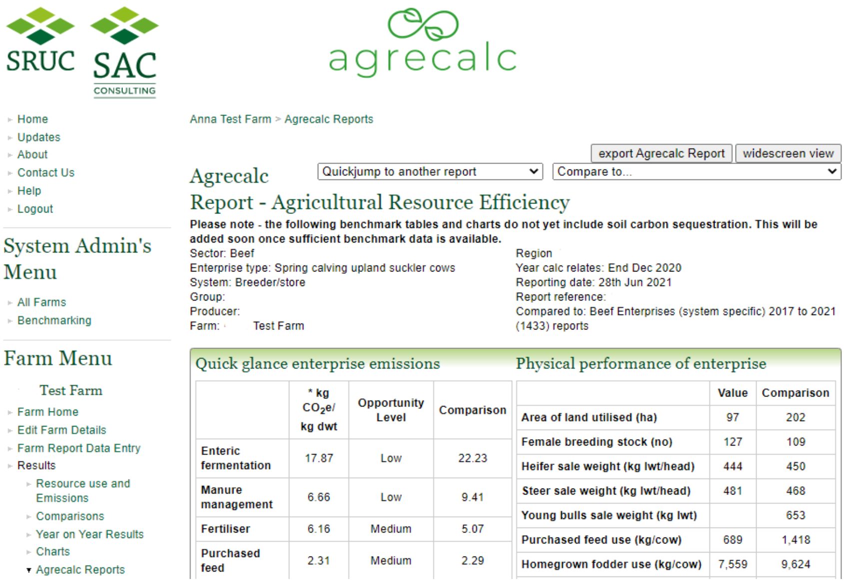
This will provide a 'starting point' to help to understand current practices and productivity and to provide a baseline to monitor progress. The more accurate a business is when inputting data, the greater the accuracy of the carbon footprint.

For up-to-date advice on funding available for carrying out a carbon audit and getting advice from an expert, visit the Farm Advisory Service website: www.fas.scot/carbon-audits/).

2. Carbon footprint benchmarking

Benchmarking a baseline carbon assessment will enable businesses to compare their farm enterprises to other similar farms, to identify high emissions areas, and opportunities for mitigations and optimising resource use.

As shown in the sample report, Agrecalc's benchmarking facility can provide businesses with an indication of whether the performance of an individual enterprise is above or below average and can highlight areas where improvements can be made. The quick glance enterprise emissions report benchmarks a business's enterprise emissions broken down by source against similar farms, together with the 'opportunity level' for improvement.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Anna Test Farm > Agrecalc Reports

export Agrecalc Report | widescreen view

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Agrecalc Report - Agricultural Resource Efficiency

Please note - the following benchmark tables and charts do not yet include soil carbon sequestration. This will be added soon once sufficient benchmark data is available.

Sector: Beef
Enterprise type: Spring calving upland suckler cows
System: Breeder/store
Group:
Producer:
Farm: Test Farm

Region
Year calc relates: End Dec 2020
Reporting date: 28th Jun 2021
Report reference:
Compared to: Beef Enterprises (system specific) 2017 to 2021 (1433) reports

Quick glance enterprise emissions

	* kg CO_2e/ kg dwt	Opportunity Level	Comparison
Enteric fermentation	17.87	Low	22.23
Manure management	6.66	Low	9.41
Fertiliser	6.16	Medium	5.07
Purchased feed	2.31	Medium	2.29

Physical performance of enterprise

	Value	Comparison
Area of land utilised (ha)	97	202
Female breeding stock (no)	127	109
Heifer sale weight (kg lwt/head)	444	450
Steer sale weight (kg lwt/head)	481	468
Young bulls sale weight (kg lwt)		653
Purchased feed use (kg/cow)	689	1,418
Homegrown fodder use (kg/cow)	7,559	9,624

3. Identifying suitable mitigation measures

Mitigation measures fall into 3 categories:

1. Avoiding or reducing emissions through improving efficiency and or work practices.
2. Reducing or eliminating through changing inputs e.g., switching to renewable energy sources.
3. Sequestering or offsetting emissions.

Effective mitigation strategies for one farm may not be effective on another farm, so specialist advice from a farm advisor may be helpful to identify actions that are best suited to the individual farm and to identify short-term and longer-term options.

