Farmers' Union of Wales response to a Senedd Economy, Trade and Rural Affairs Committee inquiry on soil health in agriculture

11th April 2025

About the FUW

The Farmers' Union of Wales (FUW) was established in 1955 to exclusively represent the interests of farmers in Wales. Since 1978 the union has been formally recognised by UK Governments, and subsequently by Welsh Governments, as independently representing those interests.

The FUW's Vision is *thriving, sustainable, family farms in Wales,* while the Mission of the Union is *To advance and protect Wales' family farms, both nationally and individually,* in order to fulfil the Union's vision.

In addition to its Head Office, which has thirty full-time members of staff, the FUW Group has around 80 members of staff based in twelve regional offices around Wales providing a broad range of services for members.

The FUW is a democratic organisation, with policies being formulated following consultation with its twelve County Executive Committees and eleven Standing Committees.

General comments

The majority of the themes covered by this inquiry are addressed by the FUW's response to a Welsh Government consultation on its Draft Soil Policy Statement in 2022 (Appendix 1). Therefore, in addition to the further comments below, we would refer members of the Committee to Appendix 1 as well as the Soil Carbon and Baselining recommendations of the Sustainable Farming Scheme Carbon Sequestration Panel summary.[1] The full report is expected to be published on the Welsh Government website ahead of the committee's oral evidence sessions.

The role and state of soils in agricultural systems

Farmers in Wales manage a range of different soil types, even within their own farming systems. Soils themselves are influenced to varying degrees by previous and current management practices, underlying geology, soil structure, microbiota, weather, and increasingly, climate change. Furthermore, different soils can react differently to management practices, making

[1] Sustainable Farming Scheme: Carbon Sequestration Evidence Review Panel: summary report | GOV.WALES

standardised policies, measuring and management techniques difficult (for example, the impact of tree planting on organo-mineral soils and sandy soils' soil carbon content).

Figure 1: An overview of Wales by a) land cover [1], b) agricultural land classification land quality (Predictive ALC Version 2) [2], c) elevation [1] and d) major soil groups [3].

MMH is 'mountain, moorland and heath'; BMV stands for 'Best and Most Versatile' land; SW is 'surface water' and GW is 'ground water'.

Figure 1 (taken from the Welsh Government's review of evidence on Welsh soils).[2]

There is an estimated 410 Megatonnes of carbon stored in Welsh soils[3]. Whilst farmers in Wales manage soils ranging from arable land to peatland, the vast majority of farmland use is permanent pasture or upland rough grazing. This often-undervalued habitat acts as a huge soil organic carbon store in Wales (SOC)[4], subject to very little disturbance in comparison to land used for arable, horticulture, forestry or development purposes. Yet, current private carbon sales only value 'new and additional' sequestration[5,6], and payments are often higher for creating new

[2] Welsh Soil Evidence Review
[3] Russell, S., Blackstock, T., Christie, M., Clarke, M., Davies, K., Duigan, C., Durance, I., Elliot, R., Evans, H., Falzon, C., Frost, R., Ginley, S., Hockley, N., Hourahane, S., Jones, B., Jones, L., Korn, J, Ogden, P., Pagella, S., Pagella, T., Pawson, B., Reynolds, B., Robinson, D., Sanderson, B., Sherry, J., Skates, J., Small, E., Spence, B. and Thomas, C. (2011). Chapter 20: Status and Changes in the UK's Ecosystems and their Services to Society: Wales. UK National Ecosystem Assessment: Technical Report. Assessment of Welsh Soil Issues in Context
[4] Welsh Soil Evidence Review
[5] Regenerate Outcomes
[6] Getting paid for carbon

habitat through Government schemes, as opposed to valuing existing carbon stocks, their protection and enhancement. This means farming practices which have protected and maintained their soil carbon stores (and habitat value) are often at a disadvantage for obtaining further funding.

This lack of disturbance and sustainable management through livestock is reflected in recent research compiled by the Welsh Government's Environment and Rural Affairs Monitoring and Modelling Programme (ERAMMP), which demonstrated no changes in national topsoil carbon[7], in contrast to England. However there was a loss within Arable soils (-7.7%). Arable farmland in England is now seeking the re-integration of livestock to restore their soil organic matter levels[8].

The importance of soil health (particularly soil organic matter- SOM) for providing multiple benefits cannot be understated. It impacts our ability to produce food, recycle nutrients, filtrate water, store carbon, and support biodiversity. However, there is a shift underway within agricultural practices, as the science and understanding around the biological element of soils is developing, alongside how management techniques can directly and indirectly influence these factors. Historic policies and agricultural businesses have focused on dramatically increasing production via chemical means (artificial fertilisers). However, both the scientific and practical implications of the role of mycorrhizal fungi,SOM, root exudates, the sustainable use of inputs and the impact of grazing management and rest on soil health, soil carbon and achieving optimum productivity is now increasingly understood.
The high costs and market volatility of manufactured fertilisers, the direction of agricultural support policies, and an uplift in farmer to farmer knowledge exchange[9][10][11], alongside biological soil consultants is enabling this shift.
This means the adoption of both new and old management techniques such as no or minimum tillage, ensuring diversity of species and deep rooting plants, mob/cell/holistic planned grazing, consideration of anthelmintic use, and outwintering or bale grazing.

