Healthy Grassland Soils – Four quick steps to assess soil structure

Step one: **Surface assessment**
Look at sward quality to identify potentially damaged areas which require further assessment.

- **Good**
  - Sward intact
  - No poaching
  - Few wheelings

- **Moderate**
  - Surface poached
  - Wheelings in places
  - More weed species

- **Poor**
  - Surface compacted
  - Soil exposed
  - Poaching
  - Poor sward quality

Step two: **Soil extraction**
- Dig out one spade-sized block of soil (depth approx. 30cm). Cut down on three sides and then lever the block out leaving one side undisturbed
- Lay soil block on a plastic sheet or tray

Tip: When starting out it is useful to dig in an area where you know there may be a problem (eg a gateway) and get familiar with signs of soil structure damage.

Remember: Sample when the topsoil is moist – if the soil is too dry or too wet it is difficult to distinguish signs of poor soil structure.

Step three: **Soil assessment**
Gently open the soil block like a book to break it up
- 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
- Carry out the rest of the assessment on this **limiting layer**

Step four: **Soil scoring**
Break up the soil with your hands into smaller structural units (known as aggregates)
- Assign a score by matching what you see to the descriptions and photos overleaf
- A score of 1 or 2 is **Good**; a score of 3 **Moderate**; and 4 or 5 is **Poor** and requires management action
- Record depth of limiting layer to assess management options
<table>
<thead>
<tr>
<th>Structure quality</th>
<th>Identification of structural problem eg limiting layer</th>
<th>Soil structure features</th>
<th>Description</th>
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</table>
| **Score 1**       | Friable                                              |                        | • Good soil structure  
• Highly porous  
• Many roots  
• Sweet earthy smell  
• No signs of compaction |
| Aggregates readily crumble with fingers | Small (<6mm), round |                        |             |
| Management Options | Re-assess after equipment crosses the ground or grazing in wet conditions or every two years. |
| **Score 2**       | Intact                                               |                          | • Good soil structure  
• Porous  
• Good root distribution  
• Earthy smell  
• Some indication of larger aggregates |
| Aggregates easily break apart | Rounded (10mm) |                          |             |
| Management Options | Re-assess after equipment crosses the ground or grazing in wet conditions or yearly in spring. |
| **Score 3**       | Firm                                                 |                          | • Adequate soil structure  
• Some aggregates non-porous, less visible pores  
• Moderate root distribution  
• No strong smell  
• Some indication of reduced porosity  
• Fewer worms |
| Most aggregates break down | Round (10mm) but some are angular |                          |             |
| Management Options | Consider infrastructure changes (eg back-fencing, multiple field entrance or tracks) to minimise traffic in marginal weather conditions. |
| **Score 4**       | Compact                                               |                          | • Large angular aggregates (>5cm across) with low pore numbers  
• Some red/orange mottling maybe present (sign of poor drainage)  
• Roots clustered in large pores, worm channels and cracks between aggregates  
• May have sulphur smell (ie bad eggs) |
| Effort needed to break down aggregates | Larger (>5cm) angular |                          |             |
| Management Options | Consider use of sward slitter or aerator (if poor soil structure <10cm) or top-soiler or sward lifter (if poor soil structure deeper than 10cm). |
| **Score 5**       | Very compact                                          |                          | • Very large angular aggregates (>10cm), with very few pores  
• Any roots seen mainly at the surface or clustered down large pores or cracks  
• May have grey colour with red/orange mottling (sign of poor drainage)  
• May have strong sulphur smell (ie bad eggs) |
| Aggregates compact, difficult to pull apart and platy | Large initially (>10cm) angular |                          |             |
| Management Options | Use sward slitter or aerator (if poor soil structure <10cm) or top-soiler or sward lifter (if poor soil structure deeper than 10cm). Assess sward and plough and reseed if required. |

Based on the VESS method of soil structure assessment (www.sruc.ac.uk/vess)
See Healthy Grassland Soil Pocketbook for more information. It is available at www.healthygrasslandsoils.com.