THE MAGAZINE FOR FARMING & FORESTRY IN WALES

FARMING connect

FARMING connect
cyswllt FFERMIO

Demonstration Network
The use of technology aiding management decisions

Welsh Soil Project
Measuring your soil carbon stock

Llywodraeth Cymru
Welsh Government

ISSUE 43 - January/February 2023 | gov.wales/farmingconnect

FOREWORD - Eirwen Williams

Welcome to the last edition of the Technical Publication in its present form. From 1 April, the new Farming Connect programme will be launched to strengthen the provision and pave the way for the Sustainable Farming Scheme. We will be recruiting a new network of demonstration farms across Wales to represent the various sectors and types of farms across the country. Therefore, if you are interested in becoming a demonstration farm for Farming Connect, we would be very pleased to hear from you. This Technical Publication also will change into a quarterly instead of a bimonthly publication.

We would like to thank those who have contributed to the success of Farming Connect over the years. Since 2015, we have registered nearly 27,000 individuals, have held about 10,000 events and nearly 18,000 people have attended our surgeries and clinics. Nearly 5,000 businesses have received advice through the advisory service with a recent survey showing that 93% said that they had changed or intended to change the business following the advice. In addition to this, we have established 55 joint ventures, and would encourage anyone who is considering taking a step back from managing a farm to contact us to give those who want to start farming the opportunity to step onto the ladder. There is no doubt that we all learn throughout our lives, and we can learn, not only from experts in various fields but also from other farmers. Joining our discussion groups is a good way of doing this, or taking advantage of our mentoring scheme where farmers mentor other farmers. Over 750 people have been part of the mentoring scheme, with over 90% of them saying they would recommend the scheme to other farmers.

In looking forward to the new Farming Connect programme, I would like to encourage all of you to contact us. We are here to help!

Glanmynys — Peredur Owen & Carine Kidd

TECHNICAL OFFICER: Menna Williams
PROJECT TITLE: Utilising software to make management decisions

Peredur Owen and Carine Kidd have started to incorporate FARMAX software into the farm management. This software assesses the dry matter requirements of the stock alongside the dry matter production of the forage. It is vital that accurate data such as grass measurements, stock number and weights are inputted into the FARMAX software to generate information that can be acted upon. Growth in 2022 and demand levels can be seen in Figure 1, and highlights a pinch point in January and February and again between June and September 2022. This is identified when the thin green line dips under the thick green line.

Investigatory work was undertaken to identify a management decision that can alleviate these pinch points. The best scenario identified was to send 840 ewes away on winter keep. The dry matter deficit from December 2022 through to March 2023 (red box) is eliminated as the grass will have an opportunity to recover. By July 2023 (red box), the supply dips below the target line due to closing an area out for silage, but from September 2023 (blue box) onwards, the supply remains on target.

Figure 1. Pasture cover for Glanmynys between December 2021 and November 2022

Figure 2. Pasture cover prediction at Glanmynys for 2023

In addition, Table 1 shows how ewe body weight increases both at tupping and weaning as a result of sending more ewes away on winter keep. The increase in body condition score also results in more lambs weaned and at higher weights.

Sheep year:	2021 - 2022	2022 - 2023	2023 - 2024
Average lamb weaning weight. Base v Scenario	23 kg - 25 kg	24 Kg - 26 kg	22 kg - 24 kg
Ewe lambs mating to lamb. Base v scenario		25 - 25	55 - 25
Average ewe weigh at mating weight. Base v scenario	55kg - 55 kg	54 kg - 55.3 kg	54 kg - 56 kg
Average ewe weigh in July weight after weaning. Base v scenario	53 kg - 53 kg	54 kg - 58.2 kg	48 kg - 57.5 kg

Table 1. Comparison between historic management (base) and sending more ewes away on winter keep (scenario).

Looking at the economics of this scenario, taking into consideration the improvement in animal output outlined in Table 1, the gross margin increases by £89/ha grazed after estimating winter keep at £1.50/ewe/week.

Having this ability to forecast and produce scenarios has given Carine and Peredur the confidence to send more ewes away on winter keep to reduce possible future shortages. The most alarming finding from the forecasting is how the management decisions taken now have a long-term effect and, in this example, it takes nearly two years to get to a point where the supply and demand levels are matched.

Remember, when using any software, the more accurate the data that is inputted, the better the management decisions you can make.

For further information on this project, please scan or click on the QR code or visit the Farming Connect website; **gov.wales/farmingconnectourfarms**

Moelogan Fawr — Llion & Siân Jones

TECHNICAL OFFICER: Non Williams
PROJECT TITLE: Using bolus technology to improve conception rates, calving pattern and health monitoring

Project update:

Trialling innovative technology to improve herd fertility has been at the centre of Moelogan Fawr's work as one of Farming Connect's red meat demonstration sites. The main aim of the project from the outset was to reduce the calving period via the use of bolus technology and increasing data collection in order to:

- Reduce labour inputs by using technology to aid heat detection
- Reduce the cost of veterinary fertility and health treatments

Key outcomes from the first year of the project (2020) indicated that a total of 95% of the heifers that received a smaXtec rumen bolus to aid with heat detection were in-calf (following a total of two artificial insemination (AI) cycles and bull turnout).

Project developments in 2022 saw a total of 50 upgraded smaXtec classic SX.2 rumen boluses administered to yearling Stabiliser heifers in spring 2022. The upgraded bolus measures rumination, giving more accurate heat and calving detection. In addition to this, this bolus system had a longer readout range (150-300m) than the previous system, meaning that there was no need to move the base station around the fields with the heifers. This resulted in a significant time and labour saving for Llion and Siân Jones, who farm at Moelogan Fawr.

Scanning results indicated that a total of 56% of the heifers were in-calf following one AI cycle (in comparison with 57% in-calf following two AI cycles in 2021 without the use of the bolus and with significantly more labour input). An additional 36% were in-calf following bull service. Of the 56% in-calf following one AI cycle, 14% were detected on heat by the bolus alone (not seen to be bulling). This result will be key in shortening the 2023 calving period as the farm aims to continue to improve the herd fertility based on improved genetics, less labour and tightening the calving period and interval.