The vast majority of Welsh farmland inadvertently follow the five rules of 'regenerative agriculture'[12] - don't disturb the soil, keep the soil surface covered, keep living roots in the soil (depending on the grazing implemented), grow a diverse range of crops (unimproved or semi-natural grasslands have the highest diversity, unless abandoned[13]) and integrate livestock. However, the supply chain and Government-led schemes still lack recognition and reward for ensuring the long term viability and good health of soils. Soil health is a long term investment, however, short tenures, annual Government funding cycles and pressure on tight profit margins makes this long term vision, and implementation, challenging to balance against annual

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[7] https://erammp.wales/sites/default/files/2025-03/Report%20105.%20Wales%20National%20Trends%20and%20Glastir%20Evaluation.pdf
[8] https://www.soilassociation.org/media/25271/sa_ex-livestock_3_web.pdf
[9] Pasture for Life
[10] Regenerative agriculture training, webinars and course in the UK — Regenerate Outcomes
[11] Da Byw
[12] Principles of Regenerative Agriculture - Groundswell
[13] Species-rich grasslands management - Farming for Nature

profitability, in addition to understanding the complexities of soil carbon.

Monitoring of soil health

There is a huge array of soil modelling, research and papers written on Welsh soils via the ERAMMP and Soil Policy Evidence Programme. [14,15,16]

Yet, the vast majority of this data and detail is not communicated back to the farmers managing these soils, representing a missed opportunity for engagement, knowledge sharing and monitoring. However, accurate and cost-effective monitoring of soil carbon through comparable and repeatable measurements is challenging at the farm-level.

The engagement potential is illustrated well in Northern Ireland's Soil nutrient Health Scheme. The largest baseline soil sampling programme ever undertaken has had a 92% farmer uptake, in part due to the delivery of farm-level, and field-level soil data on fertility and carbon stocks, with accompanying LIDAR run-off risk maps and above-ground biomass maps.[17]

The Carbon Panel recommended that Welsh Government makes improvements to its soils monitoring programme to ensure it meets United Nations Framework Convention on Climate Change (UNFCCC) compliant standards to assess soil carbon to a minimum of 30cm, (as opposed to 15cm) recognising that good practice involves sampling to 1m or the bedrock.

Farming Connect currently have an ongoing Welsh Soil project, seeking to understand the carbon content of soils under different management intensity across Wales[18], using a selection of the demonstration network farms. However, comparing averages can be challenging as was reflected in a First Milk and University of Leeds study. The study showed carbon stocks in permanent pastures varying from 35-350 tonnes of Carbon per hectare[19].

Soil sampling has been supported via various Government-led schemes, including Farming Connect. Farmers also pay for their own soil sampling to ensure lime, slurry and fertiliser applications are optimal, or to identify mineral deficiencies which may impact on livestock health. However, the results collected through Government-funded schemes are not noted against fields or farms[20] (such as on RPW Online) due to data sharing technicalities, but rather compiled according to geographical area. They have historically included nutrient indices tests only (P, K & Mg, and also pH), but are now being expanded to incorporate biological factors such as soil organic matter and structure.
The soil testing of field parcels that receive inputs is proposed as a Universal Action within the upcoming Sustainable Farming Scheme (SFS).

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[14] Soil & Peat | ERAMMP
[15] Soil function maps resource review
[16] Soils | Sub-topic | GOV.WALES
[17] Soil Nutrient Health Scheme | Agri-Food and Biosciences Institute
[18] Farming Connect Demonstration Network - Welsh Soil Project
[19] On farm carbon capture - Knowledge Transfer Partnerships
[20] Summary of Farming Connect Soil Results 2023/2024

New markets and companies are taking advantage of this appetite from farmers to understand their soils, particularly carbon levels and the ability to increase (or decrease) their levels, via sales from soil carbon credits. Examples include Agreena, Soil Capital, Trinity AgTech and Regenerate Outcomes - but many will take a significant cut of any credits generated, both in order to pay for the soil carbon baselining and monitoring, in addition to profit.

Applications (paid for) are also available to guide farmers through soil sampling and monitoring, such as Soil mentor[21], which allow you to plot results, observations and photos against GPS field locations, and to benchmark them against other farms. However, at current prices, they are not widespread or widely used.

Soil structure can also be assessed by farmers via the 'Visual Evaluation of Soil Structure'[22] steps, simply using a spade out in the field. Worm count tests can also be done in the field, which give a good indication of organic matter[23].

Classification of soils for land use

(Please see the Soils Policy Statement response)

The FUW endorses the need to protect agricultural soils classified as the Best and Most Versatile (BMV) for sustainable food production, given the challenge of conflicting profitability of different land uses, long term food security, and the increase in population predicted over the next decades, amid increasingly unstable geo-political trade.

However, other grades of land should not be disregarded or left unprotected for food production. Climate change is adding increasing stress to soil health on all types of land, particularly arable land which is generally classified as BMV. This is due to challenging growing conditions and extreme weather, which causes increased compaction or the loss of microbial activity due to drought, or increased levels of pests and pathogens from warmer, wetter weather. This will increase the need for other grades of land to 'fill the gap', whilst delivering on various other land use demands such as biodiversity, energy generation, carbon sequestration and development.