Mitigation measures can include:

- Looking at most significant emissions sources on the farm and in comparison to other farms.
- Identifying easy changes e.g., switching an input for one with lower associated emissions or finding ways to reduce energy/fuel use.
- Focusing on 'win-wins' that will provide resource and cost savings as well as carbon savings, such as precision feeding of livestock. The Marginal Abatement Cost Curve, produced by SRUC researchers, provides substantial detail into the cost-effectiveness of selected mitigation measures.
- Investigating funding schemes, as further details on programmes within the new four-tier framework of future support are announced.
- The baseline carbon results to test out potential impact of different measures e.g., finishing cattle earlier, can be a useful tool when creating a carbon plan for the business going forward.

The Farming for a Better Climate website provides advice and resources for farmers wishing to assess and improve their carbon footprint.

4. Monitor and review

After new practices and measures have been implemented, repeating the carbon assessment process helps to monitor and review progress. Carrying out a second audit a year or two later will allow a business to assess the impact of the 'easy wins', but for more involved practices and system changes waiting three to five years may be more appropriate.

Choosing the most appropriate carbon calculator

As there are various farm carbon calculators in the UK that will generate a farm carbon footprint with differing methodologies, outputs, and features – which one should you choose? All carbon calculators are essentially computer models, and how they calculate emissions varies according to the underlying calculations and assumptions made. The more detailed the data input, the more accurate the result. A comparison of the key farm greenhouse gas calculators see online is available here.

The key questions to consider when choosing a farm carbon calculator are:

- What data does it ask for? Do you have this data readily available in your farm records?
- Are the results presented in a way that is useful to you and will help inform business decisions? Are you interested in whole farm results, individual enterprise results, or both?
- Does the tool enable you to benchmark against other similar farms?

- What standards and methodology are used? Calculators based on IPCC (Intergovernmental Panel on Climate Change) guidelines are considered more scientifically rigorous, and certification such as PAS 2050 means it has been reviewed and verified by a third party on its use of the internationally applicable method for quantifying product carbon footprints.
- Does your buyer e.g., milk company or your participation in a particular grant or business support scheme require or recommend that you use a particular carbon calculator?

Once you have chosen your carbon footprinting tool, it is best to stick with the same one to make it easier to compare your progress year on year.

Farm carbon accounting and the National Inventory

A crucial principle of farm carbon footprinting is that it calculates only the emissions associated with agricultural activities on the land, not overall emissions from the land itself. To be able to measure, monitor and benchmark with consistency and to identify areas for efficiency and resource use improvement, it is necessary to separate out natural cycles of greenhouse gases from land and those resulting from agricultural activity.

Due to how carbon is accounted on a national scale in the UK's Greenhouse Gas Inventory, farm woodlands and renewables are classified as non-agricultural activities. This means that the carbon benefit is attributed to LULUCF (Land Use, Land Use Change and Forestry) and Energy sectors respectively.

However, some carbon tools, such as Agrecalc, calculate carbon sequestration from woodlands and soil carbon, and energy generated by on-farm renewables, in addition to whole farm emissions. This allows the user to measure and monitor the footprint of these, as part of the whole farm picture. Renewables generated and used on-farm are included in this. As renewables have a lower carbon footprint than grid electricity, emissions from farm energy use associated with enterprises will also be reduced. While farm woodlands may currently be considered part of the LULUCF, agroforestry is one way in which trees would be considered part of agriculture, according to the GHG Inventory.

Carbon benchmarks by enterprise

As an illustrative guide to carbon benchmarking within Scottish Agriculture the following benchmarks were extracted from the Agrecalc dataset. The benchmarks provide breakdown of emission sources by enterprise, and average key performance indicators. Additional options are available in the Agrecalc webtool, including comparison with the top 25% performers and benchmarking against previous carbon audits.

Beef Benchmarks	Upland suckler spring calving cows		Lowland suckler spring calving cows	
EMISSIONS BY SOURCE	kg CO2e/ kg dwt (%)			
Enteric fermentation	24.34	57%	20.97	57%
Manure management	8.49	20%	6.62	18%
Fertiliser	4.75	11%	4.56	12%
Purchased feed	2.09	5%	2.09	6%
Purchased bedding	0.71	2%	0.55	1%
Fuel	1.33	3%	1.16	3%
Electricity	0.03	0%	0.04	0%
Other	1.26	3%	0.98	3%
TOTAL EMISSIONS	42.91		36.89	
KEY PERFORMANCE INDICATORS				
Steer sale weight kg	477.2		530.91	
Mortality %	2.65%		2.35%	
Calving %	92.88%		95.03%	

