Chair’s welcome and AHDB update

Paul Hill, AHDB Cereals & Oilseeds Knowledge Exchange Manager South East
South East Agronomy 2018

Thursday 15 February 2018
Christchurch Suite, The Kassam Stadium, Grenoble Road, Oxford, OX4 4XP

Programme

09:30   Registration

10:00   Chair’s welcome and AHDB update
        Paul Hill, AHDB Cereals & Oilseeds Knowledge Exchange Manager, South East

Session 1: Consistent yields, quality and net margins

10:15   Agronomy methodology for consistent yields
        Tim Lamyman, Farmer

11:00   Proactive grass weed management
        Dr Stephen Moss, Stephen Moss Consulting

12:00   Refreshment break

Session 2: Organic farming: developing a sustainable and viable cereal system

12:15   The benefits of livestock in an arable rotation
        John Pawsey, Farmer

13:15   Closing comments
        Paul Hill, AHDB Cereals & Oilseeds Knowledge Exchange Manager, South East

13:30   Lunch & event close

Details correct at time of publication, subject to change
Agronomy methodology for consistent yields

Tim Lamyman
Tim Lamyman
Lamyman Worlaby Farms

- World Oilseed Rape Record 6.7 t/ha
- Former World Wheat Record 16.50 t/ha
- YEN Gold Award for highest grain yield in 2014 and 2015
- YEN Silver Award for achieving 79% of Potential Grain Yield
- Yen Special Award for extraordinary consistency in the production of record yields in 2014 and 2015
Background

• Two farms 600 ha Grade 2 to 4 Lincolnshire chalky wold land near Louth and 120 ha pure blow away sand 20 miles away at Tumby
• 200 ha winter wheat
• 200 ha spring barley
• 120 ha winter oilseed rape
• 50 ha spring beans
• 50 ha game cover
• 30 ha permanent pasture
• 20 ha fallow
• 50 ha woodland and ponds
Background

- I started running the farm in 1997
- Two farms 600 ha Grade 2 to 4 Lincolnshire chalky wold land near Louth and 150 ha pure blow away sand 20 miles away at Tumby
- The challenge – taking LWF farming practices to the next level
- Originally improving the seed beds the farm produced
- Discovering the plough was not the way forward for level seed beds
- Compaction levels halved in depth going to minimum tillage
- Speed of drilling/land work operations improved
Soil Cultivations

- Worlaby Flat Lift Press

- 2 x Lemkin Terra Disc – For records table top level required

- Vaderstad Carrier for wheat or Power Harrow for Rape

- Vaderstad Rapid Drill

- Roll
The Next Stage

• How to control weeds effectively
• Black grass, meadow grass, wild oats, cleavers and poppies
• Black grass – Topic, Lexus, Atlantis, Defy, Liberator and Pendimethalin
• The number one yield killer – Resistant Black grass – No effective control for resistance apart from an integrated management plan of spring cropping or fallow being introduced heavily into the cropping programme.
• At the moment all other weeds mentioned are controllable
Drilling date and seed rate

• For winter wheat on or before 15\textsuperscript{th} September – understandable those with black grass will be later
• After this date in wheat you are limiting the grain set capacities of the ear
• Raise seed rate the later you drill

• For Oilseed rape on or before 15\textsuperscript{th} August
• This gives the rape plant plenty of time to put down large tap roots and form a canopy large enough to withstand the winter or pigeons
Variety Choice

• What to look for
• High Yielding
• Fits into your growing types – Milling, biscuit, soft or hard feed wheat
• Good to excellent standing power
• Maturity date
• High disease resistance
• Good hectolitre weight
• Plant and leaf architecture
Winter Wheat Variety

• Winter wheat – Reflection

• Short, stiff, good disease resistance (at the time of planting), early and high yielding

• It is also almost unique in it’s growth habit with very prostrate stems and smaller virtually 45 degree angled leaves
Disease Control

• Septoria, Yellow Rust, Brown Rust, Mildew and Eyespot

• Over the years each of the above have been major problems in wheat

• Losing any amount of green leaf area to disease will limit the capacity of the plant to absorb radiation.

