SUMMARY OF

Farming Connect Soil Results 2023/2024

Ariennir gan
Lywodraeth Cymru
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Introduction

Farming Connect is a knowledge transfer and support programme for the agricultural industry in Wales. The programme aims to provide support to thousands of farmers and foresters within Wales to help transform business prospects through guidance, training and one to one support.

One focus of the programme has been on agricultural soils within Wales. Soil condition, organic matter content and nutrient status are all important factors with regards to soil health, where healthy soils can lead to improvements in forage and crop yields, quality and consistency.

As part of this focus on agricultural soils, Farming Connect offered soil clinics which provided the opportunity for registered businesses to send soil samples off for analysis. The programme also provided the opportunity for soil sampling and analysis on the Farming Connect Our Farms Network Farms. The subsequent soil sample results provided participating businesses with the necessary information to understand their current soil status and to make informed decisions with regards to nutrient management.

In total, 3054 soil samples were taken from grassland fields across Wales during the autumn and winter of 2023/24 from a mixture of red meat and dairy farms. Samples were analysed for pH and the three major nutrients, phosphorus (P), potash (K) and magnesium (Mg), which are typically measured in standard soil analysis packages.

Samples were categorised into ranges for pH and into indices for nutrients as described by the AHDB, (2023) Nutrient Management Guide RB209 (last updated June 2023). Soil samples were further categorised by geographical region into categories, North East, North West, Powys, South East and South West Wales using pivot tables in Microsoft Excel (version 2403). Categorical distribution analysis was carried out using Chi squared analysis in SPSS (version 29.02). The main findings of the soil results are summarised in this report.

LIMITATIONS:

The reader should note, when drawing conclusions, a sense of caution should be adopted as the data is not necessarily representative of total Welsh grassland soils. Reasons for this include, soil samples were limited to farms that participate and engage with the Farming Connect programme and therefore were not randomly selected from the total Welsh population. It should also be considered that soil type and the characteristics of the soil samples are unknown and as such results in a slight limitation to this report when determining the optimum pH range and categorising into indices. It is also not considering differences in climate between sites (rainfall / temp). Furthermore, samples were categorised into indices and therefore analysis is made on a rather broad scale. Nevertheless, the data set provides a snapshot of the potential pH and macronutrient concentrations of Welsh grasslands and allows for broad trends to be identified and some conclusions to be made.

Results

Of the 3054 soil samples, when categorised into geographical regions, 473 soil samples were found to be from the North East, 799 from the North West, 601 from Powys, 260 from South East and 921 from the South West of Wales (Table. 1).

Table 1: Geographical distribution of soil samples categorised into the regions, North East, North West, Powys, South East and South West.

Region	County	Count
North East	Conwy, Denbighshire, Wrexham and Flint	473
North West	Lleyn and Snowdonia, Gwynedd, Isle of Anglesey	799
Powys	Brecknock, South Montgomeryshire, North Montgomeryshire, Radnorshire	601
South East	South Carmarthenshire, Swansea and Gower, Torfaen and Blaenau Gwent, South Wales Valleys and Vale of Glamorgan	260
South West	South Ceredigion, South Pembrokeshire, East Carmarthenshire, North Ceredigion, North Pembrokeshire and West Carmarthenshire	921

pH

The recommended industry standard for the optimum pH range for grassland soils varies. According to the AHDB (2024), a pH range of 6.0-7.0 is thought to be sufficient for maximising nutrient uptake in continuous grasslands with this figure based on the findings from Truog, (1947). Whereas, according to DEFRA (2023), the optimum pH for grassland soils is thought to be 6.2 for light sand, medium, deep clay and deep silty soils, 5.9 for organic soils with an organic matter content of 10-25% and 5.5 for peaty soils with 25% plus organic matter. Likewise, according to a publication by Hybu Cig Cymru (2015) the ideal pH range for grassland soils which include grass and clover species is reported to be pH 6.0-6.5. Furthermore, according to Teagasc (2024), the optimum pH for grassland soils is 6.3 or above with a target set of achieving 6.5. Reasons for variations within the literature may reside due to factors such as, variations in soil type, soil composition, sward type, plant species requirements, management practices, climate and geographical location. As such, for this report and to ensure that such factors outlined above are considered, an optimum pH range of 6.0 - 7.0 was adopted.