It should also be recognised that using land classifications can often be a blunt tool for determining the appropriateness of certain land areas for other uses such as tree planting or development. The FUW has previously questioned the Welsh Government's intentions to plant 'less productive areas' of Wales with trees given that the areas of Wales categorised as Less Favoured Areas (LFA) and Severely Disadvantaged Areas (SDA) are 79% and 56% respectively, and therefore for many farming business the entire farming system will consist of land classified as Grade 3 or lower. When determining the appropriateness of different land

[21] Soilmentor
[22] https://ahdb.org.uk/knowledge-library/how-to-assess-soil-structure
[23] https://soils.vidacycle.com/soil-tests/1-1-earthworms/

areas for other agricultural or non-agricultural purposes, the FUW maintains that socio-economic and wider environmental factors must also be considered on an equal basis.

The policy and legislative mechanisms to protect soils and productive land (including the Sustainable Farming Scheme, National Minimum Standards and planning policy (amongst others))

The potential for legal frameworks and targets for soils

(Please see the Soils Policy Statement response for an outline of existing policy and legislative mechanisms farmers work within)

A singular Soil Carbon Code[24] is desperately needed, to standardise measuring, modelling, permanence requirements and provide governance around selling Carbon credits from soils. The soil carbon credit market is still considered somewhat of a 'Wild West', whereas there are established codes for Woodlands and Peatlands. Yet, it offers a unique opportunity for farmers to increase carbon sequestration, implement soil and grazing management practices which benefit biodiversity, water quality and soil health, alongside earning a potential new income and helping to reduce GHG emissions.

The challenge with setting targets for soils is their variability and establishing current (and varying) baselines. However, in general, increasing Soil Organic Matter is a good ambition due to the multiple benefits it provides, although some areas will have high existing levels already (such as permanent pastures or habitats in good condition). A farm scale study at 'North Wyke' showed how interrelated Soil Organic Carbon stocks were with various other environmental and productivity indicators, correlating positively with water discharge quality, botanical diversity, liveweight gain and stocking densities.[25,26]

As outlined in our response to the Welsh Government consultation on its Draft Soil Policy Statement, any additions to the current legal framework around soils must consider all types of land management and impacts on soil.

Whilst previous Cross Compliance requirements regarding the management and protection of agricultural soils were in 'return' for the Basic Payment Scheme payment, it is possible that these requirements are introduced as part of a regulatory baseline for all farmers..

The Control of Agricultural Pollution review has also recommended that these (Cross Compliance) requirements are replicated within the regulations. Any steps to bring such measures into regulation would benefit from industry consultation, to ensure they are practical and implementable. The Environmental (Principles, Governance and Biodiversity Targets) Bill will also seek to further strengthen environmental governance, compliance and targets. Soil

[24] https://sustainablesoils.org/soil-carbon-code/about-the-code
[25] https://www.sciencedirect.com/science/article/pii/S1751731118000502?via%3Dihub
[26] Key Research Findings

health also crosses over into the Sustainable Land Management objectives and the Agriculture (Wales) Act 2023 objectives, therefore any targets or legal frameworks for soils should be incorporated into these existing pieces of work.

It is important to emphasise the challenge for farmers having to comply with these regulations and expectations, whilst competing against other agri-food imports produced to far lower environmental standards.