Figure 3. Heifers and calves at Moelogan Fawr

For further information on this project, please scan or click on the QR code or visit the Farming Connect website;
gov.wales/farmingconnectourfarms

Erw Fawr — Ceredig & Sara Evans

TECHNICAL OFFICER: Non Williams
PROJECT TITLE: Use of LoRaWAN sensors to improve the timing of fertiliser applications and silage quality at Erw Fawr

Erw Fawr has utilised soil and air temperature sensors to aid decision-making associated with silage production on the farm. Long Range Wide Area Network (LoRaWAN) sensors have been deployed on the farm as part of Erw Fawr's role as a Farming Connect dairy demonstration site, as well as the involvement in an European Innovation Programme (EIP) project that focuses on the use of sensor technology to improve slurry management. Data from the sensors are relayed to a visual dashboard (Figure 4) that is accessible on a computer or mobile phone.

Erw Fawr also participates in Farming Connect's Welsh Pasture Project. The temperature and moisture information captured by the sensors, along with grass growth measurements taken as part of the Welsh Pasture Project has aided the farmer, Ceredig Evans, to make data-driven decisions in relation to the timing of fertiliser applications as well as silage cutting dates. As seen in Figure 4, there was a rise in soil temperature during mid-end of March, as well as during mid-end of April of 2022. This resulted in early fertiliser application, and an excellent first cut of their multi-cut silage system being taken at the end of April (D-value = 733 g/kg, Crude Protein = 174 g/kg, Metabolisable Energy = 11.7 MJ/kg). The time between the first and second cut was reduced in comparison with that of the previous year, which was very beneficial later on in the season, given the dry weather conditions impacting grass growth during the summer.

The detailed information gathered via this innovative sensor technology has positively impacted the farm from a performance and profitability perspective.

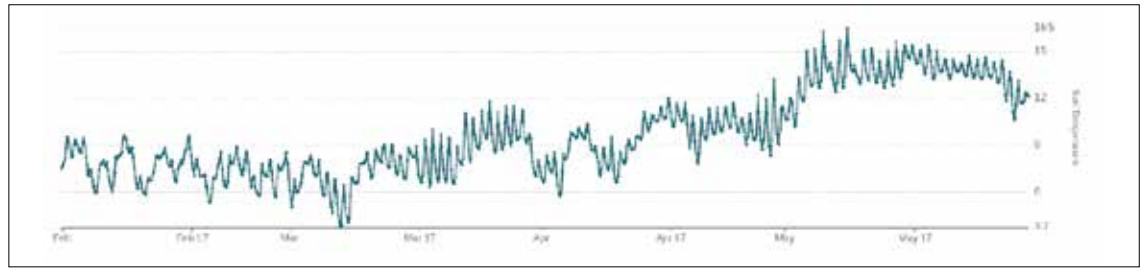


Figure 4. Soil temperature data from one of the sensors from February-May 2022.

For further information on this project, please scan or click on the QR code or visit the Farming Connect website;
gov.wales/farmingconnectourfarms

TECHNICAL OFFICER: Dr Delana Davies

PROJECT TITLE: Using LoRaWAN connectivity to monitor real time soil nitrate levels in a winter wheat crop

This project made use of the existing LoRaWAN gateway at Pantyderi demonstration site to collect and monitor real time soil nitrate readings in a winter wheat crop. The project collaborated with an Innovate UK project developing the use of soil nitrate sensors, based at the John Innes Centre in Norwich.

Three sets of nitrate sensors, together with temperature and moisture sensors, were installed at the top, middle and bottom of the field at 15cm soil depth and connected to a LoRaWAN transmitter. Data recording continued from the end of October 2021 through to crop harvest in July 2022.

Figure 5: Set of soil nitrate, temperature and moisture sensors with LoRaWAN transmitter

Soil nitrate sensor readings

Following placement, the nitrate sensors showed readings two to three times higher than expected for normal soil basal levels and this was assumed to represent the available nitrogen fixed by the previous bi-crop of peas and beans. Advice given by Prof. Tony Miller was to wait until nitrate levels dropped by 20% before applying nitrogen fertiliser, but there was no evidence of this occurring over the winter period (figure 6).

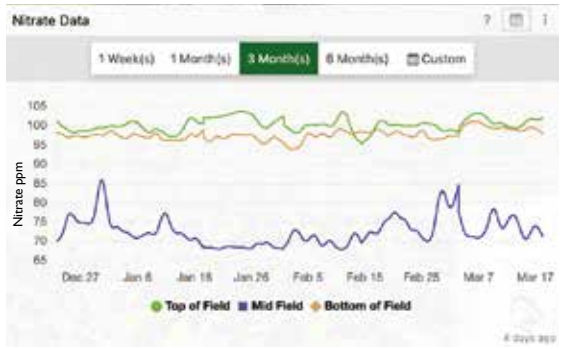


Figure 6: Nitrate sensor readings from December to March

A 25% nitrogen fertiliser with 5% sulphur was applied at the end of March at the rate of 150kg/ha, although no significant response was recorded by the sensors. It was suggested by the project team that they should be dug up and replaced, and the old sensors were returned for calibration. On testing, these sensors showed poor sensitivity to nitrate, particularly in the lower concentrations where finer changes are detected, which confirmed suspicion that they deteriorate over time and have a soil life of no more than 4-5 months.

Figure 7: Replacing the nitrate sensors on 26 May

Soil temperature and moisture readings

The ability to collect data every two hours on soil characteristics at 15cm depth provided a valuable insight into this exposed field at 230m above sea level. Soil temperatures of 6-7°C are required for nitrogen mineralisation and uptake, coinciding with increased soil biological activity and plant growth, and this was not recorded consistently until mid-April.

Soil moisture is also critical to nitrogen use efficiency and soils began to dry out in mid-March and continued in this vein all summer. Later nitrogen applications were therefore made by foliar spray to ensure the best outcome for this expensive input.

Conclusions

LoRaWAN connectivity has worked well to collect and transmit large volumes of real time data and the Innovate UK project team are encouraged enough by the results to investigate this application further in their work.