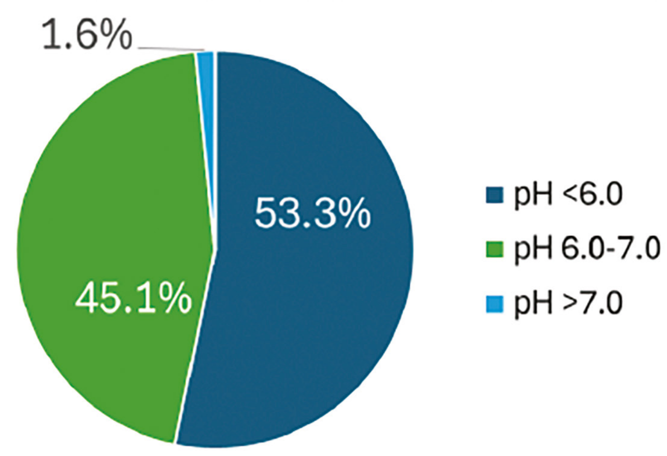

Figure 1: pH of grassland soil samples taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3054). Where soils < pH 6.0 are regarded as below the optimum pH range, soils of pH 6.0 – 7.0 are regarded as within an optimum pH range and soils > pH 7.0 are regarded as above the optimum pH range for grasslands.

The results of the soil analysis revealed that less than half (45.1%) of soil samples were within the optimum pH range for grasslands (Figure. 1). In fact, a large proportion of soil samples were below the optimum pH range for grasslands (53.3%), suggesting a large proportion of Welsh grasslands to perhaps be acidic. A small proportion of soil samples were above the optimum pH range (1.6%) for grasslands (Figure. 1).

When the data was analysed by region, it was apparent that 52.0% of soil samples from the North East, 39.9% of soil samples from the North West, 51.6% of soil samples from Powys, 50.0% of soil samples from the South East and 40.5% of soil samples from the South West were within the optimum pH range (pH 6.0-7.0) for grassland soils (Figure 2). Whereas, 43.6% of soil samples from the North East, 58.9% of soil samples from the North West, 47.6% of soil samples from Powys, 47.7% of soils samples from the South East and 58.6% of soil samples from the South West were below the optimum pH range for grassland soils (Figure 2). Moreover, 4.4% of soil samples from the North East, 1.1% of soil samples from the North West, 0.8% of soil samples from Powys, 2.3% of soil samples from the South East and 0.9% of soil samples from the South West were above the optimum pH range (pH 6.0-7.0) for grassland soils (Figure 2). A chi squared analysis was performed to determine if soil pH was dependant on region. The results of the chi squared analysis demonstrated region to have a significant effect on soil pH ($p<0.01$).

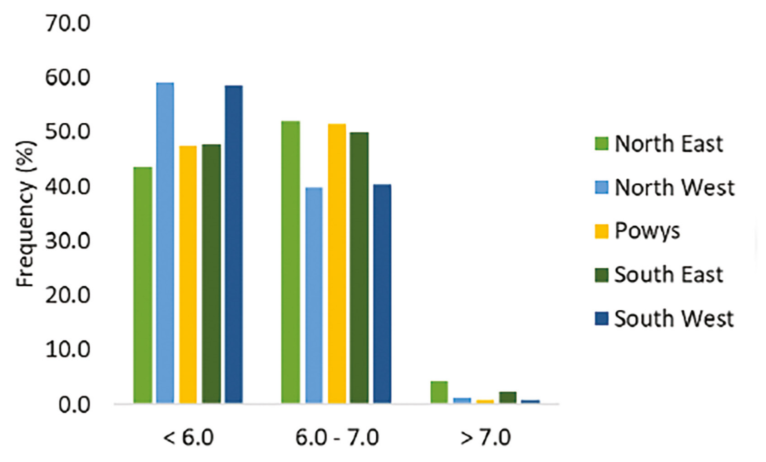

Figure 2: Regional distribution of the pH of grassland soil samples taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3054). Where, soils < pH 6.0 are regarded as below the optimum pH range, soils of pH 6.0 – 7.0 are regarded as within the optimum pH range and soils > pH 7.0 are regarded over the optimum pH range for grasslands.

Phosphorus

The concentration of phosphorus (P) in soil samples were categorised into indices (0-9) as described by the AHDB Nutrient Management Guide RB209 (last updated June 2023). A soil index of 2 (16 - 25 mg/L dry soil) was defined as being optimum for grasslands. Of the 3054 soil samples, three samples did not have any P results resulting in a sample size of n = 3051.

