

Here, in the third of a series of five articles, we take a look at how producers can manage soil and grassland to reduce GHG emissions and what this means for dairy businesses and the environment.

- Part 1 Assessing your herd's carbon footprint
- Part 2 Improving feed efficiency to reduce nitrogen losses and  $\text{CH}_4$  emissions
- Part 3** **Grassland management to improve nitrogen utilisation, losses and increase carbon sequestration**
- Part 4 Manure management to reduce nitrogen losses through ammonia and  $\text{N}_2\text{O}$  emissions
- Part 5 Breeding to reduce the carbon footprint

# Manage soils to sequester carbon and cut emissions

The importance of reseeding leys has been drilled into producers for the past few years. But as producers come under increasing pressure to reduce GHG emissions, that advice requires a more considered approach. We spoke to two leading dairy scientists to find out more.

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**R**eseeding exposes the top soil to the atmosphere and carbon, in the form of carbon dioxide, will be released into the atmosphere. However, reseeding is essential to maintain grassland quality and productivity. The environmental impact could be reduced, though, if we can take advantage of grass varieties and ley mixtures that can reduce GHG emissions, or more specifically methane, from the rumen. This can help to reduce dairy's carbon footprint (CFP).

So how are producers meant to interpret these conflicting messages on farm? "Well, for a start, producers should focus, first and foremost, on managing the soil. And that will, of course, be beneficial to grassland productivity – be it for grazing or silage," says Promar's Tom Gill. He's urging producers to go a step beyond the standard pH and soil nutrient testing that agronomists have been advocating for decades. "That's vital for healthy soils and crops. But think of it as a sink for carbon."

#### **Lock away**

Grassland has the capacity to store or sequester as much carbon as woodland, hedgerows and other natural green spaces. Organic farms sequester (or lock away) around 560kg of carbon per hectare per year. And all dairy units have the potential to improve the soil carbon indices of their soil year on year.

To do this, the carbon needs to stay in the soil – this minimises emissions. "Conventional tillage, or ploughing, releases GHG from the soil, so zero or minimal tillage is the



**Tom Gill:**  
**"Think of the soil as a sponge and how you can make it more absorbent"**

key here – or overseeding where possible," says Mr Gill. Using minimal cultivations – or min-till – it yet to be adopted by much of the arable sector. Estimates are that just 30% of arable producers operate a min-till policy. "We encourage dairy producers to consider grass as a crop and adopt a more 'arable' approach and now we want them to go further and think about the soil in more depth. "But if producers want to reduce their GHG emissions then the soil is good place to start. But, soil management is only part of the picture. "What's grown on that soil, how it's grazed or cut, how it's fertilised and how the manure that's spread on the land is stored and applied all has an impact on the overall business' CFP. That's why every unit is unique and that's why there's no one-size-fits-all when it comes to reduce GHG emissions. The soil, can indeed, sequester significant amounts of carbon. "Think of it as a sponge and think about how you can make it more absorbent and able to hold on to not only the carbon but also other nutrients that are essential to grass growth."





When land is ploughed – either for reseeding or growing arable crops – that sponge is broken up and carbon is lost to the atmosphere. “The message for the past decade or so – and particularly during the past five years as the impetus has been on producers to produce more milk from forage – is to reseed leys regularly to ensure that they’re productive. “Reseeding is good – particularly if it’s with high sugar grass variety and/or red clover mixtures that allow the grazing cow to convert more nitrogen to milk, rather than excreting it as methane or nitrate,” adds Mr Gill.

High-sugar grasses supply the rumen bugs with more sugars that then allow them to convert/divert more of the nitrogen in the grass to milk/milk protein production. And red clovers

**Siwan Howatson:**  
**“Multispecies leys are better at locking away carbon”**



## Useful links

- <https://climatechange.ucdavis.edu/news/grasslands-more-reliable-carbon-sink-than-trees>
- <http://sustainableforageprotein.org>
- <https://www.farmcarbontoolkit.org.uk/news/new-research-carbon-sequestration-and-grassland>
- <https://www.teagasc.ie/media/website/publications/2019/Grassland-and-carbon-sequestration.pdf>

are rich in polyphenol oxidase, which works in a similar way and reduces nitrogen losses from the rumen through methane (belching). “But it’s the method of reseeding that needs consideration and also, possibly, the frequency.” AHDB Dairy’s dairy scientist Siwan Howatson agrees and says that producers should calculate how much grass they need and how much they are producing before deciding to reseed. During the past 40 years, breeding programmes in the UK have improved both yields and the quality of grass varieties. Yields have improved by 0.37% per year and grass digestibility has also increased by 10g/kg DM. “So a 10-year-old ley will be more productive when it’s reseeded due to seed genetics. But that, alone, is not a reason to reseed a sward.”

### Minimal cultivations

“Producers must also weigh up their options, in terms of method and mixture, when it comes to reseeding.” She says that using minimal cultivations – min-till – is one such option, but it may require a herbicide application if weeds are a problem. And overseeding is another possibility. The good news is that both options cost less – around £636 per hectare for min-till and £430 for over seeding – compared to £689 per hectare for a conventional reseed. “And research, in Ireland, also shows that there’s very little difference in productivity between the reseeding methods, providing they’re done properly and in optimal conditions.” But, she stresses, the key is to look carefully at the pros and cons of reseeding techniques. The cost has to be outweighed by production benefits and it should be carried out with a longer term view and with environmental benefits in mind. “Multi-species leys are better at locking away carbon and could also help to lengthen the productive life of the ley. They’re also better for soil health, particularly if there are species with longer root systems that will help soil structure. And if they also include species that reduce emissions from the cows that graze them, then all the better.” |

## Dairy carbon footprint facts

- Dairying’s key GHG emissions comprise: CO<sub>2</sub> (carbon dioxide), CH<sub>4</sub> (methane) and N<sub>2</sub>O (nitrous oxide).
- The latter persists in the atmosphere for decades and has the highest global warming potential (GWP) of the three. All three are produced and emitted by the

- cow through belching, urine and faeces. Other emissions from dairy, that are also the focus of reduction plans, include nitrate and ammonia. Both are produced from nitrogen excreted in faeces and urine.
- Methane emissions from dairy cows are the result of belching (enteric fermentation).

Improved rumen function will reduce CH<sub>4</sub> emissions and improve feed conversion efficiency (FCE).

- Methane emissions from enteric fermentation in cattle has decreased from 22 million tonnes in 1990 to 19 million tonnes in 2015. It is still falling.