

Soil and Nutrient Network



Helping farmers improve soil and nutrient management

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Case study -

Crumhaugh Farm, South Lanarkshire

Crumhaugh farm, sits between Stonehouse and Strathaven in South Lanarkshire is a 252 acre dairy unit run by the Baillie family.

The farm is run in conjunction with the Baillie's other holding Over Dalsarf. A new dairy unit was constructed at Crumhaugh in 2014; all dairy cows are now milked there with young stock being reared at Over Dalsarf. There is 115 acres cut twice for silage, 31 acres cut then grazed, plus 50 acres of winter triticale grown for wholecrop.

Soil types on the farm range from very light alluvial soils alongside the Avon Water to heavy clay loams. The majority of the soils are Sorn series with areas of Darvel, Drongan and Rowanhill. These soils are noted as imperfectly draining. As part of the SRUC Soil Nutrient Network, the Baillies invited farmers to Crumhaugh discuss soil and nutrient management and see if this could be improved at all.

Top tips for all farms

- Sample soil for pH P, K, Mg
- Record yield of individual fields so you can accurately replace offtake in fertiliser applications
- Take slurry/FYM applications into account before applying fertiliser.
- Consider how you spread slurry - applying slurry with a trailing shoe or shallow injection reduces losses of the greenhouse gas Nitrous Oxide to the environment, increasing N for the growing crop.

Ideas for Crumhaugh

- Soil pH is a key limiting factor. Fields have been prioritised to receive 2t/acre of lime in spring. Granular lime will be applied to a third of one of the Triticale fields (pH 5.2) as a "quick fix", Magnesium limestone will be applied to another third and the final third will be untreated. Yield will be monitored to see impact and we will look at this again at our second meeting.
- Yields of silage and wholecrop will be recorded to improve accuracy of nutrient budget.
- Sward-lifting of the compacted fields will be carried out.



For more information on the Soil and Nutrient Network see www.farmingandwaterscotland.org. For dates of SNN events, find us on Facebook or follow us on Twitter @FarmWaterScot.



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Soil analyses

A routine soil analysis (pH, P K and Mg) was taken of every field at Crumhaugh. The majority of the fields were below optimum for pH, ranging between 5.2 and 5.9. Phosphate levels were seen to be low, with Potash in the low to moderate ranges.

Fields which had most recently been re-sown showed the highest pH and phosphate levels indicating that an improvement to soil fertility was being made.

Assessing soil structure

Soil profile pits were dug in an autumn reseed, a 3 year old reseed and a permanent grass ley.

Compaction around the plough layer was found in the younger pastures. The Autumn reseed also had a layer of straw/manure which had not been broken down since application 2 years previously. This indicated that the soil was in anaerobic conditions, meaning soil bacteria could not effectively break down the manure, reducing nutrient availability for the growing crop.



Using a soil penetrometer, soil compaction was shown to be worse in wheelings in the field compared with in the sections in between.

The permanent pasture field was a grazing field which had not been ploughed in many years. The profile showed high root mass in the top 2 inches typical of a permanent pasture field. The structure below showed dry, friable soil with no compaction that easily broke apart. The excellent soil structure in this old pasture came as a surprise to the farmer and the group. It had been anticipated that this field was more likely to have compaction brought about by poaching by livestock. This demonstrated that soil structure should always be investigated before attempting to rectify any problem. **Trying to rectify a problem in the wrong way can actually exacerbate the issue.**

Importance of soil pH

The correct soil pH for crop type is vital to maximise yield and ensure efficient use of fertiliser.

Optimum pH for grassland is between 5.8 and 6.0 for mineral soils. For arable fields pH 6.0-6.2 should be targeted. From 100 samples taken in Lanarkshire in 2015, the average pH was 5.6. At this sub-optimum pH, phosphate becomes locked up, clover will struggle to grow and nitrogen fertiliser will not be taken up as efficiently by the crop.

Incorrect pH also has an interaction with trace-elements which can cause problems for livestock.

All soils will start to become more acidic over time. How quickly this happens depends on a number of factors including soil type, rainfall and application of nitrogen fertiliser.

Sandy soils should be limed little and often whereas clay soils have a greater ability to hold on to lime and can therefore be limed less frequently.

Benefits of nutrient budgeting

Fertiliser applications should be tailored according to soil analysis, crop need and take account of nutrients in slurry or FYM. In grazing fields phosphate and potash are largely returned to the soil through the animal. In arable or silage fields, large amounts of phosphate and potash will be removed from the field in the crop. It is important to ensure that offtake of nutrients is replaced with slurry, FYM or fertiliser applications to ensure soil nutrient status does not become depleted and crops can achieve target yields.

With a plentiful supply of slurry at Crumhaugh, it was calculated on a moderate P & K soil status field that current fertiliser applications could be reduced by at least 0.5cwt/acre. **If this could be replicated on all the silage ground savings of up to £1000/year could be made.**