Monitor farm meeting, 7 February 2018

Recommended List

Jenna Watts
Outline

• The RL
• New varieties
• Local RL trial results
• Have your say on the RL
RL trials

2017 RL WW trial locations
Trials behind the list
Pyramid of selection – Winter wheat

Breeders pre-NL trials
Around 800 lines

National List year 1
60-80 lines

National List year 2
40-50 lines

Recommended List 1
11 varieties

3-6 varieties

Candidates selected from previous 2 years’ data
Recommendation based on previous 3 years’ data

2013
2014
2015
2016
2017

AHDB CEREALS & OILSEEDS

(RECOMMENDED)
### Criteria to select a new variety

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>nabim 1 &amp; 2</th>
<th>nabim 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Bread</td>
<td>Biscuit</td>
<td>Other (hard &amp; soft)</td>
</tr>
<tr>
<td>Millers assessment</td>
<td>V High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Ukp (bread making export)</td>
<td>High</td>
<td>-</td>
<td>High</td>
</tr>
<tr>
<td>Uks (biscuit wheat export)</td>
<td>-</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Distilling</td>
<td>-</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Protein</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>HFN</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>SPWT</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Agronomy</strong></td>
<td></td>
<td></td>
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<tr>
<td>Lodging</td>
<td>V High</td>
<td>V High</td>
<td>V High</td>
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<tr>
<td>Height</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Ripening</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Sprouting</td>
<td>High</td>
<td>High</td>
<td>High</td>
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<tr>
<td><strong>Pathology</strong></td>
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<tr>
<td>Yellow rust</td>
<td>High</td>
<td>High</td>
<td>High</td>
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<tr>
<td>Brown rust</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Septoria tritici</td>
<td>V High</td>
<td>V High</td>
<td>V High</td>
</tr>
<tr>
<td>Fusarium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Combination of untreated yield &amp; disease</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>
Criteria for Recommendation

Does the variety have a balance of features that are sufficiently better than existing varieties & such that it could potentially provide a more economic return in the market?

Comparator varieties

UK yield in ranked order

-2% Recommendation unlikely below here

Expect not to Recommend
Variety needs something special (innovative traits)

Yield target

Expect not to Recommend
Variety needs additional strengths and no weaknesses

Expect to Recommend
Unless variety has weaknesses compared to comparator varieties

+2% Automatic selection

Recommend
If variety meets minimum standards
New Wheat varieties
Wheat yields

![Chart showing wheat yields from 2013 to 2017, with 2017 having the highest yield, and the 5-year average also highlighted.]
**Winter wheat**  
- hard Group 4

<table>
<thead>
<tr>
<th></th>
<th>RGT Gravity</th>
<th>Gleam</th>
<th>KWS Kerrin</th>
<th>Graham</th>
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<tbody>
<tr>
<td>UK treated yield</td>
<td>106</td>
<td>105</td>
<td>105</td>
<td>103</td>
</tr>
<tr>
<td>Untreated yield</td>
<td>83</td>
<td>88</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>Specific weight</td>
<td>76.8</td>
<td>76.6</td>
<td>76.6</td>
<td>77.1</td>
</tr>
<tr>
<td>Lodging + PGR</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Maturity</td>
<td>+1</td>
<td>0</td>
<td>+1</td>
<td>0</td>
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<tr>
<td>Mildew</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Yellow rust</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Septoria tritici</td>
<td>5.2</td>
<td>6.2</td>
<td>5.3</td>
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</tr>
<tr>
<td>Brown rust</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
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<tr>
<td>OWBM</td>
<td>R</td>
<td>R</td>
<td>-</td>
<td>-</td>
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Yield control: 11.0 t/ha (UK)
# Winter wheat - soft Group 4

