

Soil and Nutrient Network



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Helping farmers improve soil and nutrient management

Case study - Dormieston Farm, Ayrshire

Dormieston is a dairy unit farmed by James Sloan and his family which is located in the heart of Ayrshire, just outside Coylton, Ayr. The farm is predominately grassland extending to 280 hectares, of this 232 hectares are grassland with a further 44 hectares grown as cereal. Most of the land which the business farms comprises of class 3₁ and 3₂. This type of land is capable of growing most cereal crops with high yields and grass.

Soil pH Status

During the first meeting of the network group, the topics in focus were soil compaction and nutrient status. Since the business is located in the River Ayr diffuse pollution priority catchment, it had been part of a previous project during which all of the fields were soil sampled in 2013. These records provide a baseline set of analyses which this current project can refer to in order to show what changes have been made in the last five years.

The Sloan family has worked hard to ensure that the land is in optimum health with a good cropping rotation to prevent compaction being too much of an issue. The business is now focussing on targeted nutrient applications, taking into account individual field's soils nutrient and pH statuses. Applying nutrients in this way has allowed the business to reduce on compound or blended fertilisers and rely more on purchasing straights. This has reduced the risk of either causing an under or over supply of phosphorus and potassium.

At the beginning of this project, the whole farm was soil sampled which provided a set of results that could be compared to the previous 2013 analyses. Although the business has been regularly applying lime, when the 2013 & 2018 results were compared, it became clear that the applications have not been sufficient to improve the overall pH across the farm. Figure 1 shows the current soil pH map, whilst Figure 2 shows the 2013 map. This is an area in which the business is planning to address over the coming months. The business also purchased new land which was included in the 2018 soil sampling. This land has shown that it will require significant work to bring it to a level similar to the rest of the farm.

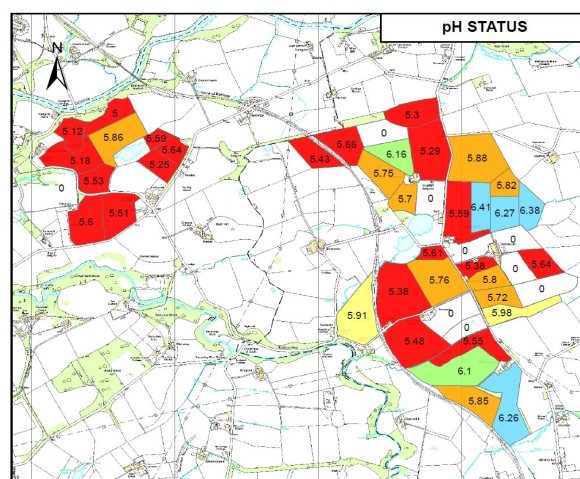


Figure 1: Soil pH map 2018

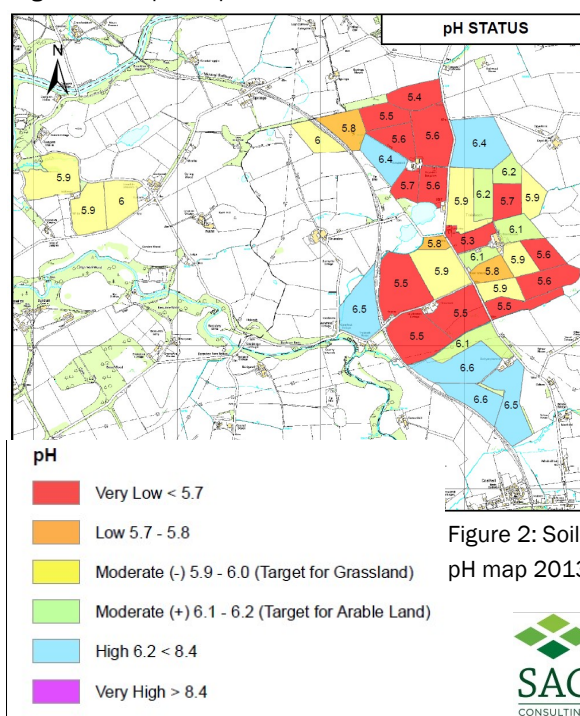


Figure 2: Soil
pH map 2013



For more information on the Soil
and Nutrient Network see

www.fas.scot For dates of SNN events, find us
on Facebook or follow us on Twitter @FASscot



