Moving beyond carbon: assessing the public goods from organic farming

Laurence Smith, Catherine Gerrard, Susanne Padel

The Organic Research Centre, Elm Farm
Development of tools at ORC

• OrgPlan
• Organic Systems Development Group Sustainability Audit (Measures, 2004)
• Quality and Environmental Benchmarking for Organic Agriculture (Defra project OF0348)
• EASI (Energy, Emissions and Agricultural Systems Integration)
• OCIS Public Goods Tool
Measurements have been achieved by:

• Consultation with experts
• Literature search
• Comparing performance with industry benchmarks
• Comparing to each other in small groups
Results of farm’s greenhouse gases and carbon sequestration presented in an aggregated format:

- GJ Consumed
- t CO2 Captured
- t CO2 (e) Emitted

Bar chart showing the comparison of energy consumption (GJ) and carbon emissions (t CO2 (e)) for different categories such as Arable, Beef, Field Veg, Arable Marketing, Beef Marketing, Veg Marketing, Composting, Veg Processing, Domestic, Swimming Pool, Domestic 2, and Sequestration.
Development of the Public Goods tool

• Natural England project, funded as a part of the OCIS contract
• Aimed to assess the benefits that accrue from organic management and the addition of an OELS agreement
• 40 organic farms assessed throughout England
• 11 ‘Spurs’ chosen through consultation with experts (farmers, advisors and researchers)
• Performance against each spur measured on a 1-5 scale
Public Goods ‘Spurs’

- Soil Management
- Biodiversity
- Water Management
- Manure Management and Nutrients
- Energy and Carbon
- Agricultural Systems Diversity
- Landscape and Heritage
- Social Capital
- Animal Health and Welfare
- Food Security
- Farm Business Resilience
Results presented in a spider web diagram:
Pilot run with 40 organic farms:

• The highest scoring spurs are animal health and welfare and soil management, the lowest being water management.

• The highest scoring activities are food quality certification and erosion management. The lowest is biodiversity awards.

• Tenancy/ownership status and length of time the farm as fully organic have less of an impact on the scores.

• Level of agri-environmental participation only had an impact on the biodiversity spur.
Pilot results 1

- For farm type and whether or not the farm was solely grassland, the same three spurs show significant results: energy and carbon, food security, and nutrient management.

- Farm type, whether or not the farm is grassland, and advisor showed significant differences for more than one spur.

- Arable farms compared favourably to conventional benchmarks in terms of energy use, livestock farms performed less well in this area.
Range of results from pilot

- Biodiversity
- Landscape and heritage features
- Soil management
- Water management
- Nutrient Management
- Agricultural systems diversity
- Food security
- Energy and carbon
- Farm business resilience
- Social capital
- Animal health and welfare

Overall mean, maximum, minimum
## Nutrient budget and energy benchmark results from pilot

<table>
<thead>
<tr>
<th>Average kg/ha for NPK</th>
<th>Cereals</th>
<th>Dairy</th>
<th>General cropping</th>
<th>Beef and sheep</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>109</td>
<td>155</td>
<td>158</td>
<td>128</td>
<td>153</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>5</td>
<td>0</td>
<td>12</td>
<td>-1</td>
<td>-5</td>
</tr>
<tr>
<td>Potassium</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Energy (out of 5)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Organic farms compare favourably to conventional benchmarks for energy use – results from EASI

<table>
<thead>
<tr>
<th>Farm number</th>
<th>% of benchmark</th>
<th>Domestic</th>
<th>Diesel</th>
<th>DERV</th>
<th>Petrol</th>
<th>Grain drying</th>
<th>Electricity use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>586%</td>
<td>75%</td>
<td>69%</td>
<td>81%</td>
<td>N/A</td>
<td>180%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>189%</td>
<td>82%</td>
<td>92%</td>
<td>24%</td>
<td>N/A</td>
<td>154%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>109%</td>
<td>147%</td>
<td>18%</td>
<td>41%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>56%</td>
<td>51%</td>
<td>39%</td>
<td>10%</td>
<td>N/A</td>
<td>60%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>79%</td>
<td>90%</td>
<td>180%</td>
<td>250%</td>
<td>80%</td>
<td>76%</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>370%</td>
<td>51%</td>
<td>7%</td>
<td>76%</td>
<td>269%</td>
<td>68%</td>
</tr>
<tr>
<td>AVG:</td>
<td></td>
<td>232%</td>
<td>83%</td>
<td>115%</td>
<td>80%</td>
<td>118%</td>
<td>91%</td>
</tr>
</tbody>
</table>
Feedback on public goods tool

• Most farmers found useful to highlight public goods and boost understanding
• Opportunity to ask questions
• Some advisors want to separate off sections of it (such as the nutrient budget and the energy benchmarking)
• Further work required before we can make the tool more widely available, possibly as a web-based self assessment tool
Future plans

• Make updates suggested by advisors
• Adapt to assess all farms and farming systems (not just organic)
• Add benchmarking
  • Compare to overall pilot results
  • Compare to similar farm-type
  • Use of median and/or range for comparative
Old adage: time is money!

Seeing the wood for the trees…

Public Goods tool has achieved a good balance
Acknowledgments

We would like to thank:

• Natural England and Defra for funding the work

• Advisors for completing the pilot study

• Luddesdown Organic Farms Ltd, the Ratcliff Foundation, the Roger Vere Foundation and the Constance Travis Charitable Trust for their support of the EASI project