The results of the analysis demonstrated that 35.7% of soil samples were of the optimum soil P-index (2) for grasslands (Figure. 3). However, 36% of soil samples were below the optimum soil P-index with 10.8% of the soil samples had a P-index of 0 (0-9 mg/ L dry soil) and 25.2% of soil samples had a P-index of 1 (10-15 mg/ L dry soil) (Figure. 3). Likewise, 28.3% of soil samples were above the optimum P-index, where 23.8% of soil samples were categorised within soil-index 3 (26-45 mg/ L dry soil) and 4.5% of soil samples were categorised as having a soil P-index equal to or greater than 4 (≥46 mg/ L dry soil) (Figure. 3).

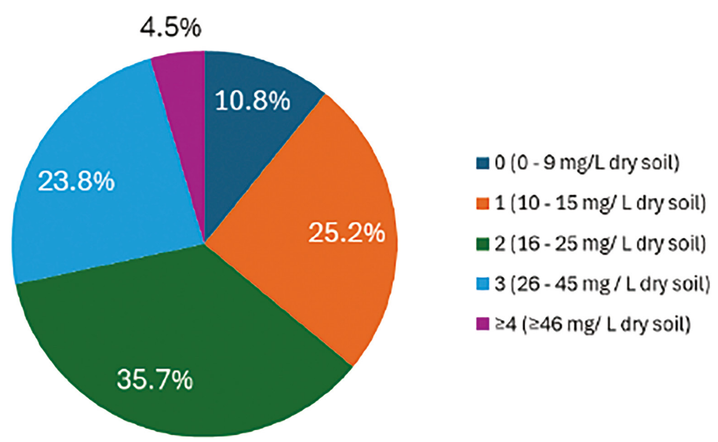

Figure 3: Phosphorus (P) levels of grassland soil samples from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3051). Samples are categorised into indices (0, 1, 2, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a P-index of 2 is regarded as optimum for grasslands.

When soil samples were analysed according to geographical region, 35.1% of soil samples from the North East, 35.3% of soil samples from the North West, 36.6% of soil samples from Powys, 31.9% of soil samples from the South East and 36.7% of soil samples from the South West were of the optimum soil P-index of 2 (16-25 mg/ L dry soil) (Figure. 4). However, 15.4% of soils from the North East, 11.4% of soils from the North West, 10.4% of soils from Powys, 15.4% of soils from the South East and 6.9% of soils from the South West were below the optimum soil P-index and were of soil P-index 0 (0-9 mg/ L dry soil) (Figure. 4).

Likewise, 27.3% of soils from the North East, 25.8% of soils from the North West, 28.7% of soils from Powys, 22.3% of soils from the South East and 22.0% of soils from the South West were of soil P-index 1 (10-15 mg/ L dry soil) (Figure. 4). Moreover, a proportion of soil samples were above the optimum soil index level where, 19.2% of soil samples from the North West, 24.4% of soil samples from the North West, 21.5% of soil samples from Powys, 25.0% of soil samples from the South East and 26.8% of soil samples from the South West were of soil P-index 3 (26-45 mg/ L dry soil) (Figure. 4). Likewise, 3% of soils from the North East and North West, 2.8% of soils samples from Powys, 5.4% of soil samples from the South East and 7.5% of soil samples from the South West were greater than or equal to soil P-index 4 (≥46 mg/ L dry soil) (Figure. 4). A chi squared analysis was performed to determine if soil P-index was dependant on region. The results of the chi squared analysis demonstrated that region had a significant effect on soil P-index ($p<0.01$).