Sheep benchmarks	Crossbred ewe flock		Good hill ewe flock	
EMISSIONS BY SOURCE	kg CO2e/ kg dwt (%)			
Enteric fermentation	17.65	59%	20.48	62%
Manure management	5.05	17%	5.75	18%
Fertiliser	3.58	12%	2.62	8%
Purchased feed	1.79	6%	1.94	6%
Purchased bedding	0.12	0%	0.09	0%
Fuel	0.98	3%	0.90	3%
Electricity	0.04	0%	0.05	0%
Other	1.01	3%	1.13	3%
TOTAL EMISSIONS	30.13		32.85	
KEY PERFORMANCE INDICATORS				
Lamb sale weight (kg dwt/head)	19.2		18.3	
Mortality %	6.18%		4.80%	
Lambing percentage (%)	160.26%		138.34%	

Dairy benchmarks	Dairy - all year calving, 8,000l avg. yield	
EMISSIONS BY SOURCE	kg CO2e/ kg FPC milk	
Enteric fermentation	0.61	44%
Manure management	0.25	18%
Fertiliser	0.16	12%
Purchased feed	0.29	21%
Purchased bedding	0.01	1%
Fuel	0.03	2%
Electricity	0.01	1%
Other	0.02	1%
TOTAL EMISSIONS	1.38	
KEY PERFORMANCE INDICATORS		
Milk production (l/cow)	7845.08	
Mortality %	5.22%	
Calving %	93.25%	

Ruminant systems – key emissions sources

- **Enteric fermentation** – methane emissions are caused by the digestive process of the animal as they break down plant materials in the rumen. This is a normal process, so emissions cannot be eliminated, however there is much ongoing research into the role of diets and additives in reducing enteric emissions.
- **Manure management** – total emissions relate to how much time livestock spend at pasture, on the hill, or housed, whether slurry or bedded systems, and how the manure is stored.
- **Fertiliser** – linked to fertiliser use for pasture, other home-grown forages/feed crops and bedding produced on farm for livestock use.
- **Purchased feed** – this source of emissions is regarded as embedded emissions. Embedded emissions may include fertiliser, fuel use in the production of the feed, as well as transport to the farm.

Top mitigation actions for beef and sheep systems

- Improve livestock performance - linked to genetic selection (breed, EBVs) and management practices e.g., seeking to reduce days to slaughter, reduce age at first calving and reduce carcass weight.
- Increase calves/lambs reared – linked to reducing mortality rates through improved breeding selection, birth management, nutrition, and body condition scoring management.
- Increase homegrown forage use and reduce purchased feeds – linked to adapting management practices to make better quality silage, improve grassland management, growing additional forage

crops and seeking to match feed demand with grass supply (appropriate lambing and calving dates).

- Optimising feeding and nutritional strategy, use of precision feeding to reduce days to slaughter, improve feed conversion efficiency, thereby improving ewe and cow performance.
- Optimising soil nutrient use by carrying out soil sampling, nutrient budgeting incorporating organic manures, manure management, and optimal fertiliser application and timings.

Top mitigation actions for dairy systems

- Improving livestock performance through genetic selection (breed, EBVs) and management practices to reduce calving interval, improve fertility, using sexed semen, and improving milk quality.
- Increasing milk output and quality through optimising nutrition, body condition score management, and improving the health and welfare.
- Increasing homegrown forage use and reducing purchased feeds through producing better quality silage, improving grassland management, reviewing grazing strategies, growing alternative forage crops, and better matching feed demand with grass supply.
- Optimising nutrient use through soil sampling, nutrient budgeting incorporating organic manures, manure management, and optimal fertiliser application and timings.
- Reviewing manure management and storage linked to the use of slurry store covers, acidification and separation, and precision spreading.

Cereal Benchmarks	Malting spring barley		Feed wheat	
EMISSIONS BY SOURCE	kg CO2e/ kg grain (%)			
Manure and fertiliser	0.20	67%	0.22	71%
Pesticides	0.00	0%	0.00	0%
Lime	0.03	10%	0.02	6%
Fuel	0.05	17%	0.05	16%
Electricity	0.00	0%	0.00	0%
Crop residues	0.03	10%	0.03	10%
Other	0.00	0%	0.00	0%
TOTAL EMISSIONS	0.30		0.31	
KEY PERFORMANCE INDICATORS				
Grain yield (t/ha)	6.74		9.09	
Straw yield (t/ha)	2.81		3.19	
Fertiliser use (t per t grain)	0.08		0.07	
Red diesel use (l per t grain)	17.26		15.07	

Top mitigation actions for cereal crops

- Optimising nutrient use using soil sampling, nutrient budgeting incorporating organic manures, manure management, optimal fertiliser application and timings and optimising fertiliser/manure/biosolids use.