The use of nitrate sensors can provide valuable insight into how water-soluble nitrate levels are changing in the soil at plant root depth, with the potential to increase nitrogen use efficiency. The sensors obviously need more attention to develop their robustness under field conditions.

The winter wheat crop yielded 9.7t/ha and YEN Grain Nutrient Benchmarking results showed that the crop was not deficient in nitrogen despite receiving around 50% less applied nitrogen than the normal crop recommended level.

Soil temperature and moisture sensors are cheap to deploy and together with automatic collection of data using a LoRaWAN gateway, have the potential to provide farmers with specific knowledge that can improve timing and quantities of nitrogen application for a particular field. It may also help provide an indication of conditions where foliar nitrogen application would give a better outcome than soil application in a moisture deficient situation.

For further information on this project, please scan or click on the QR code or visit the Farming Connect website; **gov.wales/farmingconnectourfarms**

RHWYDWAITH ARDDANGOS DEMONSTRATION NETWORK

TECHNICAL OFFICER: Simon Pitt
PROJECT TITLE: Selecting for efficient genetics in a spring calving herd

Background

This project was set out to review the opportunities and potential for maximising genetic gain from replacement dairy heifers in a spring block calving herd. The selection criteria must take account of the breeding goals set by the farm as well as ensuring sufficient replacement animals are available to meet any losses due to bTB breakdown.

Introduction

Mountjoy is a late spring block calving herd run by the Hannah family, with most day-to-day decisions made by Will Hannah. Due to the prevalence of bTB in the area, the Hannah family have consistently reared more heifers than needed, with limited breeding goals set to ensure animal numbers are maintained.

The farm extends to 186ha, predominantly as the grazing platform for the 370 milking cows and 200 replacement dairy heifers. The breeding criteria in recent years has been for a compact NZ Friesian grazing animal to produce high milk solids and milk from forage.

The aim of the project was to evaluate the strengths and weaknesses of the youngstock's genetic potential, with an opportunity to sell the remaining heifers, leaving the best to fulfill the 20% replacement rate.

The following breeding criteria were set by the Hannah family as their breeding objectives:

- Positive weighted fat and protein
- Positive fertility
- Positive locomotion
- *TB resistance
- Body depth and width

**TB Advantage was introduced as a new breeding trait in 2014. It is on a scale of +3 to -3, with a positive score being desirable. The trait has been developed to breed resistance to bTB within a herd. The value is available for all genomically tested bulls and genomically tested females.*

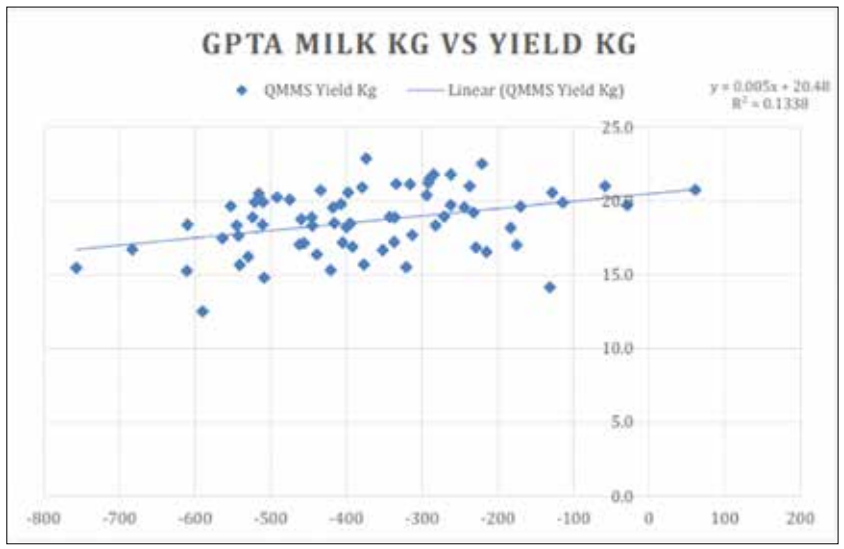


Figure 8: Genomic prediction compared to actual milking performance.

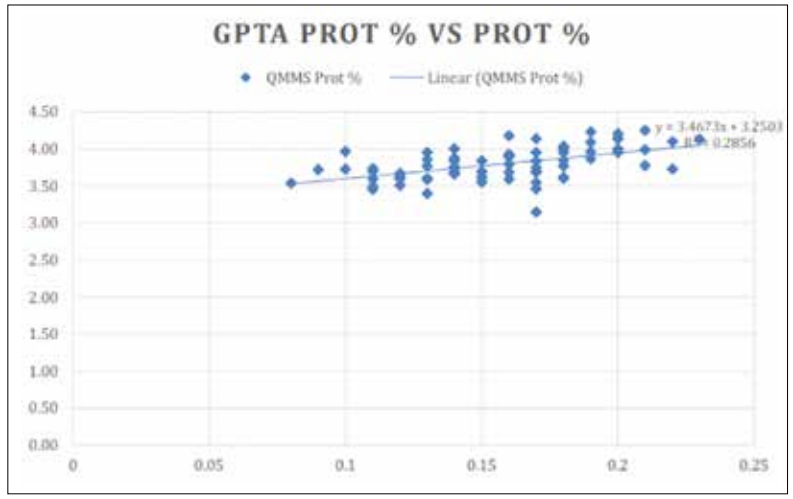


Figure 9: Genomic protein % prediction against actual milking performance.

Figure 9 shows the same blue diamonds to indicate the genomic prediction for percentage protein with the blue line showing the actual milk recording results.

Results

As can be seen from figures 8 and 9, the genomic production traits generally tracked the actual performance of the animals once they calved into the herd.

Conclusions

We can see from the results that genomic testing allows us to pick and choose the replacement heifers which can have a significant impact on which animals to retain in the herd for best performance.

With a range of +61kg to -757kg on milk solids within the group tested and a £PLI range of £286 between top and bottom, huge genetic progress can be made in one generation.

Even with the bTB restriction risk, using genomics to ensure the Hannahs only breed replacements from their best animals will result in rapid genetic progress.