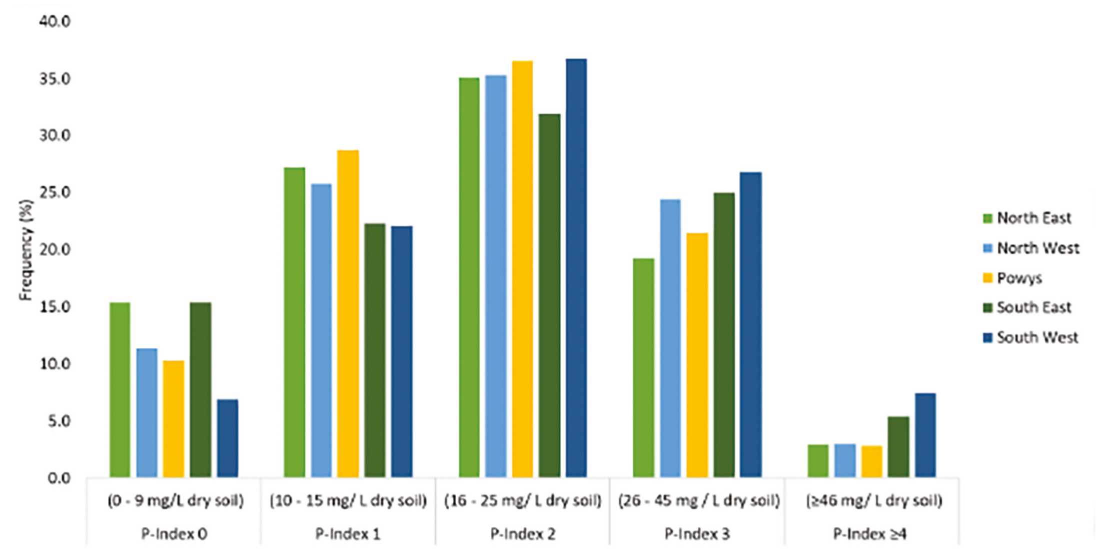

Figure 4: Regional distribution of phosphorus (P) levels from grassland soil samples taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3051). Samples are categorised into indices (0, 1, 2, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a soil P-index of 2 is regarded as optimum for grasslands.

Potassium

The concentration of potassium (potash, K) in soil samples were categorised into indices (0-9) as described by the AHDB Nutrient Management Guide RB209 (last updated June 2023). A soil index of 2- was regarded as the optimum K-index for grasslands. Of the 3054 soil samples, three samples were not analysed for K resulting in a sample size of n = 3051.

The results of the analysis demonstrated that 48.8% of soil samples were of the optimum K-index (2), this could be further broken down to reveal that 15.4% of soils were of K-index 2- and 33.4% of soils were of K-index 2+ (Figure. 5). A large proportion of soil samples were below the optimum K-index where, 5.6% of samples were of soil K-index 0 and 34.5% of soil samples were of K-index 1. A small proportion of samples were above the optimum K-index where 10.3% of soil samples were of soil K-index 3 and 15.4% of soil samples were equal to or more than soil K-index 4 (Figure. 5).

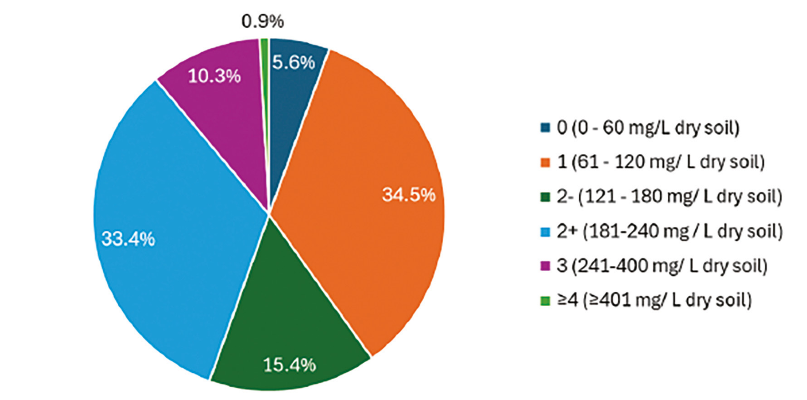

Figure 5: Potassium (K) levels of grassland soil samples taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3051). Samples are categorised into indices (0, 1, 2-, 2+, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a P-index of 2- and 2+ are regarded as optimum for grasslands.

When samples were analysed according to geographical region it was apparent that 50.5% of soil samples in the North East, 44.6% of soil samples in the North West, 58.9% of soil samples in Powys, 41.9% of soil samples in the South east and 46.9% of soil samples in the South West were in the optimum K-index (2- and 2+) (Figure. 6). This could be further broken down to reveal, 35.5% of soil samples from the North East, 29.7% of soil samples from the North West, 41.6% of soil samples from Powys, 28.1% of soil samples from the South East and 31.7% of soil samples from the South West were of K-index 2- (Figure.6). Furthermore, 15.0% of soil samples from the North East, 14.9% of soil samples from the North West, 17.4% of soil samples from Powys, 13.8% of soil samples from the South East and 15.2% of soil samples from the South West were of K-index 2+ (Figure. 6).