• Having a proactive approach to stopping disease in wheat is a major way to increase the yield
Winter Oilseed Rape Variety

• Variety – Django and Elgar – 2017

• Good standing power, reasonable disease package

• Medium maturity and high yielding

• Conventional
Yield Enhancement Network (YEN)

• Sunlight
• Water
• Above the two basic foundations of yield
• Using Scientists' Knowledge and facts
• Opening your mind to other factors affecting yield
• Converting these thoughts into practical ideas for your farming practices
YEN

• Capture of solar radiation (sunlight)
• The more sunlight your plant can capture the higher the yield is going to be
• Developing root structures for plants to absorb more water
• The deeper your roots can go and the larger the fibrous root structures your plant has the more water it will have available to full fill the plant’s yield potential
• YEN – Learning ways of maximising Yield Potential for your farm!
2013 UK Wheat Record Kielder at 14.31t/ha
Maximum Field Yield Potential

- Maximum yield potential
- Delta & 1-4-ALL
- Standard Agronomy
- Fertiliser only
Fertilizer

- Moving with the times?
- Splitting applications – Splitting the risk from leaching
- Three or four evenly split applications of Nitrogen
- Early applications of N with Sulphur?
- P and K applications or holidays?
- Surely that is all that is relevant
Nutrition

• Manganese, Magnesium, Zinc, Copper, Iron, Molybdenum, etc.

• Liebig's Law States

• “That yield is proportional to the most limiting nutrient, whichever nutrient it may be”

• Ignore this at your peril!
Smart Nutrition

• Using a targeted approach to identifying and helping the plant not suffer stress is the way forward.

• If you have high pH soils you may have plenty of nutrients but most of them are locked up and unavailable to the plant.

• Using smart nutrition can help unlock this problem.

• Standing power and tillering capacity can be dramatically improved with smart nutrition.
Treated Vs Untreated Rape 2
Standard Nitrogen

- Comparison between Delta and standard Nitrogen.

- The plant absorbs standard nitrogen in the NO3 form. A lot of this can be lost due to Volatilisation and leaching before it enters the plant.

- Standard Nitrogen takes 12 times as much energy for the plant to use it than Delta Nitrogen.

- Standard Nitrogen creates auxin growth in a plant.

- Auxin growth from standard Nitrogen causes apical dominance, elongated stems, small roots and less tillering.

- This type of growth habit needs a lot of growth regulators to create better roots and stronger stems.
Delta Nitrogen

- Delta Nitrogen does not leach or volatilise into the atmosphere. The special formulation blocks the bacterial and chemical break down.

- The plant uses 12 times less energy to absorb the Delta Nitrogen because it stay in the NH2 form and is instantly useable by the plant. This allows you to spray it on in freezing ground conditions.

- Delta Nitrogen makes the plant produce cytokinin growth.

- Cytokinin growth from Delta produces shorter stem internodes, stronger stems and a much larger fibrous root system.

- Plants that have had multiple applications of Delta generally do not show visible symptoms of nutrient deficiencies, but can still be found to be short by tissue analysis.
Winter Barley
Tower
Nutrition – Autumn to Spring

1. DELTA (Stabilised N) + 1-4-ALL (Trace Elements)
   • Increased Root Mass
   • Increased Tillering
   • Stronger Stems
   • Reduced Disease Pressure
   • Foliar Applied and Tank Mixable
1-4-ALL

• A unique blend of micro-nutrients formulated with “Lightning Technology” to enhance the plant’s metabolic activity. Specifically designed to accompany Delta Nitrogen.

• Contains: 0.5% Copper, 1.5% Iron, 1.5% Manganese, 2.0% Zinc, 0.5% Magnesium, 2% Nitrogen.

• 1-4-ALL is light years ahead in micro-nutrient technology.

• The rates of nutrients in the blend seem small but the results of applying 1-4-ALL are outstanding in balancing up the deficiencies in the plant.

• A plant visually showing manganese deficiency does not mean it is not short of other nutrients.
Stress free farming

• TipTop, 1-4-ALL and Delta Nitrogen combination.

• The plant stress free solution to farming!