<table>
<thead>
<tr>
<th></th>
<th>KWS Jackal</th>
<th>Elation</th>
<th>Leeds</th>
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<tr>
<td>Distilling</td>
<td>[Y]</td>
<td>Y</td>
<td>[Y]</td>
</tr>
<tr>
<td>uks</td>
<td>-</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>UK treated yield</td>
<td>104</td>
<td>104</td>
<td>101</td>
</tr>
<tr>
<td>North yield</td>
<td>[105]</td>
<td>[103]</td>
<td>102</td>
</tr>
<tr>
<td>Untreated yield</td>
<td>79</td>
<td>82</td>
<td>71</td>
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<tr>
<td>Specific weight</td>
<td>76.7</td>
<td>78.3</td>
<td>78.4</td>
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<tr>
<td>Lodging + PGR</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Maturity</td>
<td>+1</td>
<td>+1</td>
<td>+2</td>
</tr>
<tr>
<td>Mildew</td>
<td>7</td>
<td>7</td>
<td>3</td>
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<tr>
<td>Yellow rust</td>
<td>9</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Septoria tritici</td>
<td>5.1</td>
<td>4.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Brown rust</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>OWBM</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
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</table>

Yield control: 11.0 t/ha (UK), 10.7 t/ha (North)
## Winter wheat - nabim group 3

<table>
<thead>
<tr>
<th></th>
<th>Elicit</th>
<th>KWS Barrel</th>
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<tr>
<td>UK treated yield</td>
<td>103</td>
<td>103</td>
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<tr>
<td>UK untreated yield</td>
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<td>Hagberg</td>
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<td>77.6</td>
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<tr>
<td>uks</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Resistance to lodging + PGR</td>
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<td>8</td>
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<tr>
<td>Ripening</td>
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<td>+1</td>
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<tr>
<td>Mildew</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Yellow rust</td>
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<tr>
<td>Brown rust</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Septoria tritici</td>
<td>6.4</td>
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<td>Eyespot</td>
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<td>R</td>
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Yield control: 11.0 t/ha
New barley varieties
## Winter barley
### 2-row malting

<table>
<thead>
<tr>
<th></th>
<th>Electrum</th>
<th>Coref</th>
<th>Craft</th>
<th>SY Venture</th>
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<tbody>
<tr>
<td>UK yield</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>95</td>
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<tr>
<td>Untreated yield</td>
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<td>76</td>
<td>79</td>
<td>72</td>
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<tr>
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<td>69.2</td>
<td>67.4</td>
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<td>7</td>
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<tr>
<td>Maturity</td>
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<td>-1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Mildew</td>
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<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Brown rust</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Rhynchosporium</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>4</td>
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<tr>
<td>Net blotch</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>BaYMV</td>
<td>R</td>
<td>R</td>
<td>R</td>
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</table>

Yield controls: 9.6 t/ha
## Winter barley
### 6-row feed

<table>
<thead>
<tr>
<th>Type</th>
<th>Belmont</th>
<th>KWS Astaire</th>
<th>Libra</th>
<th>Bazooka</th>
<th>Funky</th>
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<tbody>
<tr>
<td>Uk yield</td>
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<td>108</td>
<td>106</td>
<td>109</td>
<td>107</td>
</tr>
<tr>
<td>Untreated yield</td>
<td>82</td>
<td>93</td>
<td>87</td>
<td>91</td>
<td>92</td>
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<tr>
<td>Specific weight</td>
<td>68.0</td>
<td>65.5</td>
<td>70.6</td>
<td>68.5</td>
<td>68.8</td>
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<td>8</td>
<td>7</td>
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<td>8</td>
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<tr>
<td>Maturity</td>
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<td>0</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>Mildew</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Brown rust</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Rhynchosporium</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Net blotch</td>
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<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>BaYMV</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
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</tbody>
</table>

Yield controls: 9.6 t/ha
# Spring barley
- New varieties

<table>
<thead>
<tr>
<th></th>
<th>LG Diablo</th>
<th>LG Tomahawk</th>
<th>RGT Asteroid</th>
<th>RGT Planet</th>
<th>Laureate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brewing &amp; malt</td>
<td></td>
<td>Malt</td>
<td>Brewing &amp; malt &amp; distilling</td>
<td>Brewing</td>
<td>Brewing &amp; malt</td>
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<tr>
<td>UK yield</td>
<td>106</td>
<td>105</td>
<td>103</td>
<td>105</td>
<td>104</td>
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<tr>
<td>East yield</td>
<td>108</td>
<td>106</td>
<td>105</td>
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<tr>
<td>West yield</td>
<td>[102]</td>
<td>[100]</td>
<td>[102]</td>
<td>105</td>
<td>102</td>
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<tr>
<td>North yield</td>
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<td>107</td>
<td>102</td>
<td>104</td>
<td>105</td>
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<tr>
<td>Specific weight</td>
<td>67.5</td>
<td>66.3</td>
<td>68.7</td>
<td>68.1</td>
<td>66.6</td>
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<tr>
<td>Lodging</td>
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<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Ripening</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>0</td>
<td>+1</td>
</tr>
<tr>
<td>Mildew</td>
<td>[9]</td>
<td>[9]</td>
<td>[9]</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Brown rust</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Rhynchosporium</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Yield controls: 7.7 t/ha (UK), 7.9 t/ha (E), 7.8 t/ha (W), 7.4 t/ha (N)
Local trial results
Local trial results
Local trial results