With regards to the regional distribution of soil samples within the other indices, 5.7% of soil samples from the North East, 10.2% of soil samples from the North West, 1.5% of soil samples from Powys, 6.5% of soil samples from the South East and 3.9% of soil samples from the South West were of soil K-index 0 (Figure. 6). A large proportion of soil samples resided within soil K-index 1, where 34.0% of soil samples from the North East, 36.3% of soil samples from the North West, 26.5% of soil samples from Powys, 45.0% of soil samples from the South East and 35.4% of soil samples from the South West resided within this index (Figure. 6). A smaller proportion of samples resided above the optimum index where, 8.5% of soil samples from the North East, 8.1% of soil samples from the North West, 12.5% of soil samples from Powys, 6.5% of soil samples from the South East and 12.6% of soil samples from the South West were of soil K-index 3 (Figure. 6). Furthermore, 1.3% of soil samples from the North East, 0.8% of soil samples from the North West, 0.5% of soil samples from Powys and 1.2% of soil samples from the South West were of soil K-index 4 or above. No soil samples from the South East were of K-index 4 or above (Figure. 6). A chi squared analysis was performed to determine if soil K-index was dependant on region. The results of the chi squared analysis demonstrated that region did not have a significant effect on soil K-index (p=0.515).

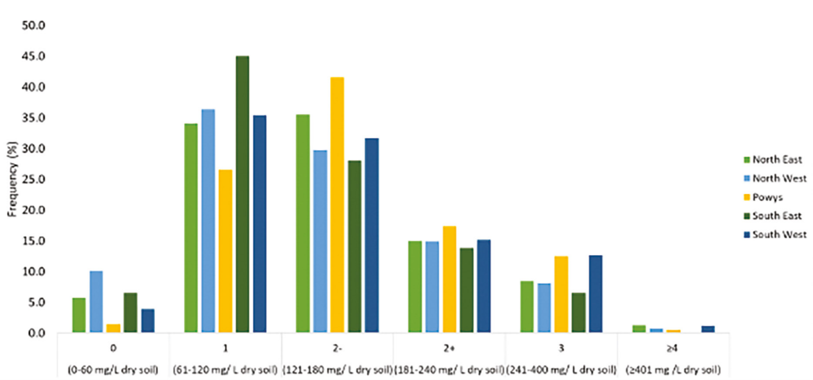

Figure 6: Regional distribution of the potassium (K) levels of grassland soil samples, taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=3051). Samples are categorised into indices (0, 1, 2-, 2+, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a P-index of 2- and 2+ are regarded as optimum for grasslands.

Magnesium

The concentration of magnesium (Mg) in soil samples were categorised by indices (0-9) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023). A soil Mg-index of 2 (51 - 100 mg/L dry soil) was defined as being optimum for grasslands.
Of the 3054 soil samples, 251 samples were not analysed for Mg resulting in a sample size of n = 2803.

The results of the analysis revealed 47.7% of soil samples to be of the optimum Mg-index 2 (Figure. 7). A small proportion of samples resided in indexes below the optimum, where 1.7% of soil samples were of Mg-index 1 (Figure. 7). A large proportion of soil samples were above the optimum soil Mg-index where 43.5% of soil samples were of index 3, and 7.1% of samples were of index 4 or above (Figure. 7).

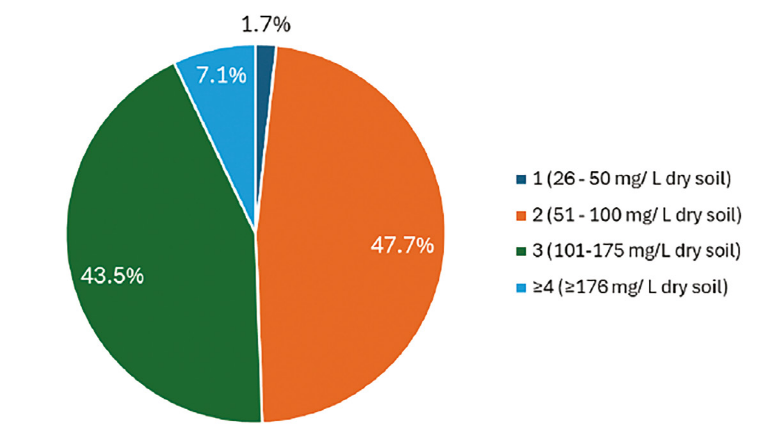

Figure 7: Magnesium (Mg) levels of grassland soil samples taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=2803). Samples are categorised into indices (1, 2, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a P-index of 2 are regarded as optimum for grasslands.