Farmers Union of Wales' feedback on the draft soil policy statement

4th October 2022

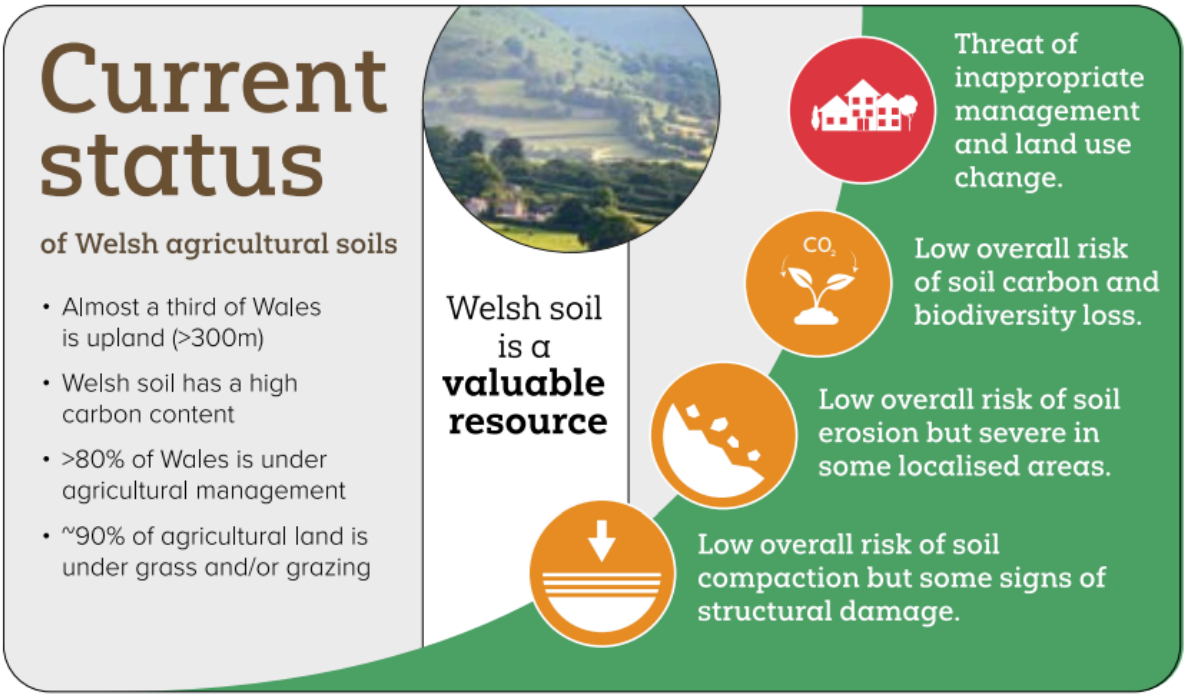
CONTENTS

Farming the Welsh Way

The Welsh Soil Evidence Review[1] is a welcome, useful review and a generally positive document which highlights the soil health benefits arising from the "Welsh Way"[2] of farming. Farming permanent grasslands (>80% of agricultural land in Wales), with mixed (cattle and sheep grazing together) and rotational/seasonal grazing (graze and rest systems, or summer/winter only hill grazing systems) on soils with a 'higher greater carbon content than most soils in England and Europe' all contribute towards;

- keeping soils covered
- a consequently low risk of soil erosion
- high soil organic matter content which contributes towards better water infiltration rates, higher carbon sequestration, and healthier soil microbiology and soil fertility

However, the review recognises the risks to soil health associated with land use change (such as afforestation, development or conversion to arable), inappropriate management (such as compaction) and climate change.



Insufficient consultation period to create a shared vision

The Welsh Government has aimed to gather feedback from farmers on the draft soil policy statement in order to *'ensure it is fit for purpose and represents a shared vision for soil policy*

[1] Welsh Soil Evidence Review & https://gov.wales/sites/default/files/publications/2022-08/review-welsh-soil-evidence-executive-summary_0.pdf
[2] The Welsh Way

in Wales'. However, the FUW would argue that despite the importance of this work, the consultation period has not been transparent enough to ensure this is a genuinely shared vision.

For example, the draft statement was shared only three weeks before the deadline for comment, which has not given the FUW sufficient time to consult fully with its members in respect of its democratic structure. In addition, the small workshops held in September consisted of farmers who had noticed the sign up call during the week prior to the Royal Welsh Agricultural Show makes it difficult to ensure that a wide cross section of farmers were consulted, especially given the soil policy needs to be fit for all farmers.

The key objectives were therefore arguably not shaped by those farmers or land managers who are managing soils every day, and who are most directly influenced by either support or regulations relevant to soils.

However, the FUW appreciates that the Sustainable Farming Scheme co-design has taken priority during this period. The FUW would therefore appreciate the opportunity to share the Welsh Government's response to this feedback with its county branches. Nevertheless, the comments provided below have been compiled from longstanding policies of the FUW.

A soil policy should be holistic

In addition, it is appreciated that the focus of the soil policy statement is on agricultural soils due to 80% of the land in Wales being managed for agriculture. However, that does not necessarily mean that agricultural soils are those with the highest risk of soil degradation. On the contrary, the review recognises the low risks that most of this management poses to soil degradation, therefore, a holistic soil policy should incorporate all land uses, especially those which result in more soil disturbance than permanent pastures - such as forestry ("*Activities associated with afforestation such as planting, management and harvesting disturb soil and can cause soil carbon loss during first rotation forestry*[3] [108], housing, road building, and renewable energy plants.

Existing soil protection, regulation and the impact of competition on farming standards

The FUW welcomes the development of a soil policy and an increased focus on soil health, however, the statement claims 'there is no soil protection policy in Wales'. Conversely, farmers have to comply with a number of rules relating to soils in order to access financial support via the Basic Payment Scheme. For example,

[3] D. Berdeni, J. Williams, and J. Dowers, "Assessment of the impact of tree planting on Welsh organo-mineral soils," Soil Policy Evid. Program. Rep., 2020.

- Cross compliance: rough surface soil guidance[4]
- GAEC 4: Minimum soil cover[5]
- GAEC 5: Managing land to limit soil erosion[6]
- GAEC 6: Maintenance of soil and organic matter[7]

Currently, managing soils in this way in addition to producing food is supported via the Basic Payment Scheme (which makes up around 80% of Welsh farmers' income). However, the Agriculture (Wales) White Paper[8] proposed to make these rules 'National Minimum Standards'. Therefore, all farmers, regardless of whether they are in receipt of any subsidies, will have to comply with these regulations or risk civil sanctions against them.