![Graph showing mean yield of controls (t/ha) for Wheat and Barley. The graph includes data for 5 yr average (2013-2017), 2017 (UK), and Cowbridge (2017).]
Cowbridge wheat yields

Average difference 28%
Range 15 – 51%
Cowbridge – range in disease on WW varieties - June 2017

- Average Septoria tritici: 22%
- Average Yellow rust: 48%

% Disease

- Average Septoria tritici: 37%
- Average Yellow rust: 0%

Legend:
- Blue: Septoria tritici
- Orange: Yellow rust

Average disease levels and comparisons are shown in the graph.
Yellow rust race changes 2016

Variety affected by change in yellow rust population

-5.06 t/ha
Winter wheat disease
- Yellow rust ratings

Does not include 2018/19 P1 varieties
RL have your say

• What information provided by the RL is most useful to you?

• Is there any additional information that would be of value?

• How do you access information?
  • Printed booklet
  • Pocket books
  • On-line
RL survey

cereals.ahdb.org.uk/varieties
Thank you

Jenna.watts@ahdb.org.uk
TOPICS

• ASPECTS TO BE CONSIDERED

• PHYSICAL CONSTRAINTS & OPPORTUNITIES

• FINANCIAL ISSUES

• SIGNIFICANCE OF OUTPUT

• POLICY
OPPORTUNITY TO TENDER FOR

- Farm Business Tenancy on ...........
- XXXXX HECTARES
- TENDERS TO BE SUBMITTED BY LUNCHTIME ON
- WEDNESDAY 7th FEBRUARY 2018
CONSTRAINTS AND OPPORTUNITIES

- Soil Type & Quality
- Weed & Disease Pressure
- Grain Storage
- Cropping Options
- Straw Requirements

Existing Labour
Joint Ventures with other Businesses
Availability & Suitability of Existing Machinery
Scale of Existing Business
FINANCIAL IMPLICATIONS

• AFTER IDENTIFYING THE CONSTRAINTS AND OPPORTUNITIES

• CAN BUILD CROPPING PLAN
  = CROP GROSS MARGINS

HOWEVER KEY TO PROFITABLE ARABLE ROTATIONS IS

• NET MARGINS
CROP GROSS MARGINS

- All gross margins taken from ABC 85th Ed. Straw value not included P&K inputs based on indices 2, no depletion
BREAK CROP GROSS MARGINS

- all gross margins taken from ABC 85th Ed. Straw value not included P&K inputs based on indices 2, no depletion
WHAT ARE KEY CONSIDERATIONS WHEN REVIEWING GROSS MARGINS

- Timing of Harvest
  - Effect of Yield
- Storage and selling Options
  - Optimise Wheat – Why not continuous wheat?
- Straw Requirements
  - Oilseed Rape
- Organic Matter Management
  - Work Load
**RELATIONSHIP BETWEEN YIELD AND SALE PRICE**

- all gross margins taken from ABC 85th Ed. Straw value not included P&K inputs based on indices 2, no depletion

### Winter Wheat - Feed

<table>
<thead>
<tr>
<th>£/Tonne</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<tbody>
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<td>£96</td>
<td>£94</td>
<td>190</td>
<td>286</td>
<td>382</td>
<td>478</td>
<td>574</td>
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<td>374</td>
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<td>588</td>
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<tr>
<td>£120</td>
<td>238</td>
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<td>598</td>
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<td>838</td>
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<tr>
<td>£137</td>
<td>340</td>
<td>477</td>
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<td>£160</td>
<td>478</td>
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<td>798</td>
<td>958</td>
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<td>778</td>
<td>958</td>
<td>1138</td>
<td>1318</td>
<td>1498</td>
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</table>
### BASIS OF ASSUMED COSTS IN NET MARGIN DATA