When samples were analysed according to geographical region, it was apparent that 62.6% of soil samples from the North East, 46.3% of soil samples from the North West, 39.8% of soil samples from Powys, 33.5% of soil samples from the South East and 51.6% of soil samples from the South West were of the optimum Mg-index of 2 (Figure. 8). A small proportion of samples were below the optimum pH where, 3.4% of soil samples from the North East, 2.8% of soil samples from the North West, 0.2% of soil samples from Powys, 0.4% of soil samples from the South East and 1.4% of soil samples from the South West were of Mg-index 1 (Figure. 8). The remaining samples were above soil Mg-index 2 where majority of samples resided within index 3 in which, 27.8% of soil samples from the North East, 44.3% of soil samples from the North West, 52.3% of soil samples from Powys, 48.2% of soil samples from the South East and 43.0% of soil samples from the South West were of Mg-index 3 (Figure. 8). Furthermore, 6.2% of soil samples from the North East, 6.5% of soil samples from the North West, 7.7% of soil samples from Powys, 17.9% of soil samples from the South East and 4.0% of soil samples from the South West were of Mg-index 4 or above (Figure. 8). A chi squared analysis was performed to determine if soil Mg-index was dependant on region. The results of the chi squared analysis demonstrated that region had a significant effect on soil Mg-index ($p<0.01$).

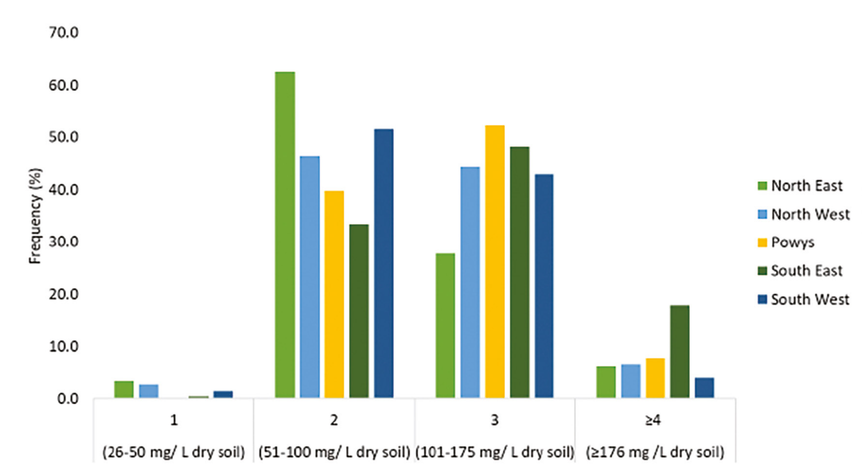

Figure 8: Regional distribution of the magnesium (Mg) levels of grassland soil samples, taken from red meat and dairy farms across Wales from March 2023 - March 2024 (n=2803). Samples are categorised into indices (1, 2, 3 and ≥4) as determined by the AHDB Nutrient Management Guide RB209 (last updated June 2023), where a Mg-index of 2 is regarded as optimum for grasslands.

Summary

As part of the Farming Connect programme, soil samples from red meat and dairy grassland fields across Wales were analysed for pH and the macronutrients, phosphorus (P), potassium (K) and magnesium (Mg) from March 2023 – March 2024. Samples were categorised into ranges for pH and into indices for nutrients as described by the AHDB, (2023) Nutrient Management Guide RB209 (last updated June 2023). Samples were then categorised as being optimum or not for grasslands based on accepted industry standards. The main findings of the soil results are summarised here.

Less than 50% of soil samples were within the optimum pH range (6.0 – 7.0) for grasslands. In fact, the majority of soil samples (53.3%) were below the optimum pH range (<6.0), with a limited number of samples (1.6%) above the optimum range (>7.0). The pH of grassland soils is important for forage productivity where inadequate pH can negatively affect nutrient availability in soils and therefore forage performance. As such, the results of this soil analysis suggest that perhaps a large proportion of Welsh grasslands are acidic. Therefore, review of liming and fertiliser application to Welsh grassland soils may be needed as a first step in ensuring low pH does not negatively affect fertiliser utilisation and to reduce the risk of nutrient losses.