Whilst Welsh farmers are proud of the high environmental and animal welfare standards Welsh food is produced to, there is a risk, particularly with liberalised trade deals being struck with large agri-exporters[9] that UK agriculture will be undercut, or undermined by the produce being imported. The costs incurred with complying to these higher standards, or the production reduction means that raising the regulatory baseline for Welsh farmers may simply serve to make them uncompetitive at their current level of production, and consequently offshore the UK's environmental footprint to other countries, whilst becoming more dependent on imported food.

Therefore, if the liberalisation of free trade agreements and unfair competition continues, the Welsh Government will need to provide additional support for farmers to ensure environmental standards are upheld and farmers are able to stay competitive. Therefore, the FUW proposes the following changes to the objectives.

Rewarding farmer-led soil health enhancement - alternative objectives

The current objectives proposed are:

Maintain and enhance the soil resource, soil functions and services by:

1. **Reducing soil degradation**
   Maintain and enhance soil organic matter
   Minimise soil erosion
   Minimise soil compaction
   Foster soil biodiversity

2. **Exchange knowledge on the value and vulnerability of soil**
   Enhance effective enhance of knowledge between farmers, decision makers and

[4] Cross compliance: rough surface soil guidance
[5] Cross compliance: minimum soil cover (GAEC 4) (2020)
[6] Cross compliance: managing land to limit soil erosion (GAEC 5) (2015)
[7] Cross compliance: maintenance of soil and organic matter (GAEC 6) (2022)
[8] Agriculture (Wales) White Paper
[9] Farmers' Union of Wales (FUW) submission to a Senedd Economy, Trade and Rural Affairs inquiry into the UK-Australia Free Trade Agreement

scientists

3. **Maintain and develop soil monitoring and modelling**
   Additional monitoring of soil at local scales
   Feedback outcomes to land managers to support farming decisions

The FUW proposes amending these objectives to enable more direct support to farmers for management actions they can take, or are currently undertaking, to enhance soil health.

For instance, the title of the first objective '*reduce soil degradation*' is at odds with the current low evidence of soil degradation on agricultural soils across Wales as a whole. 'No direct evidence for measured erosion rates'... 'grassland is generally considered to be at a low risk to soil degradation'. This gives an unjustified negative impression of agricultural soil management in Wales.

Furthermore, whilst administering and coordinating knowledge exchange, and undertaking additional monitoring are important and valuable objectives, they do not provide direct financial support for on-farm actions to enhance soil health enhancement or cover soil protection measures (as outlined is needed in Section 4.)

Therefore, the FUW would argue for the key objectives to be amended to:

Protect soil organic matter levels

a) It is important to place an emphasis on protecting and maintaining soil organic matter (SOM) content in Wales, particularly due to its value as a large carbon store. Whilst in some instances, soil organic carbon (SOC) is at an equilibrium of emissions/sequestration in soils with existing high SOM levels (and therefore does not represent an active carbon sink) it is still a highly valuable and large carbon store in Wales (the total soil carbon stock in Wales is 410 Mt, with grasslands storing a large proportion of this). As the review emphasises, *'it is of national and global importance that this carbon is retained'.*

b) Therefore, maintenance and protection measures supported by the Government are essential, particularly as any carbon market payments in the future will only value and pay for **new and additional** carbon sequestration.

c) Placing an emphasis on the protection and maintenance of permanent pastures would also value the current agricultural management outlined in Section 1, whilst putting in place measures to avoid compaction (such as track infrastructure and water trough placement as practised on many dairy farms) or erosion, protection of peatlands, and preventing the soil carbon loss from afforestation onto organo-mineral soils.

a) SOM is the best indicator of carbon storage and sequestration, water retention and ease of infiltration, population and diversity of soil biota and accessibility of plant micro and macronutrients. Whilst SOM levels are typically high in Wales, there are multiple (and public) advantages to increasing these levels[10], many of which would reflect the Sustainable Land Management outcomes the new Sustainable Farming Scheme is aiming to achieve[11] (see graphic below).

2.2 Sustainable Land Management Outcomes

The Scheme sets out a range of actions farmers can undertake. However, it is important we make a clear connection between these actions and the outcomes they are seeking to deliver.
These are:

Clean air
Air which has limited pollution (human made particles and harmful gases) including fine particulate matter, ammonia and non-methane volatile organic compounds.

Clean water
The water environment (including inland water) is sustainably managed to support healthy communities, flourishing businesses and biodiversity.

Enhanced access and engagement
People are more easily able to enjoy the countryside for health and wellbeing benefits.

High animal health and welfare
Animals are healthy, productive and have a good quality of life.

Maximise carbon storage
Creating new and enhancing existing carbon stocks on farms.

Mitigate flood and drought risk
Farms prepare for periods of low or high rainfall, reducing the risks to the farm and communities from flooding, drought and coastal erosion.

Protected natural landscapes and historic environment
Conserve and enhance natural beauty, cultural heritage and the historic environment.

Reduced greenhouse gas emissions
Farms reduce their greenhouse gas emissions, through making efficient use of fuel and energy, minimising external inputs and having productive livestock and crops.

Resilient ecosystems
Maintaining and enhancing the resilience of ecosystems delivering benefits for biodiversity, species and habitats.