<table>
<thead>
<tr>
<th>Fixed Costs</th>
<th>Winter Cropping</th>
<th>Spring Cropping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors Charge</td>
<td>£325</td>
<td>£265</td>
</tr>
<tr>
<td>Property Costs (Exc. All rent and finance)</td>
<td>£26</td>
<td>£26</td>
</tr>
<tr>
<td>General Overheads</td>
<td>£20</td>
<td>£20</td>
</tr>
<tr>
<td><strong>Total Fixed Costs</strong></td>
<td><strong>£371</strong></td>
<td><strong>£311</strong></td>
</tr>
</tbody>
</table>
NET MARGINS

- WW, Feed 9t/ha
- WW, Feed 8t/ha
- WW, Feed 7t/ha
- WW, Milling
- Second WW, Feed
- S Wheat, Feed
- S Barley, Malting
- W Barley, Feed
- W Barley, Malting

- WW, Feed 8t/ha

Net Margin
WW, Feed 8t/ha
BREAK CROP NET MARGINS

The chart illustrates the net margins for various crops, with net margins ranging from £0 to £350. The crops include W Oats, WOSR, WOSR 3.0t/ha, W Beans, SOSR, S Oats, Milling, S Beans, Grass, Winter Naked Oats, Winter Rye, and Winter Triticale.

Key highlights:
- 
- W Oats: £100
- WOSR: £300
- WOSR 3.0t/ha: £250
- W Beans: £50
- SOSR: £150
- S Oats, Milling: £200
- S Beans: £100
- Grass: £225
- Winter Naked Oats: £200
- Winter Rye: £100
- Winter Triticale: £100

The chart also includes a line representing WW, Feed 8t/ha, providing a comparative reference.
WHICH ROTATION WILL GENERATE BEST NET MARGIN?

<table>
<thead>
<tr>
<th>Example</th>
<th>Cropping</th>
<th>Gross Margin (£/Ha)</th>
<th>Net Margin (£/Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation 1</td>
<td>Continuous Wheat</td>
<td>£544</td>
<td>£173</td>
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<tr>
<td>Rotation 2</td>
<td>Wheat, OSR, Wheat, OSR</td>
<td>£704</td>
<td>£333</td>
</tr>
<tr>
<td>Rotation 3</td>
<td>Wheat, OSR, S Barley</td>
<td>£647</td>
<td>£296</td>
</tr>
<tr>
<td>Rotation 4</td>
<td>Wheat, Wheat, OSR, S Barley</td>
<td>£622</td>
<td>£266</td>
</tr>
<tr>
<td>Rotation 5</td>
<td>Wheat, OSR, Wheat, 2 Year Ley</td>
<td>£545</td>
<td>£304</td>
</tr>
</tbody>
</table>
AHDB
DESIGNING A PROFITABLE ARABLE ROTATION

Adrian Matthews
Director, Food and Farming
Telephone: 07795 446 824
Email: amatthews@savills.com
Soil health – what do we know, what can we do?

Elizabeth Stockdale
Head of Farming Systems, NIAB
All land is unique
May have similar constraints
But not the same field by field or even within a field

Soil type sets inherent limits to physical properties
Management modifies properties
Soil Biology and Soil Health Partnership

GREAT SOILS

NIAB, SRUC, ADAS, FERA, Game & Wildlife Conservation Trust, University of Lincoln, Natural England, Organic Research Centre, Elm Farm, Federation of Soil Science, BASF, Frontier, NRM.
What will the partnership do?

• Five years to deliver linked knowledge exchange and research on soil biology and soil health

• Improve on-farm understanding of soil health by sharing current academic and industry knowledge in usable formats

• Developing and validating indicators of soil biology and soil health in research trials and on-farm

• Building on work already carried out
Valuing and working with farmer innovation developing locally adapted practices
Existing knowledge
Nodule formation
Root infection with mycorrhizal fungi
Development of root hairs
Root density
Root uptake efficiency
Mineralisation - immobilisation
N fixation
Soil enzymes
Action and activity of soil fauna
Activity of decomposing micro-organisms
Mineralisation - immobilisation
Organic ligands
Presence of potentially toxic elements
Balance of macro-, micro nutrient availability
Buffer capacity
CEC
Redox potential
pH
Salinity
Mineralogy
Bulk density
Aeration
Pore size distribution
Temperature
Textur e
Soil water balance
Compaction
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Temperature
Textur e
Soil water balance
Compaction
NUTRIENT INPUTS
Fertiliser, manure, deposition etc
where availability is mediated by many of the same factors

CLIMATE
Temperature, rainfall, evaporation
Where impact is mediated by both amount and seasonality

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CLIMATE
Temperature, rainfall, evaporation
Where impact is mediated by both amount and seasonality

NUTRIENT INPUTS
Fertiliser, manure, deposition etc
where availability is mediated by many of the same factors
So what does science know?