• Increasing the plant’s natural ability to fight disease.

• Larger roots to anchor the plant and scavenge more water and nutrients.

• Shorter stronger stems with larger leaves to absorb more sunlight.

• More tillers per plant.
Nutrition – Late Spring to Summer

1. Tip Top (20:20:20 + Trace Elements)
   • Help to Reduce Stress in the Growing Plant
   • Addressing Nutrient Deficiencies
   • High Potassium Demand from GS32-59
   • Light Interception
   • Foliar Applied and Tank Mixable
Next generation

• CalFlux and Rainbow Wave.
• Specifically designed to help a plant at flowering.
• Calcium is a notoriously bad distributor round a plant. Most plants will not test deficient in Calcium but the plant will struggle to distribute it to the correct areas. The addition of Rainbow Wave (Boron and Molybdenum) to CalFlux helps with flower colour, pod survival and seed size.
• In rape, peas and beans we have seen longer pods, a lot less abortion sites and generally a much greater yield with CalFlux applications.
Lessons Learnt

• Cultivation
• Seed Rate
• Crop Establishment
• Growth Habit
• Plant Health
• High K Demand
• Yield Potential
• Weather

• Leave no stone unturned for maximising yield
Proactive and durable grass-weed control strategies for black-grass (new '5 for 5' control initiative), brome and ryegrass

Stephen Moss Consulting
Black-grass (& most other grass-weeds)
emergence

Q. What happens if you sow here?

A. Most black-grass (& brome & rye-grass) emerges in the crop

>80% emergence occurs in early autumn
% of winter wheat crop in England sown in September (1970 – 2016 harvest years)

A 10-fold increase since the mid-1970's

Source: Defra winter wheat survey
Herbicides with activity against black-grass introduced since 1956
Total = 41; only 23 still available (in bold)

Orange fill = resistance demonstrated
Green fill = no resistance (or not tested)

<table>
<thead>
<tr>
<th>Year</th>
<th>Herbicide Name</th>
<th>Year</th>
<th>Herbicide Name</th>
<th>Year</th>
<th>Herbicide Name</th>
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<tr>
<td>1956</td>
<td>simazine</td>
<td>1971</td>
<td>chlorotoluron</td>
<td>1982</td>
<td>metazachlor</td>
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<tr>
<td>1958</td>
<td>atrazine</td>
<td>1971</td>
<td>propyzamide</td>
<td>1982</td>
<td>chlorsulfuron*</td>
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<tr>
<td>1962</td>
<td>paraquat</td>
<td>1974</td>
<td>carbetamide</td>
<td>1984</td>
<td>quizalofop-ethyl</td>
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<tr>
<td>1964</td>
<td>tri-allate</td>
<td>1974</td>
<td>glyphosate</td>
<td>1986</td>
<td>imazamethabenz</td>
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<tr>
<td>1965</td>
<td>nitrofen</td>
<td>1975</td>
<td>isoproturon</td>
<td>1990</td>
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<tr>
<td>1968</td>
<td>terbutryn</td>
<td>1976</td>
<td>diclofop</td>
<td>1993</td>
<td>tralkoxydim</td>
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<tr>
<td>1968</td>
<td>methabenz.</td>
<td>1979</td>
<td>pendimethalin</td>
<td>1994</td>
<td>propanaquizafop</td>
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</table>
Counties (37) with herbicide-resistant black-grass (by 2016)

First detected in 1982 (Faringdon)

- **20,000 farms** have black-grass
- **20,000 farms** have resistance

Resistance is present on virtually **every** farm where herbicides are used regularly for its control

- Resistance to ACCase herbicides (fops/dims/dens) widespread
- Resistance to ALS herbicides (e.g. ‘Atlantis’) increasing fast
- Pre-emergence herbicides now the main means of chemical control

Enhanced metabolism at least as important as ACCase and ALS target site resistance. Multiple resistance common.
TO BEAT BLACK-GRASS
5 control strategies for 5 years

Stephen Moss &
Tom Allen-Stevens
Potential reduction of black-grass by >99% over 5 years IF seed return can be prevented

