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## In the next issue

### IPF Africa:

We take a look at the growing market for IPF's services in southern Africa

## Under the microscope



### Controlled Traffic Farming

**IPF Account Manager Tom Westerman investigates how switching to a Controlled Traffic System could lead to a reduction in crop establishment costs and an increase in yields**



Tom Westerman joined IPF in September last year, after graduating from the Royal Agricultural University where he achieved a BSc (Hons) in Agriculture (Sustainable Soil Management). He has worked the last three years' harvest at Farmcare Ltd's Down Ampney Estate and has other farming experience mustering cattle in Western Australia and milking at a small dairy near his hometown of Bexhill-on-Sea, East Sussex.

As part of his final year studies Tom completed his dissertation on Controlled Traffic Farming (CTF), looking to assess the cost benefits of CTF systems to arable farms in UK conditions.

Tom says *"Due to the size and weight of today's machinery, the risk of compaction is greater than ever before. Whilst advances in engineering have increased the size, weight and productivity of agricultural machinery, measures to reduce the stresses put on soil have not advanced at the same rate. This issue is clearly recognised by machinery manufacturers with the recent introduction of new low ground pressure tyres seeking to reduce the pressure exerted on the soil."*

*In the past the focus has been on alleviating compaction rather than preventing it occurring in the first place. CTF looks to restrict compaction to permanent wheel-ways, thereby avoiding compaction occurring on the rest of the field."*

The literature review Tom undertook for his dissertation confirmed that **compaction has negative effects on almost all soil physical properties including soil strength, structure, water holding capacity, infiltration, aeration and soil biota.** Furthermore these physical changes restricted the movement of heat, water and air within the soil and were found to impact upon crop development and root function. Direct and indirect costs identified as being affected by compaction included increased cultivation energy, yield penalties and environmental impacts.



*Extreme surface runoff as a result of compaction reducing infiltration rate (DEFRA)*

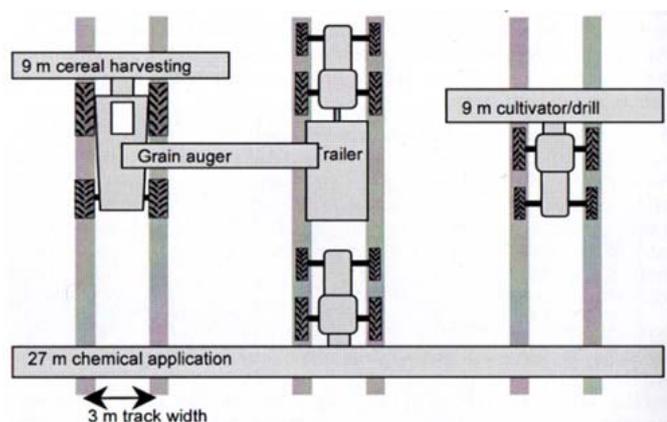
Intelligent Precision Farming

*The scientific approach that puts you in control*

## The system and principles....

CTF involves creating permanent vehicle tracks to greatly reduce the total area of compaction caused by vehicles. Due to restrictions on vehicle widths on UK roads it may not be possible (or practical) to match all vehicle tracks exactly, however, it is still possible to greatly reduce the area trafficked. There are a number of controlled traffic systems suitable for the UK with various implement and vehicle track widths; some of which are more flexible in using more than one track width. They are all, however, based on the principle of a single implement width or a multiple of this.

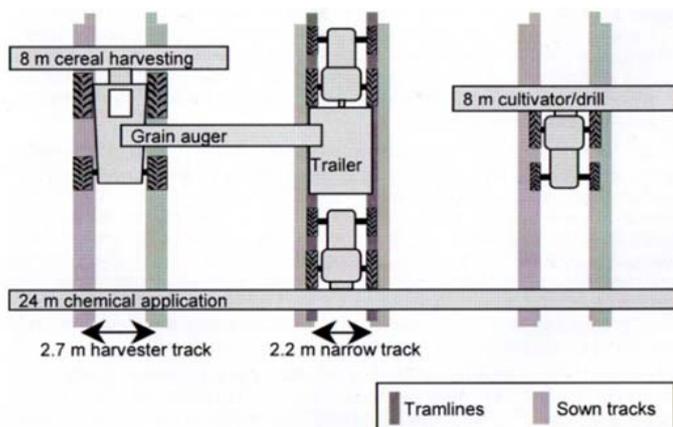
**Common Track System:** All operations use vehicle track widths of 3m which requires vehicle axle modifications. These are more suited to wide American and Australian roads and more difficult to implement in the UK due to our older and narrower roads.



Vermeulen (2010)

## OutTrac System:

Two vehicle track widths; one solely for the combine and another for all other operations results in a larger tracked area but requires less investment in machinery modifications and makes road travel easier.