At scale of farming systems, the scientists’ understanding of impacts of management on soil health is incomplete and, where it does exist, fairly sketchy.

But increasing evidence that increased OM inputs (diversity) and reduced tillage act together to promote increased biological activity.

There is some indication that resilience to extreme events may be increased as a result.

Increasing OM inputs to maintain good baseline activity increases resilience to tillage disturbance (even potatoes).
Know your textures and understand limits to workability, trafficability.

- Optimise water balance through drainage if necessary.
- Improve soil structure – effective continuous pore space.

Physical

- Know your textures and understand limits to workability, trafficability.

Biological

- Feed the soil regularly through plants and OM inputs.
- Move soil only when you have to.
- Diversify plants in space and time.

Chemical

- Maintain optimum pH.
- Provide plant nutrients – right amounts in the right place at the right time.
- Know your textures and minerals – buffering capacity, free supply!
Soil biology
Decomposition – transforming the sun’s energy a joint venture for the food web
De decomposition

- Roots
- Polysaccharides, glycoproteins
- Microaggregates – clay domains, silt, sand and OM bound together
- Faecal pellets
- Enmeshment

- Enchytraeids
- Collembola
- Mites

- Earthworms

Creating transmission pores
Mixing OM and mineral particles

Modify pore size and continuity
Mixing OM and mineral particles

SOIL STRUCTURE
With greater microbial biomass, generally, there is more soil nutrient supply.

\[ y = 0.041x + 2.68 \]

\[ R^2 = 0.59 \]

Data from Western Australian Wheatbelt, Prof. Dan Murphy
So how can I help the soil life help me?

System-oriented approaches

- Increase OM inputs
- Increase plant diversity
- Reduce tillage intensity
More detail ...
Natural England Commissioned Report 100

Available online
Natural England Commissioned Reports, Number 100.
Why measure soil quality/health?

Think of it in terms of:
An MOT for your soil OR a check up at the doctors

• Working towards
  (i) rolling out soil quality testing
  (ii) ‘what if’ model for knowledge exchange
Components of soil quality

Physics ↔ Biology

Chemistry

Current soil reports
pH
Routine nutrients
Components of soil quality

Physics  ♦  Biology

Chemistry

Putting it all together will need a different approach to sample collection – linking physical observation and soil samples sent for testing.

Current soil reports
pH
Routine nutrients
Testing and developing measures of soil quality

Existing indicators included
- pH
- Routine nutrients
- Bulk Density
- Penetrometer resistance

Less common indicators evaluated and framework for interpretation developed
- Visual assessment of soil structure (VESS)
- Soil organic matter / loss on ignition (LOI)
- Respiration and Solvita test (NRM)
- Earthworms

New indicators developed and tested
- Total N
- Microbial biomass carbon (MBC)
- Potentially mineralisable nitrogen (PMN)
- DNA measures of pathogens and soil health
- Nematodes
- Microarthropods
Rolling out soil quality testing
Scorecard threshold values

Based on proposals for soilquality.org.uk (based on the Australian model - http://www.soilquality.org.au/) to enable utilisation of a wider database for benchmarking and ultimately advice.

The traffic light system represents:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>(High risk, need to investigate urgently)</td>
</tr>
<tr>
<td>AMBER</td>
<td>(Moderate risk, need to investigate further)</td>
</tr>
<tr>
<td>GREEN</td>
<td>(Low risk, continue to monitor)</td>
</tr>
</tbody>
</table>
What might a scorecard look like ...