- Exploring alternatives to synthetic nitrogen using grassland and legumes in crop rotation, using more N-efficient crop varieties, choosing lower emission fertilisers, and the use of cover crops for nutrient carry-over.
- Monitoring and improving fuel use – identifying use hotspots and using GPS to reduce fertiliser and fuel use.
- Reducing tillage intensity where appropriate. This is beneficial for fuel as well as seeking to reduce soil compaction and soil carbon, although there are potential trade-offs with crop productivity.
- In areas/seasons where grain drying is necessary, consider energy sources with lower associated emissions, e.g., renewable energy.

Top enterprise emissions sources for cereal crops

- **Manure and fertiliser** – the embedded emissions of fertiliser and manure (imported or 'home-produced') and the process of application and volatilisation.
- **Fuel use** – linked to the field operations of establishing, treating, harvesting, and drying the crop.
- **Crop residues** – these emissions relate to the incorporation of the proportion of the crop not removed at harvest. For example, if straw is incorporated, the crop residue emissions will be higher than if it was removed. Benefits of straw incorporation to soil carbon and subsequent crop yields are not included in the carbon calculation but should be recognised.
- **Lime use** – this may or may not be a component in the carbon footprint, depending on whether the farm is recording actual lime use when it is applied, or the annual liming requirement. When applied correctly, the benefits of liming on productivity and improving emissions per unit of output of crop generally outweigh the emissions associated with using it.

Mitigation actions for other sectors

While the livestock and crop systems selected give an indication of emissions sources for other similar ruminant animal systems, emissions from mono-gastric livestock like pigs and poultry are quite different. Emissions are largely from nitrous oxide and carbon dioxide, reflecting embedded emissions of purchased feeds (including land use change), and energy use for indoor systems.

Top mitigation measures for pigs and poultry usually focus on optimising feeds, nutrition, health, and genetics.

Whole farm emissions mitigation

General whole farm actions can also be taken to reduce or offset emissions across agricultural enterprises. These include:

- **Energy and fuel use**: monitoring energy and fuel use, such as using a smart meter, can assess the efficiency of equipment and activities, and help identify small changes such as switching to more energy efficient lightbulbs or insulating areas of heat loss in water pipes.
- **Renewable energy:** generating renewables on farm, such as wind, solar and hydro-electric power may reduce energy bought in from the grid for use on farm and have lower emissions when doing a carbon audit. According to the National Inventory, emissions mitigation from energy sold to the grid is also considered as 'exported' from the farm. See the Renewable Energy section for further information on a wide range of farm renewable activities.
- **Fertiliser and manure management:** preparing a farm nutrient management plan can help to identify opportunities for better utilisation of organic and inorganic fertiliser e.g., applying nitrogen at optimum rates and timings, maintaining, or increasing clover content of swards or other legume crops.
- **Carbon sequestration and offsetting:** various measures can be used to manage soil carbon, including tillage practices, soil erosion control, conserving areas for biodiversity, and managing or increasing woodland areas. For more information on farm woodlands see the Forestry and Farm Woodlands section.

Soil carbon sequestration

On farms, soil carbon can be increased or decreased depending on the use of the land. All soil has existing (resting) carbon stocks, i.e., a natural level of carbon in the soil, which is determined by climatic factors such as temperature, moisture content, as well as mineral composition and soil texture. Generally, the soil carbon stocks in the UK vary between around 80–120 tonnes carbon per hectare to a depth of 30cm. Changes in the management of the land may affect whether these resting soil carbon stocks are maintained, increased, or depleted.

Agriculture is part of a natural carbon cycle, where carbon in the atmosphere is captured in plants and recycled to the atmosphere through livestock and animal consumption or natural breakdown. Without interference the system is in a carbon balance, with soil carbon stocks being maintained. As this (biogenic) carbon is recycled relatively quickly into the atmosphere, the growth of plant material on its own cannot usually be considered as sequestration.