If the opportunity then arose to be able to sell some of the poorer animals, this would speed up the on-farm performance as the weaker animals are diluting the milk quality of the best, for example.

A key trait to focus on going forward is selecting for a negative SCC (somatic cell count) value, whilst also maintaining the strengths in milk solids and further enhancing health traits.

At around £25 per test, when a replacement heifer costs between £1,000-£3,000 to rear from birth to calving, genomic testing would appear to be a worthwhile management tool for the Hannah family in the drive to improve output and breed a naturally healthy herd.

For further information on this project, please scan or click on the QR code or visit the Farming Connect website; **gov.wales/farmingconnectourfarms**

EIPWALES

Cydweithio er ffyniant gwledig
Collaborating for rural success

Faecal egg count (FEC) sampling can significantly reduce the need to worm dairy and beef youngstock for roundworms without impacting on their health and performance.

A three-year European Innovation Partnership (EIP) Wales project on dairy farms in Ceredigion resulted in all three farms managing their R2 yearling heifers at grass without the need to treat them for gut round worms.

The Mossman family, who run 100 R1 and 100 R2 heifers, previously followed the standard practice of routinely worming heifers three weeks after turnout and every five weeks thereafter during the grazing season.

Figure 10. Chris Mossman

But with testing showing consistently low egg counts, the Mossmans had the confidence to not treat their R1 and R2 heifers at all.

"We surprised ourselves because we didn't think it would be possible," said Chris Mossman, who farms with his wife, Debbie, and daughter, Bella, at Nantybach, Llangrannog.

The other two farms; Pentrefelin, Talsarn and Henbant, Talgarreg which had a higher worm burden, wormed their R1s less often. They also switched to using white (1BZ) drenches and yellow (2LV) drenches after efficacy testing showed a reduced efficacy of the clear (3ML) wormers.

The data collected during the EIP project showed that there were similar growth patterns to previous years when clear wormers were used and heifers were dosed routinely, therefore, the changes in worming treatments had no obvious negative effects on performance.

One of the experts involved in the project, Professor Diana Williams, from the University of Liverpool's Veterinary Parasitology Research Group, said

"Traditionally the advice to farmers was to dose first season grazing calves in the early part of the season to prevent disease mid-season but, because of lots of factors such as climate change and wormer resistance, that advice needs to change.

Figure 11. Professor Diana Williams examining slides

"This project has demonstrated that we can reliably use FEC (faecal egg count), alongside growth rate data and calf condition, as a means of monitoring infection during the grazing season and only treat when the animals actually need it rather than dosing by calendar date."

The EIP project showed big differences in EPG (eggs per gram) levels on each of the farms in the trial, despite all three having spring calving, and similar grazing systems.

One of the issues thrown up by the project is the threat of lungworm when wormer used to control gutworms is reduced.

"If you are starting to think about FEC to control gastrointestinal worms, you can't forget about lungworm," warned Professor Williams. "Seek veterinary advice if there is any reduction in growth rates or animals are coughing."

Quarantining all incoming stock will reduce the risk of bringing lungworm onto the farm and R1 heifers can be vaccinated before turnout to protect against lungworm.

For further information and to read the final report, please scan or click on the QR code or please visit the Farming Connect website; **gov.wales/farmingconnect**

WORMER RESISTANCE

The project found a significant lack of efficacy of the 3ML group of anthelmintics on two of the farms where several faecal egg count reduction tests (FECRTs) using Techion UK's FECPAKG2 system were carried out.

This was found in wormers where both ivermectin and the longer acting moxidectin were the active ingredient.

On one of the farms, treatment with a pour-on clear wormer showed that on one occasion it had an efficacy rate of just 8% and it was never higher than 81%.

In contrast, benzimidazole and levamisole – white and yellow wormers – were fully effective, giving a 100% reduction.

The results from a FECRT give a picture of possible resistance, said Eurion Thomas, of Techion UK, who was also involved in the project.

He recommends a FECRT every two to three years to ensure that the wormers that are being used are working.

Mr Thomas said the research highlighted why farms shouldn't rely on one class of wormer and that farmers should fully understand which active ingredients are in the product they are using.

TECHNICAL OFFICER: Debbie Handley

PROJECT TITLE: Building a farm destination experience around existing resources

A young farmer's resolve to make his family farm self-sufficient and remove its reliance on direct subsidy payments has been the catalyst to a successful horticulture diversification.

Ed Swan joined his parents, Clive and Gail, at Ffrith Farm, near Treuddyn, Mold, after studying agriculture. He made it his goal to further increase the self-sufficiency of the business – the Swans already had a well-established farm shop.

With a land base of 200 acres and a need for three people to make a living from it, further diversification beckoned.

"We didn't want to go down the route of economies of scale, chasing high-value land, but to make what we already had earn more," Ed explains.

With that in mind he signed up as a Farming Connect focus site, exploring options for building a farm destination experience around existing resources, supported by Farming Connect Horticulture Technical Officer Debbie Handley.

Ed's unintentional inclusion of a high percentage of sunflower seeds in a herbal ley mix for grazing cattle in 2021 had already sparked one idea for achieving that.

"It was a happy mistake," says Ed and in discussion with Debbie, I decided to look at pick-your-own as it ties in with everything else we have here."

Three acres were planted with sunflowers and in 2022, 2,500 flowers were sold. That enterprise filled a summer dip in business in the farm shop, when many of the regular customers were away. To bolster income in late autumn, when sales can tail off before the busy Christmas period, a 'pick your own pumpkins' for Halloween was developed.

Throughout his focus site work, Ed was supported by ADAS horticulture specialist Chris Creed.

"No questions went unanswered by Chris or by Debbie," he says. "Having them come in to review the project kept me in line, they weren't shy to tell me if I was doing something wrong and that was a good thing!"

Figure 12. Ffrith Farm sunflowers

An area of land below the shop, previously wasteland, was drained and earmarked as the pumpkin patch. Ed bought 4,000 pumpkin seeds and commissioned a local nursery to grow them on to plugs – the total cost for both was £700. That approach yielded a 90% success rate after planting out.

Potash applied at 200kg/acre cost £400 and £200 was spent on fungicide to tackle powdery mildew caused by the summer heat wave.

