# Carbon Footprinting on the Dairy Farm

## Practical Guide

Carbon footprinting helps you to quantify the farms greenhouse gas emissions. Acting on this information not only helps minimise emissions, in addition it can provide significant efficiency and economic benefits at farm level.

Improving on-farm efficiencies through better use of inputs strongly correlates with **reduced production costs per litre of milk** leading to improved profitability for the farm business.

Rather than a burden, lowering greenhouse gas emissions represents a challenge with clear opportunities.

This Practical Guide concentrates on some of the benefits that could come from carrying out a carbon footprint on the dairy farm.

There are five sets of Practical Guides covering :

Use energy and fuels efficiently

Develop renewable energy

Lock carbon into soils and vegetation

Optimise the application of fertilisers and manures

Optimise livestock management and the storage of manure and slurry

Find further information, including links to other Practical Guides and Case Studies, at

**www.farmingforabetterclimate.org**

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### Where do the key agricultural emissions come from?

Emissions from livestock farming include carbon dioxide ($CO_2$) produced by burning fossil fuels, methane ($CH_4$) as a natural by-product of animal digestion and nitrous oxide ($N_2O$) from soils, manure and nutrient management. Changes in land use and vegetation can also have an impact on greenhouse gas emissions from the farm.

### How is a carbon footprint calculated?

To establish a starting point, baseline information on available land area and type, breeding cow numbers, stock and milk sales is recorded along with feed, fertiliser and fuel use. The carbon footprint is expressed on a '*per net unit of food product leaving the farm'* basis. For a dairy unit, this would be in kg of greenhouse gas (normally a measure of all greenhouse gases but expressed as a ***carbon dioxide equivalent*** **$CO_2e$**) per litre of milk sold.

### What's the point of a carbon footprint for my business?

The carbon footprint shows how much greenhouse gas is being produced through routine activities on your farm. It highlights areas of the business where greenhouse gas emissions seem high and allows you to compare your farm performance against other similar enterprise types (benchmarking like for like). High farm emissions reflect poor utilisation of costly inputs, highlighting scope to implement efficiency savings – benefiting both the farm business and the wider environment. Some supermarkets already ask suppliers to provide this information.

### Websites

www.farmingforabetterclimate.org
www.farmingfutures.org.uk
www.ipcc.ch
www.agrecalc.com
www2.cplan.org.uk
www.calm.cla.org.uk
www.planet4farmers.co.uk
www.soilassociation.org.uk
www.renewableenergyonfarms.co.uk

# Carbon Footprinting on the Dairy Farm

## How do you improve efficiency on the dairy farm?

The key measures of a dairy farms performance with regard to greenhouse gas minimisation are broadly similar to already familiar technical efficiency measures used by the industry today (see box opposite). **Improvement in productive efficiency** is the most important factor that farmers have within their control to reduce emissions and positively **steer profit**. The following three example measures are based on actual farm data and indicative of what could be expected in specific scenarios. It also broadly illustrates that greenhouse gas emission reductions are achievable **and** compatible with maximising farm profits.

**Efficiency measures for the dairy farm**

- ✓ Forage quality
- ✓ Fertiliser requirements
- ✓ Electricity consumption
- ✓ Milk sales per cow
- ✓ Feed conversion efficiency
- ✓ Disease level/challenge
- ✓ Stocking rate/forage yield per hectare
- ✓ Age to first calving
- ✓ Replacement rate
- ✓ Calving index
- ✓ Calf mortality
- ✓ Red diesel use

## Example efficiency measure 1 — Improve forage quality

Unimpaired field drainage, modern grass varieties and timely field operations present opportunities to increase forage quality without necessarily compromising yield. Improved forage quality will encourage intakes, promoting milk yield or off-set purchased feed use.

**Improving grass silage energy content by 1MJ/kg DM is equivalent to near 1kg barley per cow in a ration or an additional two litres of milk from the full winter ration.** Increasing milk production from forage improves how effectively you are turning livestock feed into milk. Based on this scenario, where better quality forage is used to promote milk yield giving an **additional 7% in milk sales**, dairy herd greenhouse gas emissions were also expected to reduce by 10% for each litre of milk sold.

**Lowering emissions and saving on the electricity bill**

More effective milk cooling, reusing hot water from the plate cooler, matching equipment size to demand, checking insulation and thermostat settings and only heating the amount of water needed will all reduce power requirement. A 10% reduction in electricity demand could translate into significant financial savings on the annual electricity spend and approximately a 0.5% reduction in the dairy unit's carbon footprint per litre of milk sold.

## Example efficiency measure 2 — Improve nutrient use

**Targeting and applying manure and fertiliser in line with crop requirements is an effective method of reducing purchased fertiliser cost and increasing nutrient utilisation** (minimising the risk of nutrients lost to the environment) without compromising crop yield. A 10% reduction in fertiliser purchase will be a financial saving to the business, require better use of inputs and could reduce the carbon footprint by around 2% per litre of milk sold.

## Example efficiency measure 3 — Improve energy use

Relative to other livestock enterprises, dairy unit power requirements are high. This is mainly due to high demand in the milking parlour, especially for hot water washing. Since electricity production emits carbon dioxide ($CO_2$) as opposed to the more potent climate change gases such as methane ($CH_4$) or nitrous oxide ($N_2O$), the impact on the dairy unit carbon footprint is less. However, there does remain some opportunity to **reduce emissions from the dairy unit and potentially significant cost savings.**

## Next steps?

Undertaking a farm carbon footprint will help establish an action plan to improve business resource efficiencies and assess year on year change. Regular assessment can help quantify progress and positively direct efforts to make the most of inputs whilst reducing farm greenhouse gas losses. An action plan based on technical performance targets should aim to take one step at a time towards a more efficient, lower cost system with a reduced carbon footprint.