- Black-grass won’t be eliminated in 5 years, but infestations can be dramatically reduced
- This is why strategies need to be adopted for several years – 1 or 2 years are not enough
5 for 5 to beat black-grass

- Opportunistic (rotational) ploughing
- Post-harvest stubble cultivations
- Min till/direct drilling/strip tillage
- Min till prior to spring crops
- Inter-row hoeing/harrow

- Delay autumn drilling
- More spring sown crops
- Fallow – ideally >2 years
- Grass ley ley breaks (>2 years)
- Crop rotation

Patch spraying
- Roguing
- Crop destruct (AD?)
- Minimise seed spread (in crop seed, straw, equipment & manure)
- Novel methods (e.g. seed capture)

- Crops (e.g. barley)
- Competitive varieties
- High seed rates
- Narrow rows
- Drainage
- Cover crops

- Use glyphosate pre-sowing to kill weeds effectively
- Rational pre-emergence herbicide use
- Less dependence on high resistance risk post-em herbicides
- Reassess value of older actives (e.g. clodinafop in mixtures)
- Use alternative modes of action in non-cereal crops
- Monitor impact of herbicide resistance

Five strategies for Five years

Stephen Moss Consulting
1. Stop weed seed shedding

- Patch spraying – destroy patches in **early June**
- Roguing – remove heading plants by **mid June**
- Crop destruct – early harvest for AD?
- Minimise seed spread – in crop seed, straw, combines, balers, cultivators & manure
- Novel methods – e.g. seed capture/destruction at harvest. ‘Hoovering’ up seeds from surface?
- Late chemical sprays to reduce seed viability?
How easy is it to use GPS to enable repeated, annual spraying of same patches, small or large?
Harrington weed seed destructor – destroys weed seeds at harvest
2. Cultivation strategy

• Post-harvest stubble cultivations – what’s best?
• Direct drilling/strip tillage
• Minimum tillage before sowing spring crops
• Inter-row hoeing/harrowing
• Opportunistic (rotational) ploughing
Cultivations – a lot of interest but also a lot of unanswered questions

Do post-harvest stubble cultivations help reduce black-grass infestations in the following crop?

Should post-harvest cultivations be delayed to encourage seed predation and ‘natural loss’?
Optimum stubble management strategy for **freshly shed** weed seeds

<table>
<thead>
<tr>
<th>Weed species</th>
<th>Cultivate soon after harvest</th>
<th>Do not cultivate soon after harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteer cereals</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Sterile brome</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Black-grass</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Wild-oats</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Rye-grass</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Meadow brome</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Oilseed rape</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Cleavers</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>3 other grass + 3 other BLW</td>
<td>-</td>
<td>✓</td>
</tr>
</tbody>
</table>

From review paper by Melander *et al* (2013) *Weed Technology* 27:231-240
How much would shallow cultivations help?

But what about old seeds from previous years?
Rotational (opportunistic) ploughing requires good soil inversion. This may be best achieved before spring-sown crops.
3. Sowing date

- Delayed autumn drilling of wheat – mid October+
- Spring sowing – better results if repeated 2 or 3 x
- Fallow – ideally >2 years
- Grass ley breaks – the longer the better
- Crop rotation – mixture of crops/sowing dates

“Impossible to sow wheat in mid-October or grow spring crops on this land”. Really?
Black-grass head density in relation to sowing date

BUT pre-em herbicides work better – typically by 25-30%

Winter wheat
Sown 19 Sept. 837

Winter wheat
Sown 19 Oct. 560

Spring wheat
Sown 16 March 142

Spring barley
Sown 16 March 84

No herbicides applied (except glyphosate pre-drilling)

Warren 2009/10 edited
Field at Peldon, Essex – > 50 years in wheat
Highly resistant black-grass
BUT this = 3\textsuperscript{rd} spring-sown wheat
No black-grass visible – 1\textsuperscript{st} time in >30 years

7 July 2017

How many successive spring crops are you willing to contemplate?
A one-year fallow/grass ley is not enough

Q. What do you do at end of fallow/grass ley?
A. Have a stale seedbed to allow residual black-grass to germinate
4. Increase crop competition