The business invested £200 in a fleet of 14 wheelbarrows for customers to collect their pumpkins.

When the crop was ready to be picked, customers came in their hordes, paying from £2-£8 for a pumpkin, with many buying several.

In setting the price point, Ed struck a balance between being competitive and making a profit. "As farmers, I think we often struggle with recognising the value of what we are producing," he admits.

The income from the PYO business has added to farm profitability, and that gives Ed confidence as he looks ahead to the eventual removal of the Basic Payment Scheme (BPS).

Although the Sustainable Farming Scheme (SFS) is heavily weighted towards environmental goods, he believes farmers shouldn't need a financial incentive to work with the environment.

One of the many measures he has in place to support wildlife and biodiversity is leaving his sunflower crop in situ over winter, as feed for birds.

"It is our environment as much as anyone's, I don't think we should expect to be paid to look after it. It shouldn't be the only reason why we are making progress," says Ed.

Figure 13. Ffrith Farm pumpkin July 2022

Figure 14. Ed Swan at Ffrith Farm

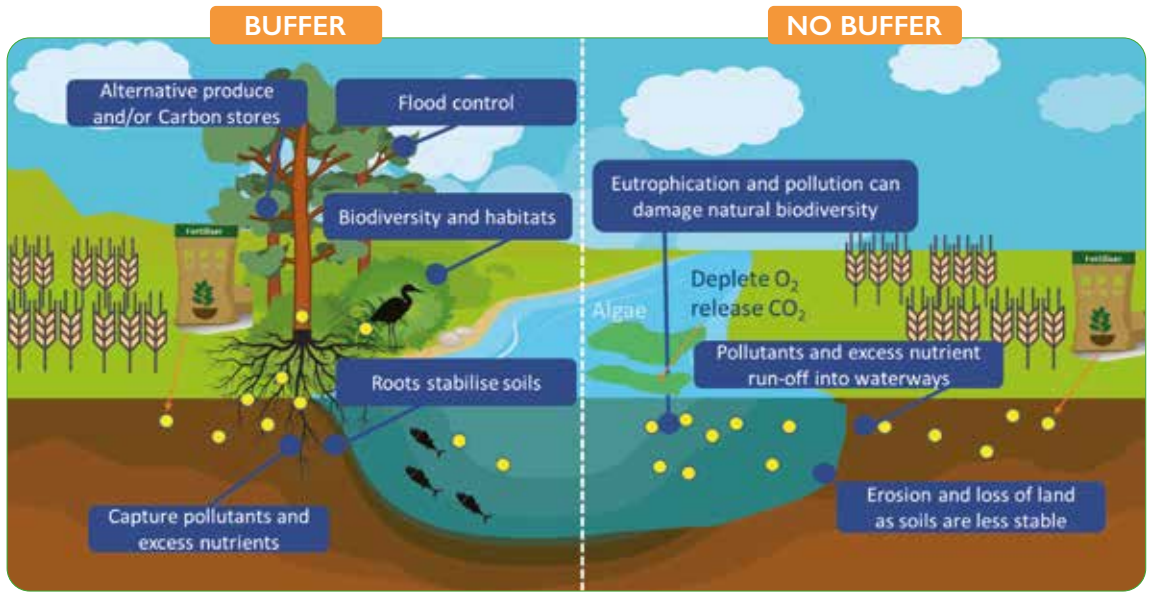
For further information on this project, please scan or click on the QR code or visit the Farming Connect website; **gov.wales/farmingconnectourfarms**

RHWYDWAITH ARDDANGOS DEMONSTRATION NETWORK

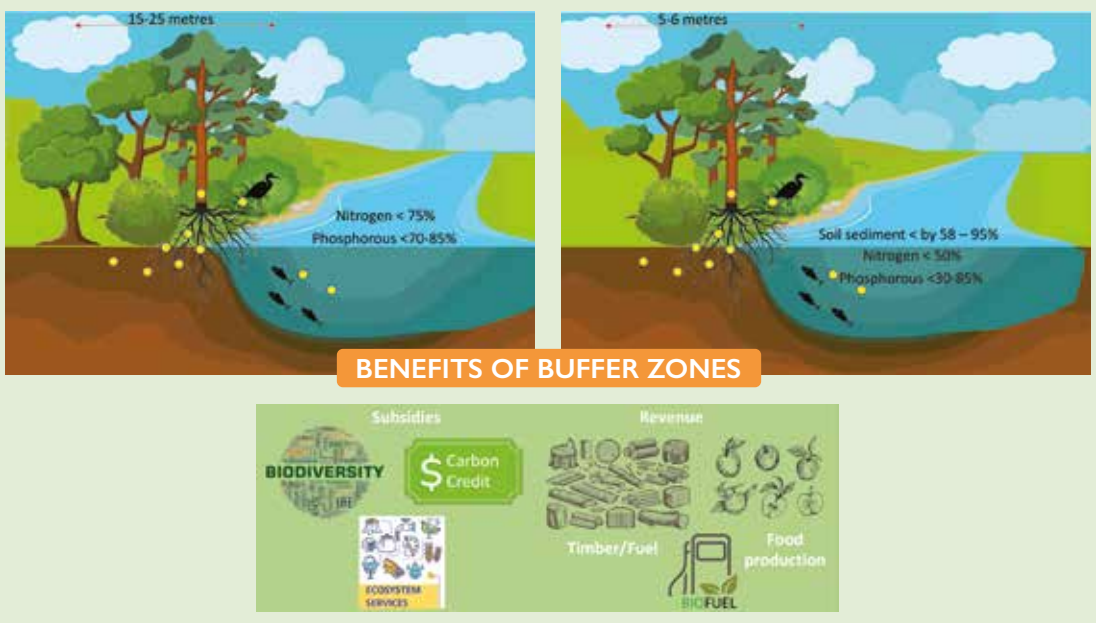
The Farming Connect Knowledge Exchange Hub