With regards to the concentration of nutrients within grassland soils, less than 50% of soil samples were of the optimum nutrient indexes for grasslands for nutrients P, K and Mg. In fact, a large proportion of soil samples were categorised as being below the optimum P and K indexes and above the optimum Mg-index. Altering the P and K indices takes time with industry advice suggesting the approach of building up and running down nutrient concentrations to be the most appropriate method. Furthermore, Mg concentrations at index 0 and circumstances in which livestock are at risk or are showing signs of grass staggers (hypomagnesaemia) are suggested to be the main reasons for correcting Mg concentrations within the soil. With regards to the regional distribution of pH and soil nutrients, chi squared analysis revealed region to have a significant effect on soil pH, P and Mg concentrations. These findings suggest that perhaps review of nutrient management procedures in Welsh grassland soils may be needed and a more targeted approach adopted with regards to regular soil testing to aid fertilizer application.

Overall, these results potentially indicate that a large proportion of Welsh grassland soils could be outside the optimum pH range and nutrient concentrations for P, K, Mg. As such, this potentially indicates that Welsh grasslands may not be performing to their full production capabilities or capacities. Furthermore, these results indicate the importance and need for improvements in soil and nutrient management on farms through regular soil testing and targeted nutrient management. By working with soils within an optimum pH range and of optimum nutrient concentrations this can help ensure soils are well suited for grassland production which in turn will benefit livestock performance and farm economics.

References

AHDB (2024). **Liming for a grassland reseed**, *https://ahdb.org.uk/knowledge-library/liming-for-a-grassland-reseed#:~:text=The%20optimum%20availability%20of%20most,sufficient%20to%20maximise%20nutrient%20uptake*, accessed online May 28 2024.

AHDB (2023). **Nutrient management guide (RB209) section 3 grass and forage crops**, last update June 2023, *https://ahdb.org.uk/documents/RB209/RB209_Section3.pdf*, accessed online May 28 2024.

Hybu Cig Cymru (2015). **Getting the most from your soil, a practical guide to maximising cultivated land resources**, *https://meatpromotion.wales/images/resources/e4364_HCC_Soil_Management_ENG_5FINAL.pdf*, accessed online May 31 2024.

Teagasc (2024). **Grassland, liming grassland soils**, *https://www.teagasc.ie/crops/soil--soil-fertility/soil-ph--liming/grassland/*, accessed online May 28 2024.

Truog (1947). **Soil reaction influence on availability of plant nutrients**, *Soil Science Society of America Journal, 11*, issue c, 305-308.

Numerical distribution and percentages of pH

Appendix 1: Numerical distribution (%) of soil pH categorised as being below the optimal pH range (<6.0), of the optimal pH range (6.0 – 7.0) or above the optimal pH range (≥ 7.0) for grasslands for geographical regions North East, North West, Powys, South East and South West Wales.

Region	Counties	Total Number	Below optimal pH range < 6.0	Optimal pH range 6.0 – 7.0	Above optimal pH range ≥ 7.0
North East	Conwy, Denbighshire, Wrexham and Flint	473	206 (43.6)	246 (52.0)	21 (4.4)
North West	Lleyn and Snowdonia, Gwynedd, Isle of Anglesey	799	471 (58.9)	319 (39.9)	9 (1.1)
Powys	Brecknock, South Montgomeryshire, North Montgomeryshire, Radnorshire	601	286 (47.6)	310 (51.6)	5 (0.8)
South East	South Carmarthenshire, Swansea and Gower, Torfaen and Blaenau Gwent, South Wales Valleys and Vale of Glamorgan	260	124 (47.7)	130 (50.0)	6 (2.3)
South West	South Ceredigion, South Pembrokeshire, East Carmarthenshire, North Ceredigion, North Pembrokeshire and West Carmarthenshire	921	540 (58.6)	373 (40.5)	8 (0.9)

Numerical distribution and percentages of phosphorus

Appendix 2: Numerical distribution (%) of soil phosphorus concentrations by indices (0, 1, 2, 3, ≥ 4) derived from the AHDB Nutrient Management Guide RB209 (last updated June 2023) for geographical regions North East, North West, Powys, South East and South West.