• Crops (e.g. barley more competitive than wheat)
• Competitive varieties
• High seed rates (but increased lodging risk)
• Narrow rows (trash issues make this difficult)
• Drainage (helps crops grow better)
• Cover crops (*indirect* effects much more significant than *direct* effects)
Richard Davey: Winter wheat sown 27 September 2009
Spent £120/ha on grass-weed herbicides at three timings
(flufenacet, diflufenican, prosulfocarb, pendimethalin, Atlantis)
Control achieved: 90%

Higher seed rates

450 wheat seeds sown/m²

150 wheat seeds sown/m²
2.2 black-grass heads/plant
170 seeds/plant

5.3 black-grass heads/plant
419 seeds/plant

59% less seed return

450 wheat seeds sown/m²

150 wheat seeds sown/m²

How high a seed rate is acceptable?
25 cm banded rows

Black-grass likes gaps!
5. Herbicides

• Use glyphosate pre-sowing to kill weeds effectively
• Rational pre-emergence herbicide use
• Less dependence on high risk post-em. herbicides
• Reassessing value of older actives (e.g. clodinafop)
• Use alternative modes of action in non-cereal crops
• Correct timing and application technique
• Monitor impact of herbicide resistance
Pre-emergence herbicides are potentially affected by:

- **Resistance** (all pre-ems vulnerable)
- Amount of **soil organic matter**
- **Enhanced degradation** within soil (by micro-organisms)

Are you willing to experiment to find the best pre-ems for your own farm and to determine exactly what post-ems are delivering?
Deliberately unsprayed patches can be very useful in quantifying level of control achieved.

£120/ha spent on herbicides

90% control

This half over-sprayed with ‘Atlantis’ in spring.

Unsprayed area 32 x 3 m (but 8 x 3 m fine)

Ideally have at least two in representative areas of field.
Non-cereal crops allow use of different herbicides
‘Centurion Max’ less affected by resistance than other fops and dims

Notts ACCase TSR (1781) population 38 DAT
• Opportunistic (rotational) ploughing
• Post-harvest stubble cultivations
• Min till/direct drilling/strip tillage
• Min till prior to spring crops
• Inter-row hoeing/harrow

Herbicides
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• Delay autumn drilling
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• Crop rotation

5 for 5 to beat black-grass

• Patch spraying
• Roguing
• Crop destruct (AD?)
• Minimise seed spread (in crop seed, straw, equipment & manure)
• Novel methods (e.g. seed capture)

5 for 5
Five strategies for Five years

• Crops (e.g. barley)
• Competitive varieties
• High seed rates
• Narrow rows
• Drainage
• Cover crops

Stephen Moss Consulting
Also essential are the three ‘R’s: Recording, Reviewing & Revising plan.
Dieting
Needs **discipline** and **commitment** – and not easy

Ditto for black-grass but need **years**, not **months**
One day, son, all this will be yours
58 seed samples for ID and herbicide testing

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of samples</th>
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<tr>
<td>Sterile brome</td>
<td>20</td>
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<tr>
<td>Great brome</td>
<td>8</td>
</tr>
<tr>
<td>Sterile &amp; Great mix</td>
<td>1</td>
</tr>
<tr>
<td>Meadow brome</td>
<td>8</td>
</tr>
<tr>
<td>Rye brome</td>
<td>15</td>
</tr>
<tr>
<td>Soft brome</td>
<td>1</td>
</tr>
<tr>
<td>Mix Bromus</td>
<td>3</td>
</tr>
<tr>
<td>Unknown (Field brome?)</td>
<td>2</td>
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</tbody>
</table>

- 38% wrongly identified by farmers/agronomists
- 8 samples of rye brome wrongly identified as soft or meadow

New brome project (started 2017)
(led by ADAS Boxworth – Laura Davies)
Which brome is that?  

A new 2 page identification leaflet

Available from:

http://croprotect.com

This new leaflet is as shorter version of the 4 page version produced last year.
Glyphosate-resistant sterile brome?

Susceptible

Resistant?