**ACME SOIL ANALYSIS COMPANY**
Report for Mr A. Farmer
(who has a grassland field that needs some lime, has had a fair bit of P added and is compacted)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
</tr>
<tr>
<td>Mg</td>
<td></td>
</tr>
<tr>
<td>Potentially Mineralisable Nitrogen</td>
<td></td>
</tr>
<tr>
<td>Loss on Ignition</td>
<td></td>
</tr>
<tr>
<td>VESS</td>
<td></td>
</tr>
<tr>
<td>Earthworms</td>
<td></td>
</tr>
<tr>
<td>DNA measures</td>
<td></td>
</tr>
</tbody>
</table>

Would be followed with links to or hard copy of background information on the parameters measured, especially if red or amber.
Backed up by details...

### Scotland – Extractable P (Modified Morgan’s)

<table>
<thead>
<tr>
<th>Bar chart classes</th>
<th>Traffic light colour</th>
<th>Description of this class (e.g. toxic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1.7</td>
<td>VL</td>
<td>VL – risk to production</td>
</tr>
<tr>
<td>1.8-4.4</td>
<td>L</td>
<td>L – potential risk to production</td>
</tr>
<tr>
<td>4.5-9.4</td>
<td>M</td>
<td>M-</td>
</tr>
<tr>
<td>9.5-13.4</td>
<td>M+</td>
<td>M+</td>
</tr>
<tr>
<td>13.5-30.0</td>
<td>H</td>
<td>H – potential risk to environment</td>
</tr>
<tr>
<td>&gt; 30.0</td>
<td>VH</td>
<td>VH – risk to environment</td>
</tr>
</tbody>
</table>
‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’
Variable Rate Farming

Is it financially viable?
Who Am I?

• Rob Fox
• Originally from Family Dairy/Arable Farm in Warks
• HND at Seale Hayne Agricultural Collage
• Back home for 6 years
• 2 years as operator on 2500ac Arable Business
• 8 years as Farm manager at Squab Hall Farm, Leamington Spa
• AHDB Arable Monitor Farmer 2014 - 2017
Why did I become a Monitor Farmer?

• Share my experiences with others.
• Learn from others and draw on their experiences.
• Drive down costs.
• Develop myself.
• Manage a better business.
Squab Hall farm

- Commercial, Managed Arable Farm
- 398ha (1000ac)
- 900ac cropped
- Further 900ac in Arable Joint Venture.
- 80ac in Countryside Stewardship
- 20ac woodland and yard etc.
- Manager and 1 Full Time plus Harvest casuals.
- 90kw solar, looking into other renewables.
- Extensive diversification in... National/international Removals and Storage, Self Storage, Document Archiving/Shredding, Van Hire.
What is Variable Rate Farming

- Adjusting the rate of any input within a field according to conditions.
- Weather
- Soil type
- Pest pressures
- Crop Biomass
- Yield potential
VR Has been around for ages!
VR Has been around for ages
Variable Rate at Squab Hall

• What are we doing now?
• How have we got there?
• How does it work?
• How much has it cost to get there?
• What are the cost benefits?
• Where next?
What are we doing now?

• Variable Rate P and K through nutrient sampling.
• Variable Seed rates through Soil scanning and also our own knowledge.
• Variable Rate Nitrogen firstly through satellite imagery, but now through tractor mounted scanner.
• Varying yields! Not aiming to even yield out!
How have we got there?

• 2008 GPS on new tractor
• Spring 2010 Variable rate P and K
• Autumn 2010 Variable rate Seed
• Spring 2011 Variable rate Nitrogen from satellite
• Spring 2017 Variable rate Nitrogen from tractor mounted scanner
How does it work

- **VR P and K**
  - SOYL Sample and create application maps for USB stick. Loaded into JD Screen. JD screen controls weigh cell fertiliser spreader.

- **VR Seed**
  - Maps created/edited on Gatekeeper by Rob for USB stick. Loaded into JD Screen. JD screen controls drill.