Region	Counties	Total Number	(0-9 mg/L dry soil) P-index 0	(10-15 mg/L dry soil) P-index 1	(16-25 mg/ L dry soil) P-index 2	(26-45 mg/ L dry soil) P-index 3	(≥46 mg/ L dry soil) P-index ≥ 4
North East	Conwy, Denbighshire, Wrexham and Flint	473	73 (15.4)	129 (27.3)	166 (35.1)	91 (19.2)	14 (3.0)
North West	Lleyn and Snowdonia, Gwynedd, Isle of Anglesey	798	91 (11.4)	206 (25.8)	282 (35.3)	195 (24.4)	24 (3.0)
Powys	Brecknock, South Montgomeryshire, North Montgomeryshire, Radnorshire	599	62 (10.4)	172 (28.7)	219 (36.6)	129 (21.5)	17 (2.8)
South East	South Carmarthenshire, Swansea and Gower, Torfaen and Blaenau Gwent, South Wales Valleys and Vale of Glamorgan	260	40 (15.4)	58 (22.3)	83 (31.9)	65 (25.0)	14 (5.4)
South West	South Ceredigion, South Pembrokeshire, East Carmarthenshire, North Ceredigion, North Pembrokeshire and West Carmarthenshire	921	64 (6.9)	203 (22.0)	338 (36.7)	247 (26.8)	69 (7.5)

Numerical distribution and percentages of potassium

Appendix 3: Numerical distribution (%) of soil potassium concentrations by indices (0, 1, 2-, 2+, 3, ≥ 4) derived from the AHDB Nutrient Management Guide RB209 (last updated June 2023) for geographical regions North East, North West, Powys, South East and South West.

Region	Counties	Total Number	(0-60 mg/L dry soil) K-index 0	(61-120 mg/L dry soil) K-index 1	(121-180 mg/ L dry soil) K-index 2-	(181-240 mg/ L dry soil) K-index 2+	(241-400 mg/ L dry soil) K-index 3	≥401 mg/ L dry soil) K-index ≥ 4
North East	Conwy, Denbighshire, Wrexham and Flint	473	27 (5.7)	161 (34.0)	168 (35.5)	71 (15.0)	40 (8.5)	6 (1.3)
North West	Lleyn and Snowdonia, Gwynedd, Isle of Anglesey	798	81 (10.2)	290 (36.3)	237 (29.7)	119 (14.9)	65 (8.1)	6 (0.8)
Powys	Brecknock, South Montgomeryshire, North Montgomeryshire, Radnorshire	599	9 (1.5)	159 (26.5)	249 (41.6)	104 (17.4)	75 (12.5)	3 (0.5)
South East	South Carmarthenshire, Swansea and Gower, Torfaen and Blaenau Gwent, South Wales Valleys and Vale of Glamorgan	260	17 (6.5)	117 (45.0)	73 (28.1)	36 (13.8)	17 (6.5)	0 (0.0)
South West	South Ceredigion, South Pembrokeshire, East Carmarthenshire, North Ceredigion, North Pembrokeshire and West Carmarthenshire	921	36 (3.9)	326 (35.4)	292 (31.7)	140 (15.2)	116 (12.6)	11 (1.2)

Numerical distribution and percentages of magnesium

Appendix 4: Numerical distribution (%) of soil magnesium concentrations by indices (1, 2, 3, ≥ 4) derived from the AHDB Nutrient Management Guide RB209 (last updated June 2023) for geographical regions North East, North West, Powys, South East and South West.

Region	Counties	Total Number	(26-50 mg/L dry soil) Mg-index 1	(51-100 mg/ L dry soil) Mg-index 2	(101-175 mg/ L dry soil) Mg-index 3	(≥176 mg/ L dry soil) Mg-index ≥ 4
North East	Conwy, Denbighshire, Wrexham and Flint	417	14 (3.4)	261 (62.6)	116 (27.8)	26 (6.2)
North West	Lleyn and Snowdonia, Gwynedd, Isle of Anglesey	794	22 (2.8)	368 (46.3)	352 (44.3)	52 (6.5)
Powys	Brecknock, South Montgomeryshire, North Montgomeryshire, Radnorshire	575	1 (0.2)	229 (39.8)	301 (52.3)	44 (7.7)
South East	South Carmarthenshire, Swansea and Gower, Torfaen and Blaenau Gwent, South Wales Valleys and Vale of Glamorgan	251	1 (0.4)	84 (33.5)	121 (48.2)	45 (17.9)
South West	South Ceredigion, South Pembrokeshire, East Carmarthenshire, North Ceredigion, North Pembrokeshire and West Carmarthenshire	766	11 (1.4)	395 (51.6)	329 (43.0)	31 (4.0)