Untreated

540 g glyphosate/ha applied at 1–2 tiller stage: 30 days post spraying
1. It is twice as competitive as black-grass
2. It produces 10x as much seed per
A bad infestation of Italian rye-grass in winter wheat
Managing herbicide-resistant rye-grass

- Take action as soon as rye-grass is noticed – hand rogue low populations or spray off patches
- Use cultural control measures (delayed autumn sowing and spring cropping may be more effective than against black-grass?)
- Avoid over-reliance on fops/dims/dens & ALS
- Be aware of the risk of glyphosate resistance – it occurs in rye-grass in 13 countries
Wild-oats

Common wild-oats
*Avena fatua*

Winter wild-oats
*Avena sterilis ssp. ludoviciana*
Somewhere in Essex
2014
Questions/Discussion

• How easy is it to use GPS to enable repeated, annual spraying of the same patches, small or large?
• Rotational ploughing. How effective?
• Could post-harvest cultivations be delayed to encourage seed predation and ‘natural’ loss?
• How many successive spring crops are you willing to contemplate?
• How high a seed rate is ‘safe’ and acceptable?
• Are you willing to experiment to find the best pre-emulsions for your own farm and what post-emulsions are delivering?
• ‘Centurion Max’. How useful is it in non-cereal crops?
‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’
Content to follow
Refreshment break
The benefits of livestock in an arable rotation

John Pawsey
Modern Organic Farming Systems
John Pawsey
• 1,360 ha of organic cropping
• 1,000 breeding ewes
• 0.6hp/ha
• 2 full time farm staff
• 1 full time shepherd
• Additional help during busy periods
• Partial organic conversion in 1999
• 6 year rotation
• Crops grown: winter wheat (heritage), spring wheat, winter barley, spring barley, winter oats, spring oats, spelt, quinoa, buckwheat, 2 year leys, diverse clover leys, spring beans, winter beans, vetches and red clover.
Farming landscape in 1999

- Average crop prices - wheat £79/t rape £117/t
- Improved health awareness
- Worries post BSE
- Facing a future of food scares? Negative campaigning
- Environmental and animal welfare concerns
- Governmental (OFS) and retail support for organics
- Farm diversification on the agenda
- Ben Powell
Organic trial

- Converted 54 ha in 1999
- A further 65 ha in 2000
- 6 year rotation:
  - 2 years grass/clover
  - Winter wheat
  - Triticale
  - Beans
  - Spring wheat (under-sown)
<table>
<thead>
<tr>
<th></th>
<th>NON-ORGANIC £/HA</th>
<th>ORGANIC £/HA</th>
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<tr>
<td><strong>OUTPUT</strong></td>
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<td></td>
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<tr>
<td>Sales</td>
<td>545.28</td>
<td>432.67</td>
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<td>Area Aid</td>
<td>235.47</td>
<td>302.41</td>
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<td>Other Income</td>
<td>1.79</td>
<td>87.68</td>
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<td><strong>TOTAL OUTPUT</strong></td>
<td>782.54</td>
<td>822.76</td>
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<td><strong>VARIABLE COSTS</strong></td>
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<tr>
<td>Seed</td>
<td>37.19</td>
<td>52.85</td>
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<tr>
<td>Fertiliser</td>
<td>81.60</td>
<td>36.84</td>
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<td>Sprays</td>
<td>85.19</td>
<td>0.00</td>
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<tr>
<td>Rogueing</td>
<td>0.00</td>
<td>22.47</td>
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<td><strong>TOTAL VARIABLE COSTS</strong></td>
<td>203.98</td>
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<td><strong>GROSS MARGIN</strong></td>
<td>578.56</td>
<td>710.60</td>
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<td>Cultivations</td>
<td>175.72</td>
<td>146.07</td>
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<tr>
<td><strong>MARGIN LESS CULTIVATIONS</strong></td>
<td>402.84</td>
<td>564.53</td>
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Shimpling Park Farm Rotation

• Year 1: grass/clover/herbal ley or diverse clover mixture
• Year 2: grass/clover/herbal ley or diverse clover mixture
• Year 3: winter spelt/wheat or spring quinoa
• Year 4: spring oats/barley
• Year 5: winter beans or spring peas, inter-cropped?
• Year 6: spring barley - under-sown