Riparian buffers

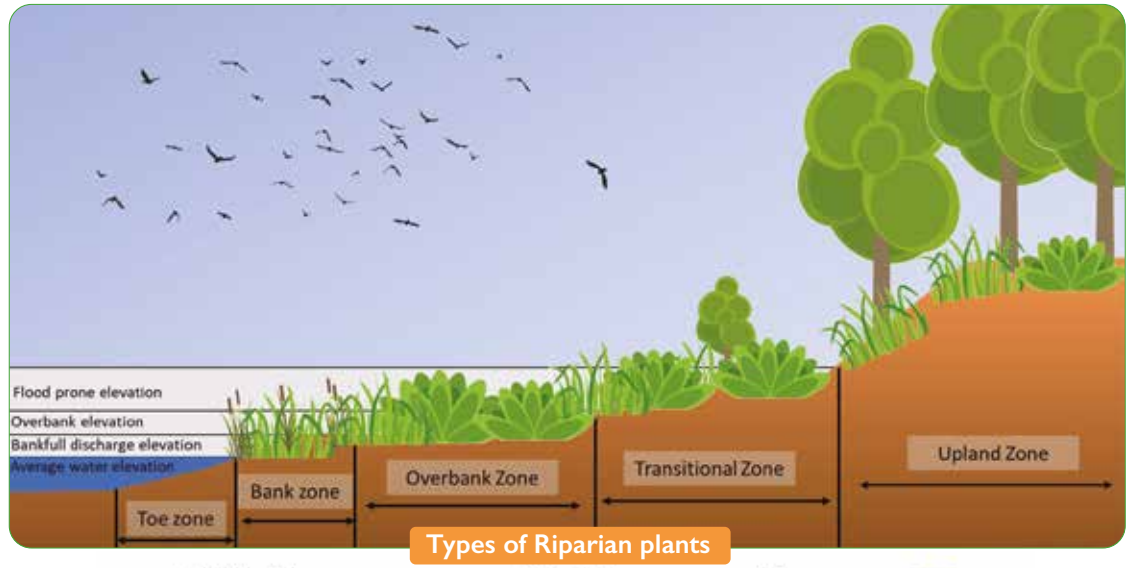
➜ Riparian buffers are physical and biological barriers between our fields and waterways. They block, absorb and filter nutrients, particles and chemicals reaching waterways.



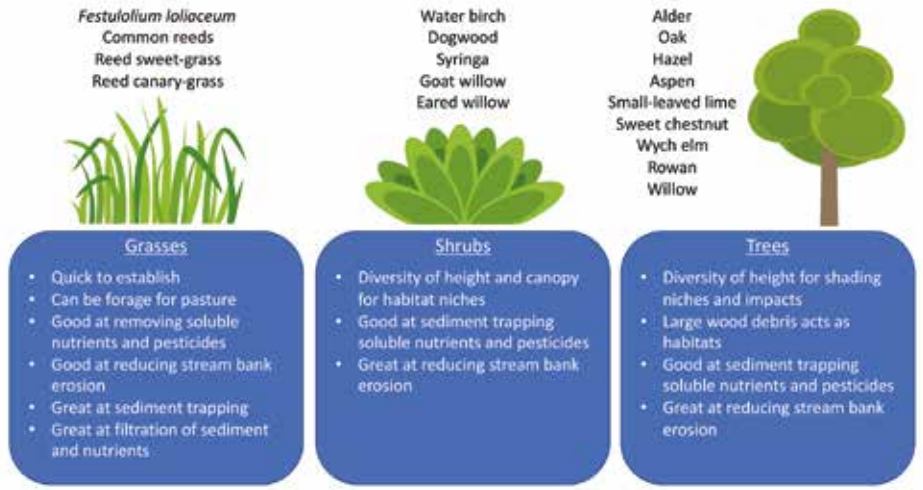
➜ Any vegetation strip or buffer is better than none, but generally the wider, the better.



➜ Different riparian zones are present next to waterways; each of these has a different vegetation type that have different abilities to deal with water and floods.



Types of Riparian plants



➜ Realistically different riparian plant types and species have different strengths and weaknesses, so mixed-species systems function best and achieve habitat mosaics with:

Native woodlands with closed canopies | Open glades within the woodland | Open ground, especially in the aquatic zone | Occasional isolated tree to allow large growth | Patches of scrub

TECHNICAL OFFICER: Lynwen Mathias
PROJECT TITLE: Managing the change: Sucklers to dairy beef project - cattle feed rations

Maximising the utilisation of grass on farm is an important aim for Neil at Cefnllan near Llangammarch Wells, a red meat demonstration site. A project which involved changing from a suckler herd to dairy beef has been happening at Cefnllan during the past three years. One of the aims of the project was to improve silage quality from 63 to 70 D value (digestibility value) and aim to achieve 0.8kg daily liveweight gain over the winter within the cattle system using a low level of concentrate supplement.

Hefin Richards, Rumenation has been working with Neil during the past three years to draw up rations for the cattle at Cefnllan. The housed growing cattle diet is based on a high forage ration and then a higher starch ration is given to accelerate the finishing period to minimise the time on-farm. Silage quality is an important factor for the beef enterprise at Cefnllan with red clover in the swards to target high D value and protein. In addition to the silage, there are undersown cereals which provide forage-based starch to the cattle. As much as possible is grown on-farm, with any gaps in the ration bought in. During the summer, multiple cuts of silage were done (clamp and bales), with a silage analysis done on three cuts.

	D Value (% DM)	Crude protein (% DM)	Dry matter (%)	ME (MJ/kg DM)
Cut 1- Clamp	71.19	11.87	28.39	11.39
Cut 2- Bales	73.50	16.56	38.02	11.76
Cut 3- Bales	71.49	19.10	46.85	11.44

Table 2. Cefnllan's 2022 silage analysis

As seen in the table above, the first cut was disappointing in crude protein compared to the other two cuts and all three cuts had a D value above 70. The grower ration drawn up consisted of the clamp and bale silage, minerals and a blend, with the blend manufactured to order and fed at around 1.75kg/head/day along with silage. The cattle are weighed regularly to allow performance to be monitored closely.