Resource efficient
Taking a circular approach by keeping resources and materials in use for us as long as possible and avoiding waste.

b) This could include supporting the management actions outlined in the Welsh Soil Evidence review which increases SOM such as; rotational grazing/seasonal grazing/graze and trample and rest management, deeper

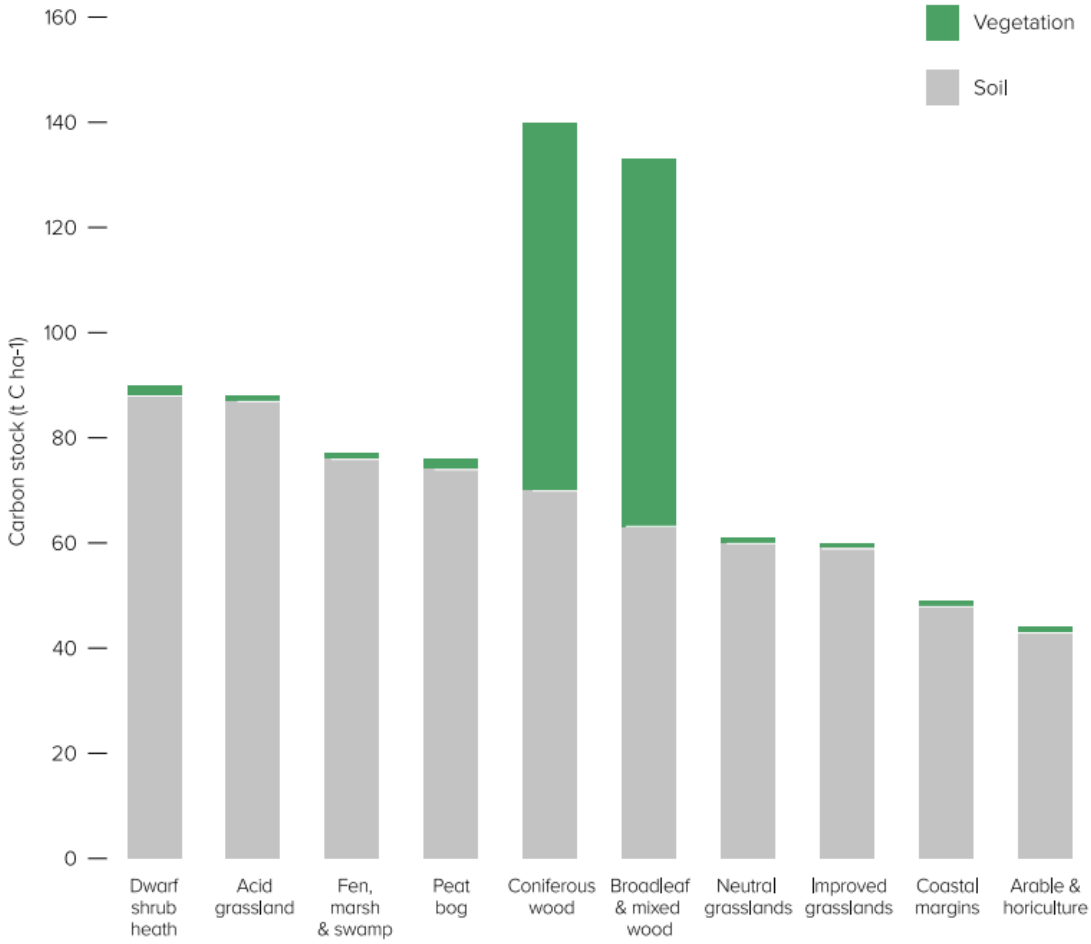
[10] Rotational grazing shown to increase soil organic matter on Welsh farm
[11] Sustainable Farming Scheme Outline Proposals for 2025

rooting and more diverse grass species (whether through allowing native species to grow taller and set seed, or reseeding deeper rooting and mixed species leys into improved grasslands), increasing nitrogen fixing species, ensuring an efficient use of nutrients/inputs, minimum tillage etc.

c) Increasing tree/woody cover has also been identified as a way to increase SOM when including trees on arable land due to the extensive litter, rooting and carbon inputs, however there is a risk of carbon **loss** when planting on high carbon soils, such as peat and organo-mineral soils. Therefore care must be taken not to apply this as a blanket policy to increase SOM/SOC. For example, whilst net carbon sequestration may increase due to the additional biomass within the tree/hedgerow cover (Figure 11), the Welsh Soil Evidence Review states that it can **decrease** the SOC levels (*Other studies have shown a decrease in topsoil carbon 14 years after planting trees in pasture in England [119] or no change in SOC or soil N 26 years after converting permanent grassland to silvopasture or woodland in Northern Ireland [120].) & 'adjacent grassland had a total SOC stock comparable to ancient woodland, which indicated that, for these sites, woodland creation on pasture had little benefit for soil carbon sequestration compared to woodland creation on former arable land [116].)* However, it is recognised that different benefits will arise such as increased crop yields due to reduced wind stress, livestock shelter, improved soil structure from rooting depth, and moderation of temperature extremes.