But be prepared to change.
Many little hammers, diversity in everything

- Rotation design
- Cultivation
- Drilling dates - macro/micro
- Crop competition
- Crop spacing
- Companion cropping
- Livestock
- Mechanical weeding
Pests

- Diversity in cropping
- Diversity within cropping
- Disrupting lifecycles
- building beneficials
- No-go areas?
Diseases

- Sowing date
- Crop spacing
- Bi-cropping
- Varietal blending
- Plant populations
- Disease issues?
Weeds

- Rotation design
- Cultivation
- Drilling dates
- Crop competition
- Crop spacing
- Companion cropping
- Allelopathy
- Drainage
- Livestock
- Problem weeds?
- Mechanical weeding
System Cameleon
Mechanical weeding - System Cameleon
System Cameleon opportunities?

• Increased weeding accuracy
• Opportunities for novel, less competitive crops
• More aggressive weeding
• Increased fertility at lower seed rates
• Ability to direct drill crops in cleaner fields
• Ability to inter-cropping or relay crop
• Establish green manures later in standing crop
Livestock
New Zealand Romneys

- "Easy-care" breed
- Availability of Genetic Breeding Values
- Low management input
- Ability to lamb successfully outside on their own
- Good feet
- Resistance to worms
- Can feed well extensively on poorer pasture
- Electric fencing and bowsers
- Grazing crops and feeding crop screenings?
Organic no-till?
Ben Colchester
Terminating cover crops without glyphosate

- Innovative Farmers project
- Anglia Farmers
- 7 sites
- Crimpling, rolling, mowing, grazing and low temperatures
- Organic and non-organic
Organic farming

Show me the money
## Non-Organic Rotation

<table>
<thead>
<tr>
<th>3 Year Non-Organic Rotation (no greening)</th>
<th>Winter Oilseed Rape</th>
<th>Feed Winter Wheat</th>
<th>Spring Malting Barley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T/ha</strong></td>
<td>3.6</td>
<td>9.0</td>
<td>6.6</td>
</tr>
<tr>
<td><strong>£/t</strong></td>
<td>315</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td><strong>ENTERPRISE OUTPUT</strong></td>
<td><strong>1134</strong></td>
<td><strong>1215</strong></td>
<td><strong>891</strong></td>
</tr>
<tr>
<td>Environmental payments</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL OUTPUT</strong></td>
<td><strong>1164</strong></td>
<td><strong>1245</strong></td>
<td><strong>921</strong></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Seed</th>
<th>Fertiliser</th>
<th>Crop protection</th>
<th>Sundries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>£/t</strong></td>
<td>37</td>
<td>163</td>
<td>240</td>
<td>20</td>
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<tr>
<td><strong>£/t</strong></td>
<td>51</td>
<td>171</td>
<td>235</td>
<td>25</td>
</tr>
<tr>
<td><strong>£/t</strong></td>
<td>59</td>
<td>114</td>
<td>175</td>
<td>18</td>
</tr>
<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td>460</td>
<td>482</td>
<td>366</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>GROSS MARGIN</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>£/t</strong></td>
<td>704</td>
<td>763</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>AVERAGE GM</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>£/t</strong></td>
<td>674</td>
</tr>
</tbody>
</table>

