

Improving Farm Profitability - Soils, Grass and Crops

Nether Aden
Climate Change Focus Farm

Notes from the meeting on
10th June 2015

This meeting was the fourth in a series of Climate Change Focus Farm Discussion Group events linked to Nether Aden near Mintlaw, by kind permission of David and Nicola Barron. Events aim to help increase farm profitability and lower the farm carbon footprint.

What can your soil tell you?

Achieving target yields starts with the soil.

Soil pits around the farm were used to show depth of topsoil, importance of organic matter, how to identify compaction, the best methods for alleviating compaction and the effect this has on the soil profile.

Key points discussed included:

- **Topsoil depth.** The soil pits on Nether Aden had at least 30 cm of topsoil. Typically, land under permanent pasture will have a lower depth of topsoil. Every time soil is cultivated, some topsoil will be lost. Ideally, soil should have at least 20 cm of topsoil.
- **Colour.** Topsoil rich in organic matter will be a dark colour. Rusty, grey mottled soils in the profile indicate poor drainage and potentially previous waterlogging.
- **Smell.** Compaction can result in water lying trapped in the soil; the air-less conditions stop the breakdown of organic matter and manures. A sour smelling layer of debris can form.
- **Roots.** In well structured soil, it should be easy to identify roots extending to 30 cm and beyond.
- **Worms.** Important for aeration. In a typical sod of soil, it would be expected to find around 10 earthworms.
- **Cracks.** Soil structure should have vertical channels to allow free movement of water, air and nutrients.
- **Cultivations.** The more a soil is cultivated, the more difficult it is to maintain its structure. Ploughing soils will lose more carbon compared with non inversion cultivation.



Soil texture

The physical properties of soils vary between and within fields, and at different depths in the soil profile. Clay, silt and sand are the main soil components but they occur in varying amounts, leading to different soil textures.

- **Sand** – largest particles found in the soil. Also have the largest air spaces between individual particles, allowing air to circulate and water to drain away.
- **Silt** – Smaller particles than sand but larger than clay. Air pockets and water channels more restricted than in sandy soils.
- **Clay** – smallest particles found in the soil. Spaces between the individual particles are also small. Air and water movement can be restricted in these soils.

To assess soil texture, rub some moist soil between finger and thumb. Sand will feel gritty and will break up when rolled into a ball. Silt will feel smooth and silky, while clay will feel sticky and look shiny when wet. Clay soils will hold a ball shape.

For information on how to assess soil texture, see SRUC Technical Note [TN656](#).

Compaction

SRUCs Gavin Elrick explained that compaction is where the soil has been squashed into a solid impermeable layer, either at the surface or within the topsoil. This can restrict the movement of air, water and nutrients through the soil profile. Compaction was seen in some of the soil pits dug on the farm (some pits had deliberately been dug across tramlines to show compaction). The compaction in the spring barley field could have been removed by ploughing in preparation for the next crop, rather than subsoiling.

Compaction will normally lead to poor root growth which, amongst other things, will reduce the plants response to nitrogen. Applying fertiliser to compacted soils is a waste of money as the plant will not be able to utilise it fully. Compaction can also cause temporary waterlogging - wet soils stay colder for longer which will shorten your growing season and reduce production.

Digging a hole in your field is the best way to find if there is compaction. Dig a hole at least a spade depth when the soil is not too dry and not too wet. Look to see how far the roots penetrate into the soil, and for any obvious change in the soil structure. The depth at which the compaction occurs is useful in determining the cause and the best course of action to alleviate the situation.



Soil compaction - causes and remedies

Knowing the depth of the compacted layer is key to choosing the correct treatment. Don't subsoil in wet conditions otherwise you could make the problem worse*.

Type and depth	Likely cause	Possible remedies*
Surface capping (0-10cm)	Grazing in wet conditions, high stocking densities, rainfall on new cultivations.	Lime/introduce organic matter to encourage earthworm activity to break cap. Soil aerators with spikes or blades.
Machinery (10-15cm)	May be caused by operations such as muck spreading, carting grain, carting silage etc.	For shallow compaction a soil aerator with knives or blades might suffice, otherwise a subsoiler or sward lifter might be required.
Plough pan (10-15cm+)	Repeated cultivations to the same depth, ploughing in poor conditions etc.	Subsoiler or sward lifter in autumn or plough to just below the pan layer.

