

# Tools for Carbon footprinting farm enterprises



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## The system boundary: What's 'in' and what's 'out'?

*'carbon' footprints are actually 'greenhouse gas' footprints*

Different tools apply different system boundaries (making them **non-comparable**)

BUT **repeat assessment** can indicate effects of management changes

UK guidance on system boundaries in **PAS2050** but not all tools comply...

### WHAT'S IN PAS2050

### WHAT DO YOU NEED TO RECORD?

'Embodied C' of all inputs

How much electricity, diesel, concentrates, fertilisers, silage wrap, string, disinfectant, drench, dip...

Transport to/from point of sale

Where does your stock go? Where does the straw come from?

Emissions from livestock

How many sheep, cattle, horses, chickens? What ages and breeds? Changes...

Emissions from manure and excreta

(see above) plus when were they housed and on what bedding? How DO you store manure?

Emissions from soil

What soil do you have? Organic soils...

Land use change (since 1990)

Have you begun arable / planted woodland?

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## The system boundary: carbon sequestration

*'carbon' footprints exclude C sequestration-  
but agriculture affects it*

PAS 2050 is an **industrial** standard that can be difficult to apply to agricultural businesses

**Specifically** it excludes C sequestration in biomass or soils from being considered as offset

**Many tools exist** which do calculate agricultural C sequestration but they are not standardised  
(and the science is still immature)

### WHAT'S NOT IN PAS2050

C content of products

C exported as products (e.g. sheep or beef) is not included

Actual or potential C offsets in farm  
vegetation, bought C offsets

**Trees** are not considered an applicable C store,  
because they a) do not have a guaranteed lifespan  
and b) do not sequester C as a direct result of  
management.

Many **biomass** C stocks are stable over a farm year  
(e.g. C in rotational crops)

Infrastructure and capital items

Buildings, tractors etc.

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## Footprint allocation

### *Separating the sheep from the goats*

Farm businesses do not produce a single product, but usually more than one and often several (wheat and straw? Milk and bull calves? Mushrooms and waste peat?) and organic farms may have particularly complex inputs and product streams

PAS 2050 recommends separating inputs and processes as far as possible – which is easier in a factory. How much of your lime went into grass for sheep, and how much into silage for cattle?

**Economic allocation** can help - footprint the entire business year, and allocate the GHG footprint to products on the basis of revenue (then divide each component by volume/mass output)

**Input allocation** - Consumables with a lifespan of more than one year are allocated proportionally (e.g. cow mats)

*Is your chosen footprint tool transparent about how emissions are allocated between products? Are co-products footprinted at all?*

# Tools for carbon footprinting farm enterprises

## The nuts and bolts: Emissions factors

*In theory, GHG footprints are simple*

**START** - Take the number of tonnes straw bought in a year

**Multiply** by the 'emission factor' – the greenhouse gas account for the production of 1 tonne straw

**Add** transport – the greenhouse gas account for straw delivery to the farm

**=** GHG total for that input

(repeat for all other inputs and processes on the farm, add them together)

**=** GHG emissions for the farm year

# Tools for carbon footprinting farm enterprises

## The nuts and bolts: Emissions factors

*In practice, agricultural GHG footprints are complex*

**START** - Take the number of tonnes straw bought in a year

Barley or wheat? Organic or conventional? UK, EU produced?

**Multiply** by the 'emission factor' – the greenhouse gas account for the production of 1 tonne straw

Type and production system affects EF. Straw is a co-product of cereal production – how was that footprint allocated? Was an appropriate system boundary used for the calculation? Did it comply with PAS 2050?

**Add** transport – the greenhouse gas account for straw delivery to the farm

Transport EF varies with fuel type and source, vehicle type, distance, system boundary (did the GHG calculation include vehicle wear and tear, manufacturing, fuel production, transport, storage, purchase?)