Figure 11: The soil and vegetation carbon stock in different habitats

Data [57] is from 15 cm deep soil samples in England. Woodland vegetation data is from 50-year-old average rotations.



d) Furthermore, the FUW believes there should be more of an emphasis within the soils policy statement on the **management of grasses and livestock to improve soil health and soil biodiversity.** The agricultural industry in Wales is already a leader in developing grass species[12], grassland management and in sustainable livestock management[13], and therefore there is great potential in harnessing the existing experience and knowledge to further improve SOM and its associated benefits. Yet, the Welsh Soil Evidence review makes limited, or purely negative references to this potential - they state '*a major threat to soil biodiversity is the intensification and extensification of agricultural management'* (which seems contradictory as extensive livestock systems are generally seen as the opposite of intensive management), whilst then admitting that *' Limited evidence currently exists on trends in soil biodiversity in Wales*'.

e) For example, **plant/grassland diversity is a key driver of SOC formation and storage.** *'High plant diversity enhances SOC storage by elevating*

[12] Aberystwyth celebrates 100 years of grass breeding at IBERS
[13] Perfecting the Welsh Way

belowground carbon (i.e., root biomass and root exudates) inputs (13, 14) and promoting microbial growth, turnover, and entombment of necromass (15). Maintaining consistently high levels of biodiversity and root carbon inputs is essential for enhancing SOC storage and persistence in grasslands (Fig. 1)[14] The actions outlined in 2b could help encourage greater diversity into our grasslands, and value those which are already diverse.

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f) Furthermore, '***grazing management and biodiversity restoration can provide low-cost and/or high-carbon-gain options for natural climate solutions in global grasslands.*** *The achievable SOC sequestration potential in global grasslands is 2.3 to 7.3 billion tons of carbon dioxide equivalents per year (CO2e year−1) for biodiversity restoration, 148 to 699 megatons of CO2e year−1 for improved grazing management, and 147 megatons of CO2e year−1 for sown legumes in pasturelands.*[15][16] The FUW would argue these potential gains for Wales should not be dismissed, particularly due to their potential to create multiple benefits, nor impact negatively on food production.

g) There is inconsistency and a lack of clarity in the review about the impact of stocking densities on soil health. Whilst it is understood that, like machinery, livestock can create compaction issues under certain conditions, however, grazing management can also be used to improve soil health and biodiversity. 'Light grazing' is referred to within the review in one section (6.3) as a reduction of stocking rates, and stated to be the most beneficial for soil carbon in grasslands. However, within the global analysis referenced, light grazing is used in the context of seasonal or rotational grazing, with other studies recommending high stocking densities in some instances to trample organic matter into the soil, and encourage growth to increase photosynthesis[17]. This implies that the rest period was more crucial than the stocking rate.

h) Reductions in grazing, and the resultant loss of vegetation structure – for example through the dominance of species such as purple moor grass (molinia) - has had adverse impacts for species such as golden plover and other waders, including curlew[18] - now considered the most pressing bird conservation priority in the UK. Moreover, a more recent study found that trebling sheep numbers led to the largest increase in species diversity on mountain land compared with either the removal of sheep or the introduction of cattle.[19] Similarly, analysis by Plantlife has shown that more than half of all wild plants need regular management or disturbance to thrive, and that 39.6%

[14] Grassland soil carbon sequestration: Current understanding, challenges, and solutions | Science
[15] Grassland soil carbon sequestration: Current understanding, challenges, and solutions | Science
[16] Pasture for Life: A solution to global warming
[17] Managing Grazing to Restore Soil Health, Ecosystem Function, and Ecosystem Services
[18] Changing livestock numbers in the UK Less Favoured Areas – an analysis of likely biodiversity implications, RSPB, December 2012
[19] Long-term impacts of changed grazing regimes on the vegetation of heterogeneous upland grasslands, Pakeman, R. J. et al., Journal of Applied Ecology (2019)

of species would decline within a decade if the land on which they grow is abandoned, while 16.4% would decline within 1-3 years under such circumstances.[20]

i) The review also reveals that in the past 30 years, whilst topsoil carbon was stable in improved land, it **decreased in habitat land** (and increased in woodland). Potentially the lack of livestock dynamics and disturbance has stalled this increase. Whilst the soils review is a comprehensive and detailed review, this area needs far more attention and research.

Increase farmer knowledge of soil management (including through gathering iterative data)

a) As recognised in the draft soil policy statement, knowledge exchange between farmers, and knowledge transfer between experts and farmers is a powerful tool for improving the management of soils. Many farmers are already part of grazing groups, discussion groups and organisations which drive forward their performance.

b) The FUW believes there is a great opportunity within the new Sustainable Farming Scheme and the proposed Sustainability Review to **pay farmers for the on-farm data they provide**, particularly as the Soils Review identifies many areas where more detailed and localised data is required. However, the data should then inform farmers as to what management support/capital costs/advice is needed from the Sustainable Farming Scheme payments based on the data, therefore, providing more **targeted support** and ensuring the data results in direct action/maintenance. Farmers already provide detailed data by completing the Single Application Form on an annual basis via RPW Online, and much more could be done to provide this data **back** to farmers, enabling benchmarking between farms in order to ensure there is an annual, iterative and useful process of data provision.

