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Athrofa y Gwyddorau Biolegol, Amgylcheddol a Gwledig
Institute of Biological, Environmental and Rural Sciences

Cynllun PROSOIL+ Project

Prifysgol Aberystwyth University

"Inspiring Farmers to Safeguard Soils"

Lan Farm: A Participatory Research Farm Case Study

Farm Facts

Lan farm is a tenanted 80ha organic dairy farm managed in conjunction with a second farm, Parceithin (a further 28ha). Lan is between 110m and 140m above sea level. Parceithin has clay soils and is a lot heavier ground situated 15m above sea level.

Stuart runs around 115 predominantly British Friesian milking cows (along with a few cross breeds) which calve in two blocks (Feb - April and August-Oct). The aim is to provide a constant supply of milk for Rachels' Dairy in Aberystwyth.

The herd averages 6100 ltr /cow/year from 1.2t concentrate. Cows are housed in the winter on mattresses and fed grass silage. In the summer, they graze grass from a rotational grazing platform. Stuart is also exploring the option of growing stubble turnips for late summer grazing and to provide a break before reseeding the following spring with red-clover leys.

Stuart Evans

Composting

As an organic dairy farmer, Stuart has long appreciated the value of the nitrogen fixed by the clover in the grazing leys. As well as carefully applying slurry according to nutrient requirements, Stuart also has ample FYM available. Stuart was interested in evaluating methods of composting the FYM to maximise its potential benefits, including:

- Reducing the volume of FYM and maximising its nutrient value when spreading
- Ability to act as a soil conditioner and increase organic matter content
- Pathogen and odour reduction and a reduced risk of pollution to watercourses

Plots (6m by 15m) were set up to look at 3 managements:
1. Compost applied; 2. Dairy cow slurry applied and 3. Plots with no application of either of these.
Plots were monitored to assess changes in nutrient indices, soil carbon, as well as differences in grass growth.

This project is funded through the Welsh Government Rural Communities - Rural Development Programme 2014-2020, which is funded by the Welsh Government and the European Union

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In summary, we found
a) Similar grass yields were found on plots that received slurry and compost (c. 3500kgDM/ha) and they were higher than the untreated plots (c. 2000kgDM/ha)
b) that nutrient indices on the plots that received compost were higher than those on the slurry plots whilst indices of untreated plots remained lower
c) Organic matter % and Soil Organic Carbon % of the soil from plots receiving compost and slurry had increased compared with non-treated plots.

Stuart commented… "Composting is a part of how we recycle nutrients on the farm; this is key to how we farm organically at Lan farm but can obviously be used to good effect on conventional livestock farms too".

Measuring Soil Carbon

A **soil carbon assessment** was also carried out from two contrasting sites:

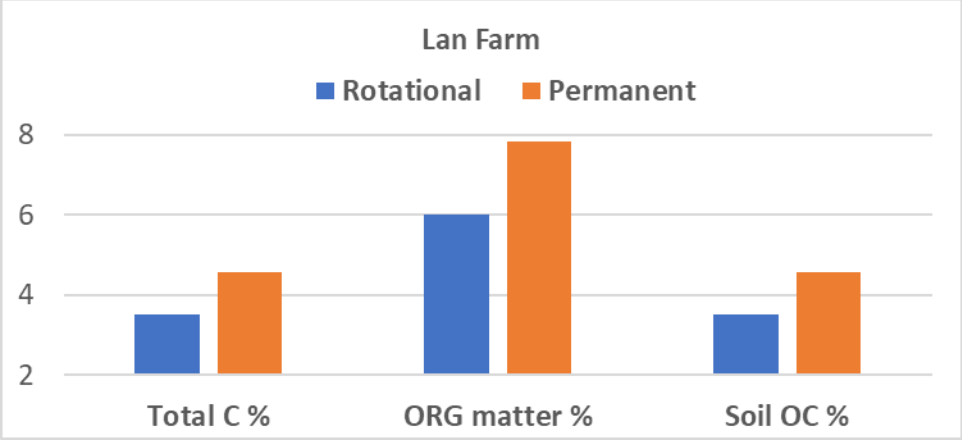
Site 1: rotationally cropped land and **Site 2**: long term pasture.