## Organic Rotation without Sheep

<table>
<thead>
<tr>
<th>5 Year Organic Rotation</th>
<th>Red Clover Ley</th>
<th>Organic Milling Winter Wheat</th>
<th>Organic Spring Milling Oats</th>
<th>Organic Feed Beans</th>
<th>Organic Spring Malting Barley (us)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/ha</td>
<td>0.0</td>
<td>4.7</td>
<td>4.0</td>
<td>3.1</td>
<td>3.5</td>
</tr>
<tr>
<td>£/t</td>
<td>0</td>
<td>275</td>
<td>250</td>
<td>330</td>
<td>280</td>
</tr>
<tr>
<td>ENTERPRISE OUTPUT</td>
<td>0</td>
<td>1293</td>
<td>1000</td>
<td>1023</td>
<td>980</td>
</tr>
<tr>
<td>Environmental payments</td>
<td>175</td>
<td>175</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL OUTPUT</td>
<td>175</td>
<td>1468</td>
<td>1060</td>
<td>1083</td>
<td>1040</td>
</tr>
<tr>
<td>Seed</td>
<td>98</td>
<td>86</td>
<td>81</td>
<td>92</td>
<td>135</td>
</tr>
<tr>
<td>Green Manures etc.</td>
<td>0</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Weeding/Sundries</td>
<td>0</td>
<td>48</td>
<td>13</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>VARIABLE COSTS</td>
<td>98</td>
<td>159</td>
<td>119</td>
<td>142</td>
<td>173</td>
</tr>
<tr>
<td>GROSS MARGIN</td>
<td>78</td>
<td>1309</td>
<td>941</td>
<td>941</td>
<td>867</td>
</tr>
<tr>
<td>AVERAGE GM</td>
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<td></td>
<td></td>
<td></td>
<td>827</td>
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</table>

*Source: The Agricultural Budgeting & Costing Book*
# Organic Rotation with Sheep

<table>
<thead>
<tr>
<th>6 Year Organic Rotation</th>
<th>2 Year Grass Clover Ley</th>
<th>2 Year Grass Clover Ley</th>
<th>Organic Feed Winter Wheat</th>
<th>Organic Spring Milling Oats</th>
<th>Organic Feed Beans</th>
<th>Organic Spring Malting Barley</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/ha</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>4.5</td>
<td>3.1</td>
<td>3.5</td>
</tr>
<tr>
<td>£/t</td>
<td>0</td>
<td>0</td>
<td>250</td>
<td>250</td>
<td>325</td>
<td>275</td>
</tr>
<tr>
<td><strong>ENTERPRISE OUTPUT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep output £/ha</td>
<td>0</td>
<td>0</td>
<td>1,250</td>
<td>1,125</td>
<td>1,008</td>
<td>963</td>
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<tr>
<td>Environmental payments</td>
<td></td>
<td></td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td><strong>TOTAL OUTPUT</strong></td>
<td></td>
<td></td>
<td>1,049</td>
<td>1,049</td>
<td>1,310</td>
<td>1,185</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1,310</td>
<td>1,185</td>
<td>1,068</td>
<td>1,023</td>
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<td>Seed</td>
<td>98</td>
<td>84</td>
<td>86</td>
<td>81</td>
<td>92</td>
<td>135</td>
</tr>
<tr>
<td>Green Manures etc.</td>
<td>0</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Weeding/Sundries</td>
<td>0</td>
<td>47</td>
<td>48</td>
<td>13</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>Sheep (inc. Forage)</td>
<td>333</td>
<td>333</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td>431</td>
<td>489</td>
<td>159</td>
<td>119</td>
<td>142</td>
<td>173</td>
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<tr>
<td><strong>GROSS MARGIN</strong></td>
<td>619</td>
<td>560</td>
<td>1,151</td>
<td>1,066</td>
<td>926</td>
<td>850</td>
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<tr>
<td><strong>AVERAGE GM</strong></td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td>862</td>
</tr>
</tbody>
</table>

*Source: The Agricultural Budgeting & Costing Book*
Opportunities and considerations

- Release of buildings for commercial lets
- Grain store rental and release of temporary stores
- Increased likelihood of acceptance onto environmental schemes?
- Attracting visitors to the farm and marketing opportunities
- Cash flow
- Operating capital
- Partial organic conversion?
Why would you do it in 2018?

- An average income per hectare of +£131/ha without sheep and +£200/ha with sheep
- 70% of organic combinable crops are imported due to lack of supply
- Increasing appetite from buyers to source UK produced organic products
- The UK organic market is back in positive growth but still trailing the EU and US markets
- Genuine price premium
- Brexit?
"The 20th Century was the century of chemical agriculture. The 21st Century will be the century of biological agriculture"

Professor Tim Benton, UK Global Food Security Champion
Thank you

John Pawsey
@hanslope

john@shimplingparkfarms.com
www.shimplingparkfarms.com
Closing comments
Paul Hill, AHDB Cereals & Oilseeds Knowledge Exchange Manager South East