c) Many farmers are undertaking carbon audits, however, the lack of consistency between calculators, particularly regarding carbon sequestration rates such as from soil, is a barrier to engagement. If the Welsh Government provided consistent, comparable and simple KPIs/proxies for carbon as part of the Sustainability Review, it would provide a large amount of useful data for both farmers and the Government, and begin the process of carbon auditing for many farmers.

d) In addition, demonstrating the business value of soils is an important aspect of knowledge transfer, particularly as soils under agricultural management are not managed in isolation to the business (see objective 4). For instance nutrient management cost savings/optimisation, value of dung beetles/earthworms, the impact of soil compaction on productivity, value of

[20] Rewilding, July 2019

liming etc. Many soil health indicators (such as compaction, earth worm counts) could also be incentivised and tested by farmers themselves, as opposed to being presented in a report, which would also increase knowledge and engagement in soils.

Sustainable Farming Scheme proposals relevant to soils:

(U) Carry out professional and farmer soil testing at Scheme entry and in time for contract renewal to include a combination of:

- Nitrogen (N), Potassium (P), Phosphorous (K), Carbon and pH
- a biological measure e.g. eDNA, respiration counting 'proxy' species (earthworms)
- a physical assessment e.g. infiltration rate, bulk density or Visual Evaluation of Soil Structure (VESS).

(U) Submit nutrient accounts and evidence covering N, P, K ,C and pH.

(O) Optional Actions which impact a farm's nutrient use and soil condition can be found throughout this document, including actions to:

- supplement applied nitrogen with nitrogen fixing plants (establishing mixed swards, planning rotations, cover cropping)
- establish leys and crops with varied rooting profiles (establishing mixed swards, crop rotations, cover cropping)
- improve soil biology (diverse planting, graze and rest practices, minimum or no till, use of anthelmintic plants to reduce wormer usage, habitat management)

(C) Support for farmers to work together in a catchment to improve water quality.

(FC) Farming Connect will provide support for:

- soil sampling
- technical advice to interpret results and use it to benefit their farm and the environment
- farmer-led learning on soil health.

Ensure soil policy, regulation and support enhances, and does not damage, the economic sustainability of family farms

a. 80% of the land in Wales is managed by farmers. Therefore, the management of soils is inextricably linked with the farming businesses and their economic viability and business decisions. They are dependent on each other. The potential negative impacts of market competition, pressure on standards and a higher regulatory baseline to both farming businesses and the health of soil are outlined above, therefore, including this objective would ensure that policies are not designed in isolation to these important considerations.

b. Any policies which influence farming businesses must also consider the significant contributions such families make to Wales' economy, culture,

language and jobs - factors which are all underpinned by ensuring that farming enterprises remain financially sustainable.

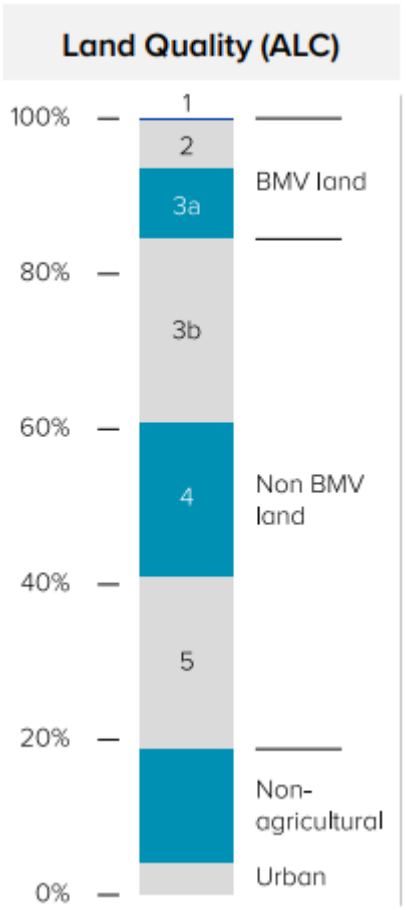
Additional considerations

The impacts of the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 on soils in Wales must be taken into consideration.

The FUW has, on a number of occasions, raised concerns regarding the impact these regulations will have on grazing management and stocking densities. It is evident that the loss of upland and hill reared suckler herds would result in the decline in species diversity and therefore the regulations in their current form go against a longstanding policy of the Welsh government to support farmers through environmental schemes such as Glastir to graze cattle in recognition of the benefit it provides for biodiversity.

Furthermore, these regulations in particular will place significant pressure on cattle farmers to empty their stores before the closed period and spread as much as possible within the limits after the closed period to ensure that storage capacity limits are not exceeded, rather than spreading at the optimal time in regard to weather conditions, soil and crop requirements.

Consideration should also be given to protecting the Best and Most Versatile land for agriculture (10-15% of land in Wales), particularly as there will be more challenging growing conditions in the future. There will undoubtedly be pressure on BMV land from urban, mineral and land-based renewables, development and afforestation, however, the FUW would argue that food security in the future must be safeguarded.


Land Quality (ALC)
100%
80%
60%
40%
20%
0%
1
2
3a
3b
4
5
BMV land
Non BMV land
Non-agricultural
Urban