Table modified from [BGS Publication](#) "Soil smart and nutrient wise a guide for on farm practice"

Optimising grassland production

Consider variety to get the most out of your grass

With guest speaker Charlie Morgan (GrassMaster) the group looked at the grass species present in the sward in one of the silage fields. Mr Morgan highlighted that there was a significant population of rough stalked meadowgrass, which will only utilise approximately 17% of the nitrogen fertiliser applied to the sward. This is compared with an 80% utilisation of applied N by perennial ryegrass.

Based on nitrogen fertiliser costing £300 per tonne, 1 kg nitrogen costs 87 pence. If a sward is made up of rough stalked meadowgrass, **only 17% of the applied nitrogen is used**. This gives an effective fertiliser nitrogen **cost of £5.11 per kg** actually used. The rest of the nitrogen is wasted. Soil pH shouldn't be overlooked - with a pH 5.5 Mr Morgan estimated that in this field, 30-40% of the grass yield would be lost.

Grass swards deteriorate over time, Mr Morgan advocated reseeding every 5-6 years. Replacing the sward would maximise potential yield which would pay for the costs of reseeding. It would also allow the farm to take advantage of new varieties which were more productive than the species currently being grown, making the business more efficient. A good quality silage could always be mixed with straw if required for suckler cows, particularly in Aberdeenshire. Maximising the production of high quality silage could free up more land for grazing and allow more stock to be carried on the farm.

Mr Morgan had calculated the cost of producing one bale of silage at £24 per bale by the time absolutely all costs had been considered. If this is the actual cost, then it had better be a high quality feed.

Assess soil structure in grazing fields

As farms attempt to carry more and more stock to become more efficient and maximise production, the potential for damage to the soil increases.

In one of the grazing fields a sod of soil showed that cattle hooves had impacted the top 5 cm of the soil. Below this there was some degree of compaction.

It is important to get water to drain down through the profile; in this case a big heavy roller with either blades or spikes would be a good way of alleviating the compaction at this depth in the profile. Knife aerators will lose less yield than sward lifters. This would be a job for later in the season when the soils were drier.

Reseeding? Points to consider at Nether Aden

- Use intermediate and late heading varieties rather than early heading
- Include a little Timothy - more drought tolerant
- Use the right choice of clovers (medium leaved clovers are best for cattle)
- Make use of the recommended variety lists



Nether Aden crop update

Crops are at least two weeks behind as a result of a late spring and generally cool growing conditions.

ICM Consultant Willie Gardiner discussed the crops at Nether Aden. The spring barley crop examined was a crop of Concerto which was aimed at the malting market. The crop had earlier received a herbicide and had more recently received its first fungicide. A second fungicide was planned for later in the season. Historically the farm has grown the spring barley variety Optic which has performed well, however the maltsters currently dictate the variety that has to be grown. The vast majority of the malting barley market is now for the variety Concerto. In general this year, crops are at least two weeks later, resulting in less tillering than usual in the current season which, allied to the expected shorter growing season, is likely to impact on the final yield. Many later sown crops this year are showing signs of stress and yellowing in wheelings and headlands as areas of compaction become very obvious given the poorer than usual growing conditions.

A field of winter oilseed rape was also examined. Nether Aden has a problem with clubroot, therefore has very little choice in the variety that can be grown. The current variety is Mentor which is approximately 10% higher yielding than the previous best clubroot resistant variety – Cracker. Oilseed rape yields on the farm appear to have reached a plateau. Mr Gardiner thought that if a farm grew oilseed rape more than one year in six, it was losing yield as a result of too tight a rotation. Slugs were also becoming more and more of a problem as winters appeared to be becoming wetter and milder. The insecticides available for control of slugs were also being more and more restricted. With Nether Aden being on the banks of the Ugie, the use of slug pellets was very closely monitored. Insect pests were also becoming more common in oilseed rape in this part of the world, gradually spreading in from further south with each passing year, for example the rape winter stem weevil, which had not generally been seen in this area until approximately four years ago. Mr Gardiner was not an advocate of applying several mid flower sprays to oilseed rape crops in order to control sclerotinia, as had become the fashion in certain parts of Aberdeenshire. Mr Gardiner preferred the use of a single well timed mid flower spray using a robust chemical at an appropriate application rate.

There are nine climate change focus farms in Scotland. Keep up to date with their activities at



www.farmingforabetterclimate.org

Meetings are free to attend and all farmers are welcome.

For Nether Aden, contact farm facilitator Alan Bruce on 01888 563 333 or via email at alan.bruce@sac.co.uk for more information.

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