Agricultural practices affecting this system can alter the amount of carbon 'recycled', resulting in either carbon sequestration or carbon loss, depending on the practice. The principle used by IPCC is that changes in agricultural practice that lead to changes in soil carbon stock levels will, if maintained, take effect over a 20-year period. After year 20 it is assumed that the soils have reached a new equilibrium of soil carbon stocks (higher or lower) and that no more soil carbon sequestration will then take place from this change in management practice.

Example: As part of the natural cycle, grass and stored carbon is removed by grazing animals, which then return the carbon back into the atmosphere or the soil, either as enteric fermentation or as manure. The portion of the grass not eaten by stock or removed by harvesting machinery, together with the roots, will in time decompose, and the carbon will then be stored in the soil. Therefore, the ability for grassland to sequester carbon in the soil depends on grassland management practices, forage utilisation, stocking density, reseeding practices, as well as land use factors such as the length of time it has been grassland, and the soil type.

In reality, it is accepted that soil carbon changes may not occur evenly over a set time and the length of time this change occurs may vary widely too. However, to make carbon estimates workable at the farm level a simplification of complex soil carbon interactions is considered necessary, as has been adopted by the current IPCC methodology.

Carbon sequestration is not an infinite process – soil will not keep absorbing carbon indefinitely, no matter how you manage it. All soils will have a natural maximum carbon threshold, based on the soil type, characteristics, structure, and management, just as soil organic matter will increase to a point but reach a maximum potential percentage individual to that type of soil. This is described as the soil reaching 'carbon saturation'.

Carbon markets and credits in agriculture

There is increasing interest and attention on 'carbon farming', i.e. the possibility that agriculture could provide a source of carbon credits through management practices, and an additional income stream to farmers through the sale of credits. Investors are moving into this space, offering farmers payments for unqualified carbon credits, and some farmers have begun to sell these assets.

However, unlike woodlands and peatlands, there is not yet a set of standards for agricultural or soil carbon credits, and the market is currently unregulated. Various research and policy projects are ongoing to explore support and systems required for a regulated carbon market in agriculture, which may enable safer engagement in these new markets – you can read more here. For the time being, the recommendation is not to sell carbon credits until such frameworks are in place.

If you are considering selling carbon credits in the future, here are a few things to check before entering the market:

- **Establish whether you have anything to sell**. Carbon offsets or sequestration may be small relative to total emissions of production. The best way to establish what your farm carbon balance is and whether you might have any carbon assets to sell is to do a carbon audit which includes soil carbon sequestration.
- **Understand the principles of soil carbon sequestration**. Soil carbon stocks are not the same as sequestration, and credits cannot be linked to stocks. Soil carbon can be sequestered or lost, and soils reach a 'saturation point' where limited further sequestration occurs. Only credits linked to sequestration can be sold if you meet the required criteria.
- In most cases **carbon credit payments require additionality**, i.e., proof that the intervention of the landowner is responsible for any changes in soil carbon levels.
- They will also require **proof that carbon capture has occurred,** including a credible measurement of soil carbon levels over an extended period.
- The **market for soil carbon credits is currently unregulated** (unlike the woodland and peatland codes). A soil carbon code is in the process of development, due later this year.
- **Who knows where the carbon price will go?** Sell now and you might be kicking yourself in a few years as prices are likely to increase as pressure grows to reach net zero targets. If you decide to sell, sell only a share of what you can capture in any one year or spread any sales out.

For more information about agricultural and soil carbon codes, see the Carbon & Climate section of the Farm Advisory Service website. For more information on the Woodland Carbon Code, see the Forestry and Farm Woodlands section.

The role of peatland in farm carbon accounting

Farm carbon footprinting aims to estimate emissions occurring solely as a result of agricultural activities. While peatland may be found on a croft, farm, or an estate, most of the carbon sequestered by peatland occurs naturally, whether or not that land is farmed, so shouldn't be included in a farm's carbon footprint. This is consistent with other farm GHG accounting such as nitrous oxide emissions, in that soils produce nitrous oxide emissions naturally, but we only include in a farm's carbon footprint the 'extra' emissions which come as a result of management.

Methodologies to explore the impact of farm management practices on the carbon stock change of peatland are being explored, although it should be noted that this is a double-edged sword; often, farming of peatland reduces or reverses the sequestration process vs. natural peat, which would have to be accounted into farm carbon footprints.