- **VR Nitrogen**
  - Application maps previously created from satellite image on SOYL website. Now Isaria crop sensor fed into JD Screen. JD screen controls fertiliser spreader. Real time

- **All “As Applied” maps imported back to gatekeeper!**
## Costs over 5 years

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
<th>Cost per ac/per yr (over 5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>728ha (1800ac)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Upgrade 1x JD screen to VR</td>
<td>£1500</td>
<td>£0.16</td>
</tr>
<tr>
<td>• 2nd Screen/VR</td>
<td>£10500</td>
<td>£1.16</td>
</tr>
<tr>
<td>• Upgrade old JD Reciever</td>
<td>£1400</td>
<td>£0.15</td>
</tr>
<tr>
<td>• SOYL Soil Type Scanning (VR Seed)</td>
<td>£7500</td>
<td>£0.83</td>
</tr>
<tr>
<td>• Drill Software Update (VR Seed)</td>
<td>£500</td>
<td>£0.05</td>
</tr>
<tr>
<td>• Gatekeeper software upgrades</td>
<td>£2000</td>
<td>£0.22</td>
</tr>
<tr>
<td>• Isaria Crop Sensor (VR Nitrogen)</td>
<td>£12500</td>
<td>£1.38</td>
</tr>
<tr>
<td>• Extra investment over 5 years</td>
<td>£35900</td>
<td>£3.98</td>
</tr>
<tr>
<td>• SOYL nutrient sampling (VR P and K)</td>
<td>£4</td>
<td></td>
</tr>
<tr>
<td>• 4x GPS Subscriptions @ £430/yr</td>
<td></td>
<td>£0.95</td>
</tr>
<tr>
<td>• Total cost per ha per yr over 5 years</td>
<td></td>
<td>£8.93</td>
</tr>
<tr>
<td>• Total cost per year on 1000ac</td>
<td></td>
<td>£8930</td>
</tr>
</tbody>
</table>
Results

Measurable Benefits
Variable P cost saving

Example: P index 2

- Maintenance dose of 100kg/ha TSP @ £345t (2011) = £34.5/ha
- Average spend at Squab Hall 2010/2011= £21.31/ha
- Nutrients more targeted – only going where it is needed.
- £13.19ha saving per application over a typical flat rate.
- Apply every other year giving a saving of £2300 per year
**VR nitrogen**

**Fertiliser Application Summary - 09/05/2012**

**T. I. Evans & Son**

**SoylSense**

**Reference Background**: Google  
**Projection**: Google  
© GEOSYS

<table>
<thead>
<tr>
<th>Field</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>10.70 ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crop</th>
<th>Drilling date</th>
<th>Parameters</th>
<th>Dose planned (Kg/ha)</th>
<th>Fertiliser - 33.50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Wheat - Oakley</td>
<td>19/09/2011</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Dose (Kg/ha)</td>
<td>85.1</td>
</tr>
<tr>
<td>Total Nitrogen needed (Kg)</td>
<td>910.8</td>
</tr>
<tr>
<td>Most represent dose (Kg/ha)</td>
<td>80.0</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>264.1</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>2,718.9</td>
</tr>
<tr>
<td>Most represent dose</td>
<td>238.8</td>
</tr>
</tbody>
</table>

**Processing date**: 09/05/2012
**VR Nitrogen**

- 2010 WW average increase in yield of 0.2t/ha @ £150t = £30/ha
- 2011 WW average increase yield 0.7t/ha @ £150 = £105/ha

- 125ha WW x £30 = £3750
• 2011 Trialled VR Seeding on a 32 ha field.
• 0.8t extra yield over the two neighbouring fields!
• 0.5t x £150/t £75/ha

• 125ha WW x £75 £9375
Total cost benefits

- Costs £8930

- Cost Benefits
  - VR P & K (Saving) £2300
  - VR Nitrogen (Increase in yield) £3750
  - VR Seed (Increase in yield) £9375
  - Total Cost Benefit £15425

- Net Cost Benefit £6495yr
Where next?

- VR Fungicide/PGR?
Where next?

- VR/On-Off spot spraying herbicide maps?
Does size matter?

• We are at the higher end of VR investment
• We farm 1800ac – spreading cost
• 3 farmers sharing upfront costs
• We like our Technology
Lots of options available

- Add on systems
- Upgradeable
- Different levels of accuracy/subscription cost
  - VR Fertiliser/seed does not need 1 inch accuracy!!
- Speak to specialists
- Biggest step is usually the first
- What machinery is up for renewal?
- (What staff are up for renewal!?)
Conclusions

• Does VR work? YES!

• Is VR expensive? It doesn’t have to be!

• Will you see a reward? YES!

• Would I do it on 250 acres? YES!
Thank you

Rob Fox  rob@squab.co.uk
Mob. 07817329158
‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’