The European Agricultural Fund
for Rural Development
Europe investing in rural areas



Scottish Government
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The Importance of Soil Structure

Soils specialist Seamus Donnelly, guest speaker at the first event at Dormieston explained the importance of knowing your soil type. Highlighting the free map resources available from the Scotland's Environment webpage, Seamus suggested it is a worthwhile exercise to know your soil type and realise from that what possible problems you might face with soil structure. A spade, ten minutes of your time and a copy of the VESS score chart are three very valuable assets to any farmer. Digging a quick soil pit at a number of locations across your field can help to identify if there are any drainage or compaction issues which could be limiting your cropping potential. You can download a copy of the 'Valuing Your Soils' booklet from www.fas.scot which provides more information about soil structure and how to evaluate it.



Seamus explained that there are various measures that can be used to alleviate soil compaction, but stressed the importance on knowing where within the soil profile the issues are, and whether or not drainage is compounding the problems. Moving the meeting out to one of the fields at Dormieston, he demonstrated how to quickly assess soil structure. There was a short demonstration to show how a sward lifter and soil aerator affect soil structure. Seamus then proceeded to dig soil pits on areas where the machines had passed to highlight the importance of knowing where the problem lies before deciding on a course of action.

More information about soil structure can be found in the free to download Valuing Your Soils booklet which is available on our website. Videos explaining the VESS and the use of sward lifters to alleviate compaction can be found on the [FAS YouTube Channel](#).

Know The Value of Slurry & FYM

With the business focussing on addressing soil pH and nutrient levels in individual fields in order to reduce the reliance on purchased compound fertilisers, the next step was to focus on an active farm nutrient budget. With 170 dairy cows plus followers, there is a significant volume of slurry and home produced manure. If applied at the correct time and more efficiently.

During a class-room based workshop for the second meeting, those in attendance worked examples of calculating a farm nutrient budget, including looking at the cost savings that can be made when accurate nutrient values from slurry and manure sampling results are used as opposed to standard book values. For the exercises, the following figures for Dormieston's cattle slurry were used.

Table 1: Nutrient Value of slurry

	Dormieston slurry values	Standard industry values
Dry Matter	6.09%	6.00%
Nitrogen	2.7 kg/m ³	2.6 kg/m ³
Phosphorous	1.5 kg/m ³	1.2 kg/m ³
Potash	3.6 kg/m ³	3.2 kg/m ³

Table 2: Fertiliser prices Feb 2019

Ammonium Nitrate	£275/t
Triple Super Phosphate	£340/t
Murate of Potash	£294/t

Using the February 2019 Fertiliser shown in table 2. the total financial value of 1 million gallons of slurry is **£12,600**.

With this information and using the information and figures from Technical Notes TN650 and TN652, the volume of nutrients volume of nutrients being applied to the fields was calculated and compared to what each field needed based on soil sample results.

The Technical Notes are available to download from : www.fas.scot/publication/technical-notes/

[PLANET Scotland](#) is a free to download and use nutrient management software that is available to help farmers to manage their nutrient budget.

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Optimising Digestates & Biosolids

With the increasing uptake of digestates and bi-products for spreading on farm, soil specialist Dr Bill Crooks attended the final meeting of the Ayrshire Soil & Nutrient Network initiative, with some key take home messages for those considering taking on the substances.

As substitutes for conventional inorganic fertilisers biosolids, composts and anaerobic digestates can be great sources of nutrients and can improve soil fertility and structure.

In addition to having a nutrient value many of these products including crumbled paper, lime stabilised biosolids and some composts can have an inherent liming value. But where liming products are being used these should always be preceded by a routine soil analysis, to track effect and inform decision making.

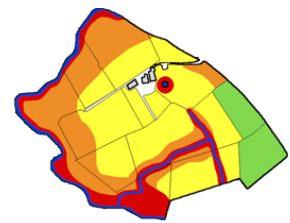
Understanding the various regulations around the application of waste to land is crucial for success, including The Sludge (Use in Agriculture) (Amendment) Regulations 1990, as well as the Controlled Activity Regulations (CARs) and General Binding Rules (GBRs).