Vermeulen (2010)

## Case studies....

Tom visited a number of farms using CTF systems to compare the establishment costs and analyse the suitability of CTF systems for UK conditions.

Tom says, "Where cost data was available, establishment costs were shown to be lower in CTF systems with a reduction in fuel costs and timing of operations. This was achieved by making use of the more favourable uncompacted soil conditions. The case studies I analysed used direct drilling and minimum tillage systems, depending on individual farm conditions."

### 10m/30m System

10.5m Combine / 10m Cultivator/Drill / 30m Sprayer

10m OutTrac system, approximately 20% tracked area.

Minimum tillage system on silty clay loam soils.

IPF and HGCA monitor farmer **Julian Gold** has been running a 10m OutTrac CTF system at Hendred Estate since 2012. By fitting 10cm wheel spacers to his two John Deere tractors this created a 2m inside track to match the grain trailers and sprayer, with the Claas Lexion 760 combine on a 2.7m track. A large grain tank (11,000 litres) and extended unloading auger allows all traffic to remain on the tramlines during harvest.



Extended combine auger allows harvest traffic to remain on CTF lanes

After combining, a modified subsoiler (with angled discs and rolls fitted to the back) is used to lift wheelways where necessary. A 9m KÖckerling Jockey drill has been extended to 10m and is used for shallow cultivations to create a stale seedbed, mix crop residue and provide a tilth prior to drilling. The drill is fitted with pre-emergence markers which gives guidance to later operations such as rolling, allowing Julian to minimise his investment in RTK receivers to his drilling tractor and combine. Using minimum tillage alongside CTF has significantly reduced establishment costs in comparison with the previous random traffic minimum tillage system:

The table below is a cost comparison from the Hendred Estate: Random Traffic vs CTF

Min-till random	Hours/ha	Litres/ha	Min-till CTF	Hours/ha	Litres/ha
Subsoiling (4.75m)	0.36	15.00	Subsoil CTF tramlines	0.22	5.00
Cultivate (6m)	0.25	9.38	Cultivate (10m)	0.15	6.80
Roll (12m)	0.17	2.00	Roll (10m)	0.17	2.00
Drill (6m)	0.26	9.74	Drill (10m)	0.17	7.48
Roll (12m)	0.17	2.00	Roll (10m)	0.17	2.00
	<b>1.21</b>	<b>38.12</b>		<b>0.86</b>	<b>23.28</b>

Other possible configurations:

### 12m/36m System:

12m Combine / 12m Drill / 12m Cultivator / 36m Sprayer

12m Common track, approximately 14% tracked area. Minimum tillage system on light, medium-heavy, heavy and peaty soils. Modifications to tractor axles to match combine. The smallest tracked area has the potential to see the largest benefits of reduced compaction.

### 9m/36m System

9m Combine / 9m Drill / 36m Sprayer

9m OutTrac system, approximately 22% tracked area. Direct drill system on medium/heavy clay loams. Reported better drainage, yield increase, reduction in fuel use and labour, and improved soil fertility and health.

### 8m/24m System

8m Combine / 8m Drill / 4m Cultivator / 24m Sprayer

8m OutTrac, approximately 29% tracked area. Direct drill or min till system on brashy soils. 8m drill used for direct drilling where conditions suit with 4m cultivator available when required.



Subsoiling wheelings and direct drilling straight behind the combine

Tom concludes, "CTF also doesn't necessarily require a large investment in machinery to be introduced on a farm and can be phased in gradually. My survey results showed a number of farms using seasonal CTF systems where only certain operations are carried out under CTF conditions. The large number of variations in system (width, establishment method) showed that CTF systems can be flexible to fit each farm and their existing machinery with examples of drills and sprayers being modified to fit into the system.

Whilst CTF does give more favourable soil conditions, that doesn't necessarily mean switching to direct drilling. Cultivations may still benefit yield depending on soil type and conditions, whilst CTF can reduce the draft force required or result in shallower cultivations being effective and reducing costs."

A ten year study is being conducted at Harper Adams University comparing Random Traffic Farming (RTF), Lower Ground Pressure farming (LGP) and Controlled Traffic Farming (CTF) systems using three tillage treatments (Deep tillage, Shallow tillage and No-till). Tom believes "this study will help to develop knowledge of the long term effects that different traffic and tillage systems have on crop yield, husbandry and field resources. Depending on the results this may well lead to more farmers adopting CTF systems in the future.

Reference:

Vermeulen, G.D., Chamen, W.C.T. (2010). 'Controlled traffic farming to improve soil structure and crop productivity'. *International Fertiliser Society Proceedings (The)*. [Journal - Academic]. 678:28.