Soil and Nutrient Network

Helping farmers improve soil and nutrient management

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Case study -
Wormiston Farm, Peeblesshire

Wormiston, farmed by Robbie Brockie is an upland mixed beef and sheep farm covering 283 ha. The farm lies around 770ft above sea level with the business focusing on grass production for cattle and sheep, with some spring barley grown for cattle feed.

The farm has 120 cows with all calves finished. The cattle are housed in the winter with half on bedded courts and half on cubicles. There are also around 1000 ewes on the farm. Wormiston has a vast range of soil types from alluvial soil running parallel to the Eddleston water, to Brown Forest soils to areas of gley. The soil series are Yarrow and Ettrick. Soil Capability ranges from 4.1 to 5.2.

Assess soil structure

SAC Consulting's Bill Crooks dug two separate soil pits to show how to identify soil structure using the Visual Evaluation of Soil Structure (VESS) guide.

Bill described the process of selecting various areas of the field for evaluation, digging down to 40cm and removing a block of soil. The depth of each horizontal layer can be measured. By looking at the soil block you can determine and score soil structure, based on 1 being friable with good soil structure to 5 being very compact suggesting additional action will be needed.

Good soil structure will be characterised by well formed porous blocks with rounded edges which can be easily broken between the fingers when moist. Vertical fissures will help to lead roots downwards. The soil will be more resistant to damage. A well structured soil will help soil nitrogen to be used more effectively and will also give good drainage and better uptake of minerals via the roots.

Poor soil structure will be much harder with sharper blocks which are more difficult to break apart. Horizontal fissures restrict root growth and development. Poor soil structure will be easier to damage. Options to rectify damage should be sought on soils scored 4 or 5.

The two soils evaluated at Wormiston were a spring barley and permanent grass field close to the steading.

The spring barley field scored a 1 - being friable with good root depth and aggregates that were easy to break up with one hand. The permanent grass field was rated 2 as being intact with much more root activity in the top two inches of soil which is typical of permanent pasture.

The quality of the soil structure in these fields was not as expected.

It is important to assess soil structure BEFORE taking any action to improve. Many problems can be easily worsened by subsoiling or taking action in unfavourable conditions.

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Nutrient Budgeting—how can it benefit your farm?

SAC consulting sampled 12 fields for pH, P, K and Mg. Maps for pH, P, K and Mg were created to give a clear picture as to which fields required targeting. The pH for the fields sampled ranged from 5.3 to 6.2. (Figure 1). Other than two fields, all were within a suitable pH range for grassland production. The phosphate levels were mostly low to moderate which would require some additional application to rectify this. The potash levels were mostly moderate to high which is typical of a farm with a lot of FYM (Figure 2).

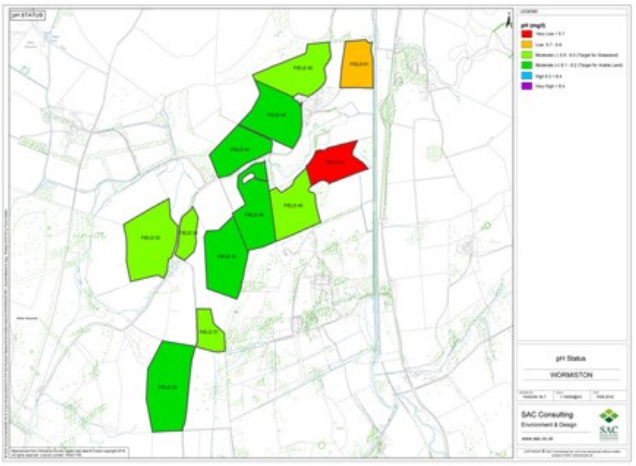

Figure 1 — pH status of fields

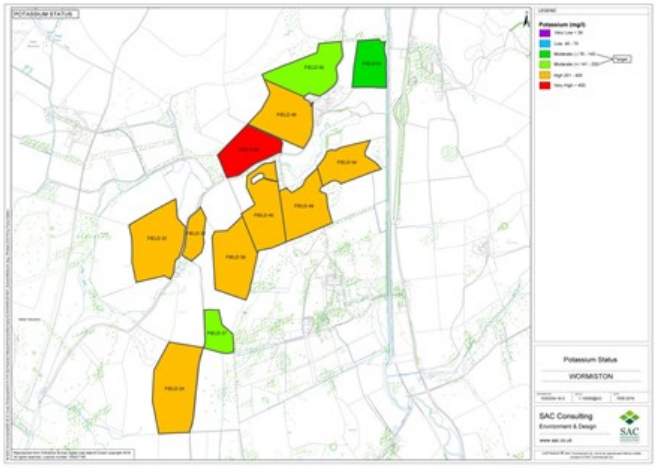

Figure 2 — Potassium status of fields

Using the soil testing information, a nutrient budget for the farm was created using PLANET Scotland. The recommendation was to alter fertiliser application to the spring barley. Currently 370kg/ha of 20:10:10 was applied over 28.57ha which resulted in a total cost of £2,625. An alternative to this was to make use of organic manure, applying FYM at 15t/ha to 25.02ha and 25t/ha to 3.55 ha.

To meet the spring barleys nitrogen requirements, the recommendation was to apply 180kg/ha of urea 46% to the 25.02ha and 105 kg/ha to the 3.55ha. On the 25.02ha no additional P & K was required and on the 3.55ha 96kg/ha was required. This gave a total inorganic fertiliser cost of £1,204 **resulting in an estimated saving of £1,421.**

For silage, currently 556kg/ha of 22:4:14 is applied on 51.83ha resulting in a total cost of £6,916. The recommendation was to apply slurry at 24m^3/ha to 43.91ha and at 20m^3 on 14.52ha. For the nitrogen requirement for growing silage, urea 46% should be applied between 200-260kg/ha of the whole area and 22kg/ha of TSP on 29.39ha. Total inorganic fertiliser cost would be £2,828 **with an estimated saving of £4,088**.

Key Findings

- Check soil structure for surface and sub soil compaction before taking any action to rectify problems.
- Sample your soils for pH, P, K & Mg routinely
- Prepare a nutrient budget to make the best use of organic manures to reduce your fertiliser bill
- Ensure sufficient storage to time organic manure applications to apply to growing crops.

Manure management at Wormiston

Dung from the straw bedded courts is typically mucked out every 2 months and middened in a field for spreading in the spring, either to stubble or to grassland.

Slurry is scraped from cubicles to a passage way then into an outside midden. Most of the farm is concreted, with dirty water also running into the midden.

It may be beneficial to explore ways of collecting dirty water to manage the dry matter content of the slurry, as a lot of rain water is collected in the slurry midden. The farm has sufficient storage to collect slurry and spread when conditions allow.