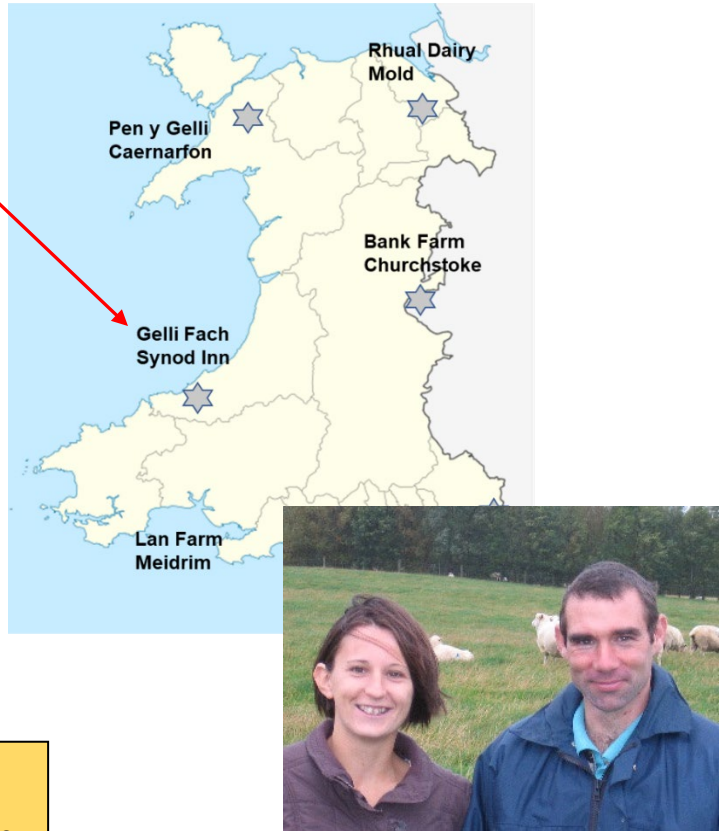


“Inspiring Farmers to Safeguard Soils”

GELLI FACH: A Participatory Research Farm Case Study

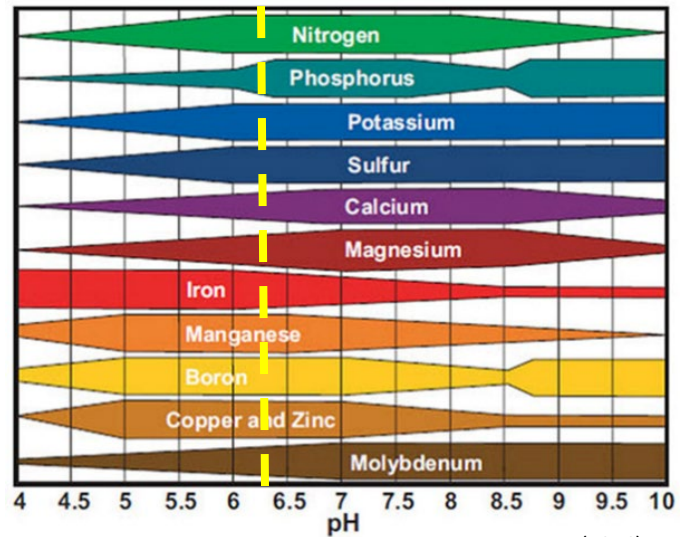
Farm Facts

Rhodri and Anwen Hughes farm 53 ha near Synod Inn, Ceredigion and run a flock of 300 breeding ewes. Of these, 180 are Lleyns running with a high index Lleyn ram. The remainder are Lleyn x Highlander ewes running with a high index Primera & Aberfield rams. Twenty store cattle are reared through to slaughter. Their aim has always been to improve and develop their business and they are active members of local farmer discussion groups. Through involvement in the PROSOIL project (2010-2015) and now with the PROSOILplus project, a system of paddock grazing is in place with the aim of having ewes out all winter using as little concentrates as possible. Soil health and management is still as important as ever and fields continue to be sampled and monitored regularly.



The importance of lime

Maintaining the soil pH at a target level of 6.0 to 6.2 is important for Anwen and Rhodri at Gelli Fach as it is in this range that essential nutrients and trace elements are most available to the multi-species swards that their ewes graze. Below this pH, soil biology is adversely affected; bacterial activity declines, earthworm activity is lower with a resultant build up of organic matter on the surface. Other soil processes such as nitrification (where ammonium is converted to nitrates that plants use for growth) and nitrogen fixation by the legumes in the sward can become restricted or even inhibited if pH drops as low as pH 5.5



