

How to assess soil structure

A visual examination of soil structure (VESS)

Soils should be assessed when they are moist and soil aggregates are easier to break up by hand. Avoid assessing soils during prolonged spells of wet or dry weather. Wait at least one month after cultivations.

Step 1: surface assessment

Assess the cover (grass sward, crop or residue) to identify moderate or poor areas that require further assessment.

Good

- Good cover
- No standing water
- No poaching and/or deep wheelings

Moderate

- Poor cover (or with more weed species in grassland)
- Some standing water
- Some poaching and/or deep wheelings

Poor

- Very poor cover and growth/sward quality
- Standing water and/or surface capping
- Severe poaching and/or deep wheelings

Step 2: soil block extraction

- Cut out three sides of a square block (about 30 cm deep) – leave an undisturbed side
- Lever out and lay the block on a plastic sheet or tray – undisturbed side up
- If the soil block falls apart easily, dig out a second block (and place it next to the first)



Top tip

Dig in 'good' (e.g. hedge bottom) and 'bad' (e.g. a gateway or tramline) areas to get familiar with soil structure.

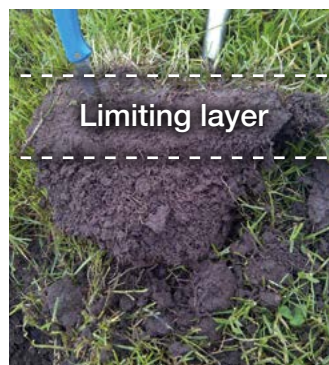
Step 3: soil assessment

Gently open the soil block by hand (like a book) to look for layers.

- If the structure is uniform, assess the block as a whole
- If there are two or more horizontal layers of differing structure, identify the layer with the poorest structure (the limiting layer)
- Record the depth of this limiting layer and carry out the rest of the assessment on this layer



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Break up the soil with your hands into smaller structural units or aggregates (soil clumps).

Using one hand, break up larger soil aggregates to assess their strength. Consider their shape, porosity and roots.

Step 4: soil scoring

Assign a score using the descriptions and photos overleaf.

Step 5: management

Consider management options based on the soil structure score. Then reassess:

- After a change in management practice
- After grazing/trafficking on wet ground
- Routinely every two years on grassland
- Routinely after each rotation on arable land

Further information

See ahdb.org.uk/GREATsoils for more information (including management options).

This factsheet is based on the VESS method of soil structure assessment – sruc.ac.uk/vess

Use this ruler to measure the depth of any limiting layer (cm).

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Score	Soil structure	Soil aggregates	Description	Management
Score 1: GOOD Crumbly (aggregates readily crumble with fingers).			Good soil structure, highly porous. Small, rounded, crumb-like aggregates (<6 mm). Numerous, well-distributed roots down to spade depth. Sweet, earthy smell.	No management changes needed, continue routine monitoring.
Score 2: GOOD Intact (aggregates easily break apart with one hand).			Good soil structure, mostly porous. Larger rounded aggregates (2 mm to 7 cm). Numerous, well-distributed roots down to spade depth. Sweet, earthy smell.	No management changes needed. Reassess annually on grassland. Continue rotational monitoring on arable land.
Score 3: MODERATE Firm (most aggregates break apart with one hand).			Adequate soil structure, less visible pores. Rounded aggregates, with some angular (2 mm to 10 cm). Fewer roots distributed within soil aggregates. No noticeable smell.	Minimise traffic on wet ground. Infrastructure changes in grassland can help, e.g. back-fencing, multiple field entrances or tracks. Consider cultivation depth on arable land in autumn.
Score 4: POOR Compact (effort needed to break apart aggregates with one hand).			Poor soil structure, very few pores. Mostly large angular aggregates (> 10 cm). Reduced rooting, clustered in large pores, earthworm channels and cracks between aggregates. Red/orange mottling may be present (sign of poor drainage). May have 'bad egg' smell.	Minimise traffic on wet ground. Check subsoil layers for compaction. Consider targeted cultivations under the right soil conditions. On grassland, consider using a sward slitter or aerator (<10 cm depth) and a sward lifter/top-soiler (10 to 30 cm depth). If the sward is poor, consider ploughing or reseedling. On arable land, consider improved drainage and diversifying crop rotations, especially the inclusion of no-till periods (e.g. ley-arable rotations).
Score 5: POOR Very compact (aggregates difficult to break apart with two hands).			Poor soil structure, very few pores. Very large angular or platy aggregates (>10 cm). Few roots, if any, restricted to the surface, down large pores, following earthworm channels or cracks. May be grey/blue in colour, or with orange mottling (sign of poor drainage). Strong 'bad egg' smell.	Minimise traffic on wet ground. Check subsoil layers for compaction. Consider targeted cultivations under the right soil conditions. On grassland, consider using a sward slitter or aerator (<10 cm depth) and a sward lifter/top-soiler (10 to 30 cm depth). If the sward is poor, consider ploughing or reseedling. On arable land, consider improved drainage and diversifying crop rotations, especially the inclusion of no-till periods (e.g. ley-arable rotations).