Figure 15: Cattle at Cefnllan

For further information on this project, please scan or click on the QR code or visit the Farming Connect website;
gov.wales/farmingconnectourfarms

RHWYDWAITH ARDDANGOS DEMONSTRATION NETWORK

PROSIECT PRIDD CYMRU
WELSH SOIL PROJECT

The Welsh Soil Project was launched in spring 2022 with the aim of estimating the soil carbon stock of multiple fields on Farming Connect's demonstration sites.

There is often confusion between different terms in relation to carbon. Here are some broad definitions to differentiate between them from a soil perspective -

Carbon sequestration – the fixing of carbon from the atmosphere by soils

Carbon stock – the quantity of carbon stored within soils

Carbon source – soils that are releasing carbon

Soils may be carbon sources or actively sequestering carbon depending on a number of factors, such as land use, management practices, climate and soil type[1]. Changes in soil carbon stock occurs gradually over several years, and accumulation over time mean that the capacity of soils to further sequester carbon eventually becomes limited[2,3,4]. This can present a challenge to accurately determine and predict changes to soil carbon stocks due to sequestration. However, many more farmers have shown an interest in quantifying and understanding their soil carbon stocks in recent years.

Measuring your soil carbon stock at present and re-assessing in future years in order to monitor the change in carbon stock allows you to calculate the annual soil carbon sequestration rate[5] (i.e. the amount of carbon sequestration that has taken place in between measurements). It may also help farmers understand the importance of managing soils in a manner that will have a positive impact on soil health, microbial activity, nutrient supply and crop/pasture yields. Generally, current estimates of soil carbon sequestration rates are modelled based on scientific knowledge due to a lack of data available[6].

Some soils may have reached their capacity in terms of their carbon stocks. In these incidences, despite the fact that the soil will not be able to sequester much more carbon, it is very important that the carbon currently stored in the soil is not lost and that the land is managed in a manner that will promote its role as a carbon store.

1 Freibauer, A., Rounsevell, M.D.A., Smith, P., Verhagen, J., 2004. Carbon sequestration in the agricultural soils of Europe. Geoderma 122, 1-23.

2 CIEL, 2020. Net Zero Carbon & UK Livestock. Centre for Innovation Excellence in Livestock. [Online]. Available at: https://www.cielivestock.co.uk/wp-content/uploads/2020/09/CIEL-Net-Zero-Carbon-UK-Livestock_2020_Exec-Summary.pdf. Accessed December 2nd, 2022.

3 West, T.O., Six, J., 2007. Considering the influence of sequestration duration and carbon saturation on estimates of soil carbon capacity. Climatic change 80(1), 25-41.

4 Smith, P., 2014. Do grasslands act as a perpetual sink for carbon?. Global Change Biology 20(9), 2708-2711.

5 Smith, P., 2021. How to measure, report and verify soil carbon change. AGU Fall Meeting Abstracts, Vol. 2021, GC41D-01.

6 Jandl, R., Rodeghiero, M., Martinez, C., Cotrufo, M.F., Bampa, F., Van Wesemael, B., Harrison, R.B., Guerrini, I.A., Richter Jr, D.D., Rustad, L., Lorenz, K., 2014. Current status, uncertainty and future needs in soil organic carbon monitoring. Science of the Total Environment 468, 376-383.

For further information on the Welsh Soil Project, please scan or click on the QR code or visit the Farming Connect website;
gov.wales/farmingconnectourfarms

Control of Agricultural Pollution Regulations
WATER REGULATIONS

The second phase of the regulations came into force on 1 January 2023. Some farm businesses will see minimal or no impact; others may need support to become compliant.

In areas previously within a Nitrate Vulnerable Zone, there is no phased approach and all of the rules have been applied from 1 April 2021.

Nutrient management planning

The Nutrient Management Plan is used to demonstrate your compliance with the Regulations, but it is also an important tool in managing the optimum application of nitrogen fertilisers to your holding which can improve crop growth, reduce the use of manufactured fertiliser and reduce the risk of pollution.

- Fertiliser inputs must not exceed specified crop limits.
- A limit of 250kg/ha of nitrogen applies to the spreading of organic manure to any field each year.
- Recording the import or export of organic manures.
- Welsh Government provide templates for the recording of Nutrient Management Plans; however, you can maintain your own records provided the criteria of the regulations are met.
- Copies of Nutrient Management Plans must be stored for a minimum of five years and must be made available for inspection if requested

Storage of organic manures (other than slurry)

Organic manure (other than slurry); or any bedding contaminated with any organic manure must be stored either:

- In a vessel
- In a covered building
- On an impermeable surface (liquid arising from any solid manure stored on an impermeable surface is classed as slurry and must be contained appropriately)
- In a temporary field site

Temporary field sites

Temporary field sites must not be located:

- In any single position for more than 12 consecutive months or the same place as one constructed within the last two years
- In a field liable to flooding or becoming waterlogged
- Within 10m of surface water or a land drain, within 30m of a watercourse on land identified as having an incline greater than 20% or within 50m of a spring, well or borehole.

Risk maps

Risk maps must be produced and can be designed to enable you to comply with other measures as well as these Regulations. You must update the risk map with any changes and you must keep all copies of your risk map, for a minimum of five years.

You can view the Farming Connect factsheet on risk maps or the Welsh Government guidance to identify the full list of features required for the risk map.

Controlling the spread of nitrogen fertiliser

Any person spreading nitrogen fertiliser must do so in as accurate manner as possible.

- Slurry spreading equipment must have a low spreading trajectory that is below 4m from the ground.
- Spreading equipment with a trajectory of more than 4m from the ground may be used on land that has a low run-off risk and where the equipment has an application rate below 2mm per hour.

From 30 April 2023

Nitrogen limit for the spreading of livestock manures

Welsh Government are providing a 4-month extension to the implementation of the annual 170kg/ha limit for nitrogen from livestock manure averaged over the holding, either directly deposited by the animal or by spreading to 30 April 2023.

Other 1 January 2023 measures are not affected.