Further advice and information can be found in [Technical Note TN699: Agricultural use of biosolids, composts, anaerobic digestates and other industrial organic fertilisers](#) & Zero Waste Scotland's "Farmer's guide to Sourcing and using digestate & compost"



Important things to consider;

- Nutrient values of these products should be viewed in the context of a full farm fertiliser plan.
- These products should be tested before application, in the same way you would test soils.
- Where organic fertilisers can be classed as waste products intended for application to land advice should be sought from SEPA regarding the requirement for an application for approved spreading.
- PAS 100 & 110 accredited digestate can be applied to land without SEPA involvement provided all other regulations are adhered to.
- The importance of transparency and communication between supplier, farmer and contractor cannot be stressed enough.
- Creation of a Risk Assessment for Manures and Slurry - RAMS map is advised, particularly where contractors are being used for applications.
- More information about preventing diffuse pollution and how to complete a RAMS map is available at www.farmingandwaterscotland.org



Comparing lime products

Soil pH is critical for nutrient management. At levels above or below the optimal levels nutrient availability becomes a problem for the growing crop. For grassland farms the pH to aim for ranges from a value of 5.8 - 6.2 and will depend on soil type. Below this range and any nutrients applied may not be fully available for the plant to uptake, resulting in sub-optimal yields, and a cost to the business.

Seamus Donnelly brought a selection of different lime products to the first meeting at Dormieston to explain the different chemical make up and open up discussion about how to value them. Key to getting value for money is to ask for a Neutralising Value (NV). Without having this to compare different products it is very difficult to determine whether your keen price is actually a bargain. Use the [Liming Calculator](#) on the FAS webpage to find out how much lime you need to apply at differing NVs to help your price comparisons.

Further guidance is available in Technical Note (TN 714): Liming materials and recommendations found at www.fas.scot/publication/technical-notes/



Soil and Nutrient Network

Establishing a Spring Grass Ley

The final meeting of the Ayrshire Soil & Nutrient Network was held in the early Spring of 2020 at Dormieston Farm. The topic for discussion for the meeting was “Establishing a Spring Grass Ley”.

Early on in the morning of the meeting Bill took the group out to dig a soil pit in a field of old grass, destined for a reseed. During the afternoon the group participated in an interactive exercise with William Fleming, a local grassland specialist.

Overtime a productive grassland will naturally want to revert to a more native pasture. This is caused largely by two processes, the acidification of soils over time and the colonisation of that reverting soils with native grass species more accustomed to the conditions.

Newly reseeded grass leys are inherently more productive, due to the removal of competitive species and in situations where soil has been worked, a reformed soil structure. Increasing productivity of the grassland in terms of DM/ha for example can have profound effects on livestock output; for example, every 1t DM/ha increase in utilised grass equates to a potential stocking rate increase of 1.4 ewes/ha or 100kg of beef liveweight gain per annum. Another way of looking at this would be, for every 1t DM achieved you will have saved 1 tonne of purchased concentrated feed substitute

William introduced the group to his own reseeding calculator, highlighting the potential return on investment for Dormieston in relation to total litres of milk produced.

William gave his take home messages;

- Weed control – spray out docks and chickweed at seedling stage.
- Promoting good seed to soil contact is crucial.
- Choose your mixture's compositions based on your own unique climate.
- Aim to promote early tillering to force out any competing species



Off Wintering Strategies

Following a successful reseed and summer to autumn grazing period it is tempting to consider the potential of sheep for winter grazing, particularly on dairy farms specialising in that one enterprise.

Introduction of grazing sheep in the back end of the year is a common activity undertaken by many conventional dairy farmers across Ayrshire, the general perception being that these sheep take grass that could otherwise be cut earlier in spring for cattle, however this view is tempered by the additional income stream generated by seasonal grazing.

Sheep offer the potential to graze down productive grassland at a time in the year which ground conditions and rates of growth mean that a larger animal could not be sustained without support.

While Dormieston has recently relinquished control of their more traditional upland farm towards Girvan and so has very little sheep on the farm now, the discussion was welcomed by the larger group and generated some strong opinions.

Grassland consultant Lorna Galloway made an ardent defence of sheep with some important points to note for anyone considering winter grazing.

- At a time when the case for rotational grazing has been made and won, why would you set-stock your winter grazers?
- A plate meter is not just for summer, managing winter grassland and moving the flock can mitigate against over-grazing and prevent long-term damage to your grass leys.
- Measuring grass growth by the grooves on your wellies can be as effective as using a plate meter.