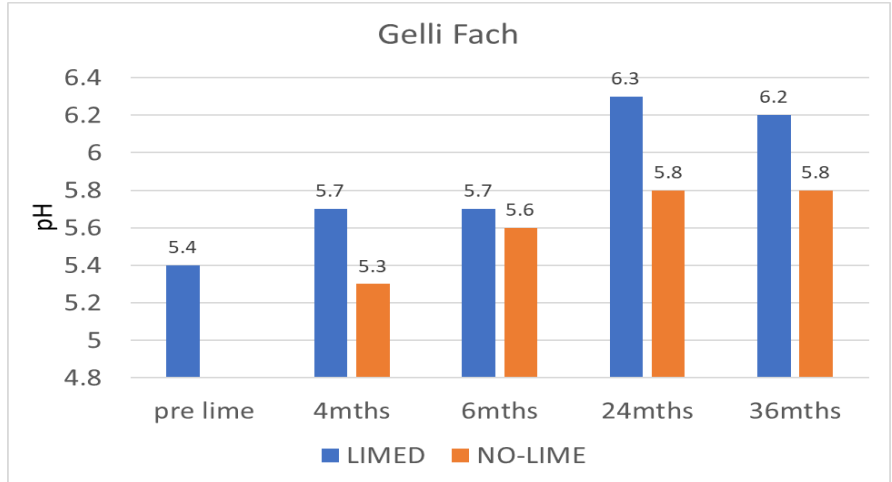
Truog, E. (1946).

Fig1: target pH for optimal nutrient availability

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



In a trial we applied lime at a rate of 5t/ha (2t/acre) to plots measuring 40 x 50m (0.2ha) and monitored the change in pH over three years, topping up when necessary. Initially at a very low pH of 5.7, the pH quickly rose within 4 months before maintaining that pH for around 18 months after which it declined to pH 5.3. Lime was applied again and the soil tests showed that pH was 6.2 at 36 months. The pH of the un-limed plots remained low at 5.6 throughout.



Multi Species Herbal Leys

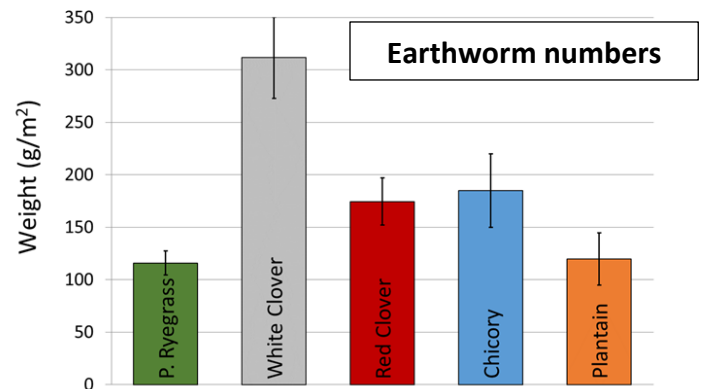
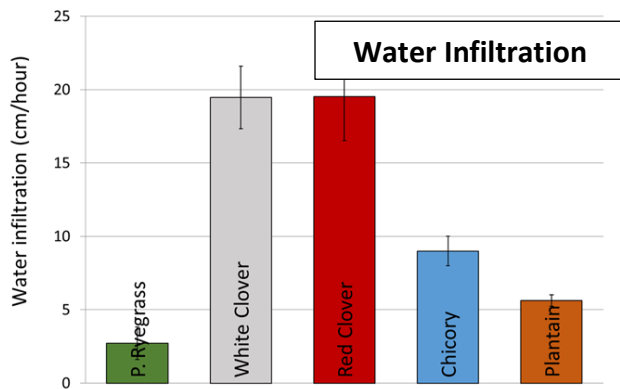
A further focus of activity at Gelli Fach has been looking at multi-species leys established either by conventional cultivation or oversowing methods. A ley was established in June 2019 after spraying glyphosate to kill off the old sward. Study plots were set up to enable us to compare oversowing into the old sprayed off sward or sowing into a conventionally prepared seedbed. Both pastures established well; initially the oversown multi species ley established more quickly with a higher plant population density - with the ley established by cultivation then catching up a short time later. The period from spraying off the old sward to first grazing of the new was c.8 weeks and the ley has been a source of high quality forage for the sheep flock and for finishing lambs. It has been managed by rotational grazing with the field split into 4 paddocks (dry matter at grazing has been around 14% with crude protein and ME at 20% and 11.1MJ/kg DM, respectively). Following establishment and utilisation in the first year, water infiltration rates were monitored on the plots to measure the effect of these cultivation methods on soil. We observed that the plots which were oversown were noticeably drier during winter months. This allowed Rhodri and Anwen more grazing days for their flock at the shoulders of the season from more resilient soils with better structure.

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IBERS PROSOIL Project Research Link

- There is current interest in the extent to which agricultural practices affect flood risk
- Research has focussed on soil compaction exacerbating this risk; less attention has been paid to how management practices increase infiltration and temporary storage of rainwater to mitigate these risks
- We investigated differences in water infiltration under various forage species with different rooting habits and interactions with earthworm populations
- Perennial Ryegrass, White Clover, Red Clover, Chicory and Plantain were sown in plots at IBERS in an experiment to investigate the effect of forage on chemistry, biology and physical properties of the soil



Perennial ryegrass showed lower infiltration rates than clovers. White clover but not red clover had large earthworm populations.

Anwen & Rhodri: “Learning from other farmers on the PROSOIL project farm network has made us think about the soil, including compaction and its effect on grass yields. We want to build on what we have learned and improve our soil structure as we have discovered that some of our fields are compacted. We hope to use more clover and grow multi species leys again to improve the soil structure and reduce the amount of applied Nitrogen.”

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