There were some key points when we considered how to measure soil carbon stocks (SCS) on farm:

- Total Carbon (TC) stocks change slowly – more bioactive carbon fractions change faster
- It is important not to confuse *stocks* with *fluctuations* in the level of soil carbon; the amount of soil carbon that is stored and lost fluctuates (known as the carbon flux) across the seasons and this depends on soil type. Mineral soils change rapidly; peats change more slowly.
- Soils gain and lose carbon continuously – the balance determines if soil is a sink or source of carbon

It is useful to compare and contrast carbon stocks in soils managed in different ways; we can then have an idea where a particular farm / field sits in the overall picture - i.e does it have a low or high stock of carbon and could stocks be increased.

Once we have an idea about soil carbon stocks, we can start asking questions about management and processes that would preserve stocks or have potential for increasing sequestration.



All carbon forms- organic or inorganic

Roots, microorganisms, leaves, residues etc

C compounds of the soil organic matter from decomposition affected by environment and management

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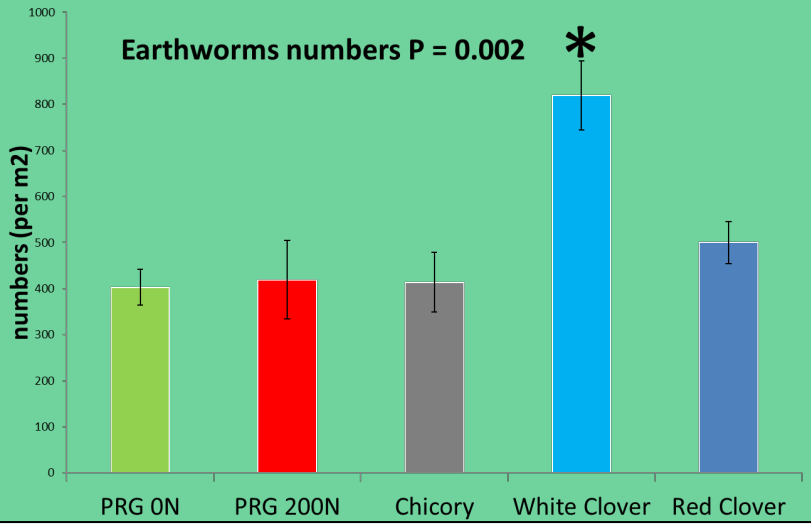
Soil Carbon Stocks- what we found at Lan Farm

- Soil carbon content did indeed differ between the 2 sites according to how they were managed
- Where soils were more regularly disturbed (**site 1**: rotationally cropped land), lower carbon levels were found
- Soil organic carbon levels were higher where organic matter inputs were higher- i.e. in the long term perm pasture soils (**site 2**) compared with regularly cropped land (**site 1**)
- In a deep soil more C is present
- Active Carbon is an indicator of recent inputs of carbon- we have found this to be the case across all the participatory research farms taking part in this assessment

IBERS PROSOIL Project Research Link



The chart shows the effect that *different forages have on soil biology* –**earthworm numbers** were found to be significantly higher in soils under **white clover**. Other effects of soil mesofauna were also found, with higher levels of other species dominant under the other forages – highlighting how collectively these forages provide an environment to support below ground biodiversity.

Stuart Evans: "We've got a lot out of the opportunities for information exchange while we've been involved in PROSOILplus and have been able to see the benefits of science being applied first hand on-farm. We try to keep our soils in good health and functioning well here; something that's becoming even more important as climate change impacts our ability to grow grass and provide drinking water to the cows in drier summers. We believe that making our soils more able to withstand these changes will help us remain viable as an organic milk business going forward."

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