Welsh Government Guidance

Detailed Guidance for Farmers and Land Managers, a digital workbook and a Frequently Asked Questions document is available on the Welsh Government's website: **gov.wales/land-management**

Farming Connect support

Farming Connect have a range of support that can assist you with nutrient management planning and optimising crop growth. For further information, please visit the Farming Connect website: **gov.wales/farmingconnect**

The Control of Agricultural Pollution Regulations Helpline

A dedicated Control of Agricultural Pollution Regulations Helpline, operated by ADAS, is available to support farmers and land managers with the requirements of the Regulations.
You can contact the helpline on **01974 847000**.

Nadine Evans always wanted to be a farmer!

Farming Connect helped her every step of the way.

In her early twenties, Nadine Evans, who grew up in Liverpool, completed a degree in environmental studies. It was very much her second choice, because at school, a careers adviser told her she would never get a place at agricultural college having had no farm experience!

After university, followed by marriage, 17 house moves - her husband was in the forces - and a succession of jobs working with horses, Nadine then returned to academic life and in her forties, read for the Bar, although she subsequently decided not to practice as a barrister. Now in her early fifties and following her husband's retirement and a move to rural Monmouthshire, Nadine says she's finally 'living the rural dream' and doing the work she always dreamt of.

For the last two years, she has been helping out Robert Whittall, who together with his son Ryan, farms the 190 acre Square Farm and popular Square Farm shop at Mitchell Troy, near Monmouth. Alongside all the practical experience she acquires every day, she has acquired extensive knowledge through Farming Connect's fully-funded e-learning courses, focusing mainly on animal health and welfare topics.

Modest about her farming skills, Nadine helps out with most of the tasks on this busy organic farm and also recently obtained an accredited certificate from Farming Connect for tractor-driving.

"To boost all the practical skills which I practice every day under the experienced eyes of this very professional farming family, I turned to Farming Connect, because I wanted to be up to speed on the theory side and to prove my own levels of knowledge."

Nadine reports directly to Mr Whittall, who is the second generation to farm at Square Farm, and his son Ryan. Nadine helps with daily checking and husbandry of all the farm livestock, making sure that they have sufficient food and water and keeping a watchful eye for potential issues.

To read the full story and hear what Nadine has to say about the benefits of her farming 'learning journey', visit the news pages at **www.gov.uk/farmingconnect**

Figure 16: Nadine Evans with Lisa Powell, Farming Connect Development Officer

NADINE EVANS

"You're our 'tractor girl'!" After gaining a lot of practical experience under the watchful eye of Robert Whittall, Nadine now has a Farming Connect tractor-driving certificate "to prove my credentials!"

"I feel confident I know when everything's fine – which it usually is, especially with an outdoor spring lambing flock bred for quality and performance – but I also know the signals if any farm animal might be in difficulty or showing early signs of health problems,"

"Seeing a list of what I've achieved through Farming Connect on my online Storfa Sgiliau record gives me the incentive to carry on learning and I've finally got a credible farming cv!"

Nadine's Farming Connect fully-funded e-learning journey included studying…

- Antimicrobial resistance (AMR)
- Biosecurity and quarantine
- Health and safety

ANIMAL HEALTH FOR CATTLE

- Body condition scoring
- Bovine TB
- Cattle lameness
- Controlling Bovine Viral Diarrhoea (BVD)
- Johne's disease in cattle
- Liver fluke in cattle
- Parasitic gastroenteritis (PGE) and lungworm in cattle
- Respiratory disease in cattle
- Skin conditions in cattle – cattle ectoparasites
- Trace elements in cattle

ANIMAL HEALTH FOR SHEEP

- Eye diseases in sheep
- Lambing docking, fostering and castration
- Lambing losses part 1: abortion and nutrition (AH&W event)
- Lambing problems
- Lambing survival
- Liver fluke control in sheep
- Ram health
- Respiratory disease in sheep
- Sheep lameness
- Sheep parasite control part 2: sheep scab, lice and liver fluke (AH&W event)

ACCREDITED TRAINING
(subsidised by up to 80% for eligible individuals)

- Tractor driving – front end loader

KNOWLEDGE TRANSFER ACTIVITIES INCLUDED…

- Bi-cropping peas and beans to produce a protein concentrate feed – Farming Connect open day
- Managing the growing lamb (Farming Connect animal health strategic awareness event)
- Soils and grassland management – Farming Connect open day

‘Farms are wonderful but can be dangerous too’

New farm safety video and booklets will help primary school children recognise the risks!

At last year’s Winter Fair in Builth Wells, Welsh Government Rural Affairs Minister Lesley Griffiths launched a new bilingual farm safety publicity campaign targeting primary-age school children in Wales.

Produced by the Wales Farm Safety Partnership (WFSP), a collaboration of some of the key rural stakeholder organisations in Wales, a short video together with two colourful A4 workbooks aimed at children aged from four to seven and from seven to eleven years old, will encourage these age groups to learn about the importance of farm safety and protect themselves from some of the most common hazards on farms.

The dangers of moving vehicles, falling from heights, slurry tanks and getting too close to animals are just a few of the ‘high risk’ areas that will be highlighted in the new campaign where hard-hitting facts will be easily understood through the highly engaging, informative video as well as the workbook puzzles, word-searches and quizzes. Each workbook will also contain a ‘Farm safety emergency plan’, which will encourage youngsters to sit down with older family members to complete and display this in a visible place, serving as a daily reminder of ‘how to stay safe’.

The Minister, who was introduced by well-known television presenter and WFSP ambassador Alun Elidyr, explained that although farms can be a fantastic source of learning, both inspiring and informing youngsters to learn where their food comes from and to respect animals and nature, it is essential that they are made aware of the many hazards too.

“Farms are wonderful places for children to grow up and provide great experiences for them.

“However, farms can be dangerous places too and tragically, accidents relating to children continue to occur on farms here in Wales year after year – each one a heart-breaking tragedy that can devastate families, friends and rural communities.

“It is critical that we all work together to do all we can to raise awareness of this important subject amongst young children and their families and I am therefore delighted to launch these important new resources for our primary school children,” said the Minister.

Alun Elidyr thanked the Minister for the Welsh Government’s continued support of the Wales Farm Safety Partnership as the industry works together with communities, stakeholders and families to try and create awareness and reduce the heart-breaking statistics that destroy farming lives year after year.