Working with Farmers to Improve Soil Management

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Drivers for good soil management

“More food for less environmental impact”

“Sustainable intensification”

• Farmer engagement is crucial……..
Good soil management

Getting crop roots and water to move downwards through a well structured soil
Soil Protection Review 2010

- Farmers are asked to take more responsibility for assessing risks to their soils and tackling soil degradation problems on their land.
Soil Protection Review

‘Brought soils up the agenda’

- Compaction
- Erosion
- Organic matter
  - “soils are not soils without organic matter”
Very useful guidance from the Environment Agency

Soil assessment to avoid erosion and runoff
Visual Soil Assessment tools

• Peerlkamp

• Landcare
Peerlkamp

Soils are scored on a scale of 1 to 10

- Lowest score St (1) – a massive condition with no tilth and few or no cracks.

- Highest score St (10) – the least compact and most porous condition.

(Uniform distribution of fine visual pores is scored higher than similar total porosity distributed in fewer coarse pores).
Landcare

Soil structure and consistence

- **GOOD CONDITION VS = 2**
  Good distribution of friable finer aggregates with no significant clodding

- **MODERATE CONDITION VS = 1**
  Soil contains significant proportions of both coarse firm clods and friable, fine aggregates

- **POOR CONDITION VS = 0**
  Soil dominated by extremely coarse, very firm clods with very few finer aggregates
Landcare

Number and colour of mottles

**GOOD CONDITION VS = 2**
Mottles are generally absent.

**MODERATE CONDITION VS = 1**
Soil has common (10–25%) fine and medium orange and grey mottles.

**POOR CONDITION VS = 0**
Soil has abundant to profuse (>50%) medium and coarse orange and particularly grey mottles.
Landcare “Visual Soil Assessment”

- Soil structure and consistence
- Number and colour of soil mottles
- Soil porosity
- Colour of the soil matrix
- Earthworm count
- Surface relief

<table>
<thead>
<tr>
<th>Soil Quality Assessment</th>
<th>VSA Score</th>
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<tbody>
<tr>
<td>Poor</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Moderate</td>
<td>10 – 20</td>
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<tr>
<td>Good</td>
<td>&gt; 20</td>
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Spade – the vital tool!

*Linking soil structural conditions to soil management practices*

- Cultivation policy:
  - Subsoiling
  - Ploughing
  - Reduced tillage/no-till

- Drainage maintenance

- Post sugar beet harvest (2010/11) – sorting out a ‘mess’!
Good topsoil structure

Peerlkamp = 9
VSA≥20
Plough – based cultivations

- Over 50% of tillage operations; typically to a depth of 20-30cm
Ploughing – early vs. late
Reduced (minimum) cultivations; typically to a depth of 10-15cm

- FPS 2010 – around 40% of arable land cultivated using reduced (or minimum) tillage

- Saves time, diesel and money
  - weed control challenges
  - compaction ‘problems’ ………
Discs, tines, more discs and press
Direct drilling (no–till)

- FPS 2010 – around 4% of arable land ‘cultivated’ using zero tillage
Direct drilling into long straw
Good vs. poor topsoil structure
‘Typical’ crop rooting depths – good *subsoil structure* is important

<table>
<thead>
<tr>
<th>Crop</th>
<th>Rooting Depth (cm)</th>
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<tbody>
<tr>
<td>Winter wheat</td>
<td>120</td>
</tr>
<tr>
<td>Oilseed rape</td>
<td>150</td>
</tr>
<tr>
<td>Sugar beet</td>
<td>180</td>
</tr>
<tr>
<td>Potatoes</td>
<td>70</td>
</tr>
<tr>
<td>Field beans</td>
<td>75</td>
</tr>
<tr>
<td>Grass</td>
<td>100</td>
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Good subsoil structure
Poor subsoil structure
Removing subsoil (deeper) compaction

- FPS 2008 - 69% of farmers removed compaction from headlands after harvest

- ADAS/Birds Eye survey 2008 (wet summer/autumn) - 55% of growers used a subsoiler on land going into winter wheat
Subsoiling guidance

- Subsoil in dry conditions
- Set tines to just below the level of compaction, but above ‘critical depth’
- Not too wide. Tines no more than $2\frac{1}{2}$ times working depth apart at the surface

- If a specific compaction issue has not been identified you may be better off doing nothing!...

  (ADAS, 1984; Frost, 1988; Soane et al. 1987, Spoor et al. 2003)
Lifting sugar beet (22 January 2011)
Crop residue decaying anaerobically
Soil compaction in grassland
Sward lifting in grassland

Defra R and D (BD5001)
Conclusions

• Get the spade out!

• Visual Soil Assessment

• Need to increase on-farm uptake of best soil management practices
  - increase crop yields
  - reduce environmental impacts (win-win)
Pay close attention to your soil management
- you know it makes sense!

Thank you
- any questions?