= GHG total for that input

(repeat for all other inputs and processes on the farm, add them together)

Have you missed an input? Do all your EF's use the same system boundary? Which value do you use if there are several different ones published? Beware double accounting...

= GHG emissions for the farm year (**probably**)

# Tools for carbon footprinting livestock producers

## Tools make footprinting easier

*But are generally not comparable with each other*

A range of tools exist for footprinting farms:

Consultancy-developed tools (E-CO<sub>2</sub> project, AB Sustain, ERM)

Free online tools (CALM, C-plan, Blaencamel Farm)

Research models : Bangor, Cranfield (EBLEX Phase I)

**Their results differ** because:

1. They use different system boundaries (many exclude all/most Scope 3 emissions)
2. They select different emissions factors for inputs or processes
3. They use different IPCC calculation standards (Tiers 1, 2 or 3)
4. They use less-detailed farm information (e.g. annual average stock numbers)
5. They use aggregated national reference data for some processes (e.g. manure handling)
6. They allocate emissions between products differently (or ignore co-products)

**Their reports differ** – in terms of including/excluding items or processes, level of detail, treatment of carbon sequestration

**Choose your tools wisely!**

# Tools for carbon footprinting livestock producers

## Tools make footprinting easier

*But are generally not comparable with each other*

**Choosing a tool:** *What do you want to know?*

**System boundary:** are you particularly interested in energy or carbon sequestration, or considering your whole farm enterprise?

**Simple or complex:** Simple tools often available free (CALM, C-plan v0, CFF), quick to apply, many exclude all/most Scope 3 emissions. More complex tools produce more detailed reports, take longer / require training to use, are not free

**Your intent:** Will your footprint results be public (e.g. a marketing tool), support your management decisions or simply personal interest?

- **Marketing**-related footprints should be **transparent and reliable** (use as complex a tool as you can and one that is compliant with PAS2050)
- **Management** tools require **detail** – since many management alterations have subtle, not dramatic effects on GHG footprints. May need to be repeatable...
- **Interest** – the best use of a C-footprint may be in repeated assessments which develop your understanding of greenhouse gas accounting your business. Is the tool available for repeated use? Do you have the time/patience/skill for more complex calculations?



# Tools for carbon footprinting livestock producers

	CALM	C- Plan	Man. Energy & Carbon	SAVEFuel/ REFuel	EASI	Carbon Friendly Food (CFF)	LCA analysis of Blaencamel farm	Bangor Farm Model
<b>Developed by</b>	CLA	D & J Coulter	CALU	SAC	ORC – EF	CFF	Peter Segger	Bangor University
<b>Format</b>	Web	Web	Paper	Spreadsheet	Spreadsheet	Web	Spreadsheet	Spreadsheet
<b>Availability</b>	Free	Charge	Free	Consultancy	Consultancy	Free	Free	Not publicly available
<b>Purpose</b>	Farm management.	Farm Management; policy development	Farm management	Farm management	Farm management	Farm management; certification; marketing	Farm management	Farm management
<b>Ease of use</b>	High	High	Medium	Consultant operated	Consultant operated	High	Medium	Consultant operated
<b>Complexity</b>	Medium	Medium	Low	Medium	High	High	Medium	High
<b>Methodology</b>	IPCC	IPCC	ADAS	SAC	Organic Research Centre	Climate friendly Food	Own methodology	IPCC, LCA – PAS 2050
<b>Scope</b>	1, 2, some 3	1, 2	1, 2	1, 2	1, 2, some 3	1, 2, some 3	1, 2, some 3	1, 2, 3
<b>Emissions from fuel &amp; electricity</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Emissions from Livestock</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Emissions from soil/ crops</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Focus on organic systems</b>	X	X	X	X	✓	✓	✓	X
<b>Sequestration</b>	✓ (Outline)	✓ (Outline)	X	X	✓ (Detailed)	✓ (Detailed)	✓ (Detailed)	✓ (Detailed)

**Environmental footprinting for farm businesses (2010 report)**

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