Controlled Traffic Farming

Why and How

Tim Chamen, CTF Europe
The underlying problem!

Timeline from the 1930s to the present day

Predicted pressure at 0.5 m depth, bar
850 kg Horse
11.2-28
12.4-36
16.9-34
18.4-38
16.9 R 34
710/70 R 38
800/65R32
1050/50R32

2.5 t vehicle
6 fold increase
21 t vehicle

Predicted pressure at 0.5 m depth, bar

Timeline from the 1930s to the present day
Tracking is extensive every year

Plan view of a field

• Rake, disc x2, drill, roll, harvest
• 127% tracking
And it’s not just cultivated soils!
Wheels have a big impact!

- Same field one week later!
Spring barley seedbed – what’s underneath!
Definition of CTF

– a system that confines all tracks to least possible area of permanent traffic lanes

– CTF is NOT prescriptive about tillage
– CTF is NOT just about keeping tramlines in the same place
BENEFITS OF CTF
Consistently higher crop yields

% increase in yield by crop type under controlled compared with random traffic

Numbers in brackets denote number of research results from which data were taken.
Lower costs

• Cuts
  – fuel use by 35%

• Uses fertilizer more efficiently
  • 15% better N recovery

The more you run on it!
the more fuel and time you waste loosening it!
What does CTF deliver?

- Lower machinery costs
  - less power per unit width
  - shallower tillage
  - smaller tractors
  - less aggressive, lighter machines
  - maximum potential for no till
RTF compared with CTF

RTF

First trafficked soil

Comparison of ease of digging!

CTF

both fields in no-till for 3 years - neither deep loosened
Environmental benefits of CTF

• 4 x better water infiltration
  – less run-off and erosion
    • reduced pollution of water courses
  – more plant available water
Randomly trafficked soil after potatoes & heavy rain (Tasmania)
Non-trafficked soil after potatoes & heavy rain (Tasmania)

4 x infiltration rate
Environmental benefits of CTF

• Reduced nitrous oxide emissions
  – consequential loss of N

• Earthworm numbers increased due to less soil compaction and tillage
Summary of water benefits

- Drainage CTF + 100%
- Plant water CTF + 34%
- Infiltration CTF + 400%
How’s CTF implemented?

- Match track widths
- Match implement widths
  - measure, don’t believe what you are told!
- Check elevator lengths
- Invest in RTK correction signal

- PLAN AND TAKE YOUR TIME
CTF - how?

TwinTrac – tractors straddle harvester passes

Max 6 m wide implements
Implement width = Track 1 + Track 2

Sown tracks
Harvester
Tractor
Trailer
Grain auger
Chemical application
Cultivator/drill
Grain trailer
Cereals harvester
Tractor
Harvester
CTF - how?
TwinTrac in practice

Implement width = Harvester track width + Tractor track width
Andrew Manfield, UK
200 ha Hessleskew

- CTF a way of thinking
- 50% less fuel with CTF & No-till
  - 5 tractors down to 3.5
  - No no-till without CTF
    - still some cults
    - ploughing 2 gears up on CTF
- Potatoes fit into system
  - 1.93 and 3.86 m track gauges
CTF - how?

OutTrac – two track gauges

- Cereal harvesting
- Grain auger
- Trailer
- Chemical application
- Harvester e.g. 2.8 m
- Other vehicles e.g. 2 m
- Cultivator/drill
Matching implement widths
Matching auger length
Repeatable positioning needs RTK.
Proof of RTK accuracy and repeatable positioning

9 m auto-steer with 9.14 m cutting platform
# Guidance investment calculator

This worksheet looks at investing in satellite guidance for CTF with RTK.

**Guidance depreciation rate**

<table>
<thead>
<tr>
<th>Crop</th>
<th>0.25</th>
<th>0.25</th>
<th>0.25</th>
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<tbody>
<tr>
<td>Wheat</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broad beans</td>
<td></td>
<td></td>
<td></td>
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</table>
| Field overlaps in yellow boxes can be changed

If an operation is not included, just reduce its area to 0.1ha and do not delete other data in that column.

**Operation Details**

<table>
<thead>
<tr>
<th>Operation Details</th>
<th>Units</th>
<th>Tillage</th>
<th>Other tillage</th>
<th>Spraying NTV</th>
<th>Dilling</th>
<th>Pelleting</th>
<th>Spraying in TL</th>
<th>Combining</th>
<th>Fertilising in TL</th>
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</thead>
<tbody>
<tr>
<td>Hectares covered</td>
<td>ha</td>
<td>300</td>
<td>0.1</td>
<td>200</td>
<td>400</td>
<td>300</td>
<td>400</td>
<td>400</td>
<td>400</td>
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<tr>
<td>Implant width</td>
<td>m</td>
<td>6</td>
<td>6</td>
<td>24</td>
<td>6</td>
<td>12</td>
<td>24</td>
<td>6</td>
<td>24</td>
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<tr>
<td>Operation speed</td>
<td>km/h</td>
<td>8</td>
<td>5</td>
<td>14</td>
<td>10</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Labour productivity without Guidance</td>
<td>ha/h</td>
<td>3.74</td>
<td>2.93</td>
<td>28.36</td>
<td>4.64</td>
<td>12.42</td>
<td>23.30</td>
<td>2.03</td>
<td>33.48</td>
</tr>
<tr>
<td>Labour productivity with Guidance</td>
<td>ha/h</td>
<td>4.06</td>
<td>3.04</td>
<td>30.20</td>
<td>4.78</td>
<td>12.85</td>
<td>23.20</td>
<td>2.24</td>
<td>34.52</td>
</tr>
<tr>
<td>Equipment cost</td>
<td>£/ha</td>
<td>45</td>
<td>44</td>
<td>53</td>
<td>66</td>
<td>10</td>
<td>53</td>
<td>70</td>
<td>16</td>
</tr>
<tr>
<td>Fuel cost</td>
<td>£/litre</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
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</tbody>
</table>

**Costs Without Guidance**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>Complete RTK system</td>
<td>25000</td>
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</tbody>
</table>

**Costs With Guidance**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 20</td>
<td>Labour cost</td>
<td>26000</td>
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</tbody>
</table>
First considerations

- CTF mindset
- Decide your cropping **within a much reduced tillage scenario**
  - widespread deep tillage probably no longer needed
  - what will work, what will not in this new scenario?
    - what are the weak points?
      - straw management?
      - drill performance?
  - risk assessment (find others doing something similar?)
Giving it a try

- Test a system
  - in one or two fields
  - know where you’ve run and where you haven’t
Example of giving it a try
Machinery as found at Compton Beauchamp Estates

<table>
<thead>
<tr>
<th>Data</th>
<th>Tracked</th>
<th>Uncropped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>66.30%</td>
<td>3.31%</td>
</tr>
</tbody>
</table>

![Data Tracked Uncropped Percentage 66.30% 3.31%]

![<2 2-3 4-5 6-7 >7]
Compton Beauchamp – small changes
Machines auto-steered on 6, 12 and 36 m

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<th>Data</th>
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<th>Uncropped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>37.57%</td>
<td>3.31%</td>
</tr>
</tbody>
</table>
- results in first season

0 post harvest

2 post harvest

3 post harvest
Effects of compaction on water infiltration - Cambs

10 mm. h\(^{-1}\) rainfall intensity
Equates to 10 litres min\(^{-1}\) 100 m\(^{-1}\)
CTF Europe membership

• Join the growing number who are:
  • Sharing ideas
  • Visiting other farms
  • Attending “in-house” workshops

• £98 one off fee

Sign up at: www.ctfeurope.eu