

Alleviating Soil Compaction



Practical Guide

The demands of modern farming coupled with heavier machinery and increasingly wet weather conditions increase the risk of compaction in farm soils.

Compaction occurs when the soil has been compressed into a solid layer within the soil profile. This could be easily done by trafficking or livestock poaching.

The compacted layer acts as a barrier, restricting the movement of air, water and nutrients within the soil profile. Compaction can lead to impeded drainage, reduce crop yields and increase

emissions of Nitrous Oxide (N₂O) and Carbon Dioxide (CO₂), both greenhouse gases implicated in climate change.



This Practical Guide gives some ideas on how to alleviate soil compaction.

See also the Practical Guides on soils and soil structure.

Benefiting the farm business

Healthy soils are key to maximising productivity. However, factors sometimes dictate that farm operations go ahead in less than ideal conditions, damaging farm soils both at the surface and down through the soil profile.

Early identification and remediation of soil problems is key to maximising both productivity and profitability from soils. For example, removing compacted layers will help root development, improving access to nutrients and benefitting crop growth. Soil health is crucial to maintaining productive grass leys, meaning the time between reseeds can be extended. Inclusion of clover within a grass sward will also reduce the need for bought in nitrogen fertiliser and make best use of nutrients on the farm.

Protecting and improving soil structure and quality will help to improve business resilience to changing weather patterns, benefit farm profitability and make best use of resources. These steps can also contribute towards a lower carbon footprint, further benefitting the farms green credentials.

There are five sets of Practical Guides covering :

Use energy and fuels efficiently

Develop renewable energy

Lock carbon into soils and vegetation

Optimise the application of fertilisers and manures

Optimise livestock management and the storage of manure and slurry

Find further information, including links to other Practical Guides and Case Studies, at

www.farmingforabetterclimate.org



Funded by the Scottish Government as part of their Climate Change Advisory Activity

Websites

www.farmingforabetterclimate.org

www.farmingfutures.org.uk

www.soilassociation.org

www.planet4farmers.co.uk

www.sruc.ac.uk/info/120062/crop_and_soils_systems/412/visual_evaluation_of_soil_structure

www.agrecalc.com



2015
International
Year of Soils



SRUC



The Scottish
Government
Riaghaltas na h-Alba

Alleviating Soil Compaction

Avoiding soil compaction

1. Sow cereal or grass seed into a seedbed that is dry to below the depth at which the cultivation machinery operates. If this is not the case on silty or clay loams, the cultivator will destroy the soil structure and work the lower depths of the seedbed into an impervious layer. This leads to impeded drainage, surface ponding and reduced crop yields.
2. Showing some restraint and patience at sowing could well reduce the effects of soil compaction at depth. If there are wetter areas in a field sow the dry areas and leave the wetter areas for a few more days since you will only sow them to reap a lower yield.
3. Shutting off silage fields and applying fertiliser early will bring forward cutting dates to give a longer weather window in which to wait for a spell of dry weather. Yield losses from cutting earlier in a forecast dry spell can compensate for the losses associated with weather delayed cutting dates.
4. Grow grass/clover swards. More clover leaf in a sward leads to slower deterioration in quality and the grower can afford to wait longer for a suitable weather window.
5. Sacrifice yield for forecast dry weather. Possibly higher quality, wet, poorly fermented, low intake silage sacrificed for lower energy, lower protein well fermented, high intake silage which can be capable of supporting a higher level of animal performance than material cut earlier in wet conditions.

Repairing the damage

In soil conditioning its important that the machine dealing with the problem must get to the bottom of things, i.e. reach below the impervious layer. The operation must be carried out when the soil is dry enough to give the shatter effect and break up the compacted layer.

Grass swards should be renewed based on production potential rather than age of sward. If a young grass sward has been trashed and is run out due to waterlogging following soil structural damage, it should be the candidate for reseeded and improved future management. As soon as soil conditions allow, the field should be subsoiled and followed by ploughing. The seedbed should be prepared when soil conditions are dry to below the working depth of the cultivation machinery. Where low lime, phosphate and potash levels have been taken care of, a productive grass sward should result. Miss out on any one of these operations and you could be back at square one in two to three years, costing you money and creating more emissions.

Next steps

Assess farm soils. Identify any compaction or soil structural issues. Plan remediation and put steps in place to avoid subsequent soil damage. When planning how to remediate any compaction, remember nature's message is to subsoil in dry soil conditions. If the conditions are too wet, any type of soil conditioning whether it be based around subsoiling, aeration or sward lifting will be a waste of time and fuel.

Coping with wet weather at ensilage

1. Move to half loads to reduce tracking effects
2. Gates are often located at bottom of the slope where fields are wet by nature. Can gates be re-sited up the slope?
3. Run on endriggs to avoid crisscrossing the field. This helps to restrict damage to single area of field
4. Bale silage down hill
5. Avoid uphill operations when machinery is under load
6. Localise guttered areas to allow targeting of subsoiling and reseeding

Gutters and surface ponding of water = soil structure damage.

Coping with wet weather at grazing

1. Graze driest fields to reduce poaching risks
2. Build up silage reserve which allows livestock to be fed on drier fields at higher stocking rates (or inside) until ground conditions improve.
3. Graze heavier fields with sheep.
4. Set up a farm management system that takes full account of soil drainage characteristics.