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Best crop establishment practice

Summer 2016

Case study

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Big picture

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To crop or not?

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Technology on the horizon

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HEADING NEEDED LOREM IPSUM DOLOR



Jon Day

On top of increasing weather extremes, demand for reduced environmental impact, and the need, long term, to increase production, we're facing exceptionally low commodity prices in a volatile trading environment. Together these are forcing the industry to adapt.

Finding new opportunities and implementing different ways of working can be challenging enough, but even more so when profitability is being squeezed. But commentators point to the fact that change is here to stay and is likely to increase at a pace. So amongst all this uncertainty we all need to be reviewing what and how we do things.

At Cereals 2016 you'll find plenty of information, not just on the new cultivation and tillage equipment available – much of which has been designed to help soils better cope with excessive rainfall and retain

moisture during droughts - but also on how you can use your existing machinery to give you greater on farm productivity and efficiency.

We've a new feature in The Soil Pit where NIAB TAG and Rothamsted will be looking at the soil structuring benefits of cover crops and in the Arable Conference Marquee we've record-breaking farm managers discussing how they've achieved yield improvements.

Pre-event we're sharing exclusive information and insight through our guest editors of our eNewsletters. Recently, Prof. Jane Rickson Soil Expert from Cranfield University explained how agribusinesses – from farmers to big businesses – will be able to test new technologies in centres specifically designed to recreate the dynamic interactions between soil, water, crops and machinery.

So, as well as attending the arable industry's leading technical event, make sure you get the latest insight and information throughout the year by signing up to our eNewsletters. Both can be done on the Cereals website www.cerealsevent.co.uk.

SEE YOU AT CEREALS



Tillage magazine will be at the event on 15-16 June at Chatsall Grange on Stand no. 523.

Come and say hello, and tell us what you think about the magazine. We are always on the lookout for good stories. We would be pleased to see you.

MAIZE COMPANION CROPPING TRIALS



Reaseheath College are hosting a series of companion cropping trials this year. The aim is to establish a successful maize and companion cropping system for the North West of England, producing a high yielding maize crop beneficial to dairy farmers, whilst also providing additional benefits provided by the companion crops, these are:

- * Prevention of soil erosion during winter months
 - * Retention of soil nutrients
 - * Improve harvesting conditions to prevent soil damage
 - * Increasing soil carbon levels and worm population levels
 - * Increasing levels of soil biota such as bacteria and fungi improving soil health.
 - * Increasing soil structure and capillary action to withstand higher levels of rainfall during winter months
- Additional benefits:
- * Possible grazing opportunities specific to individuals farming systems.
- All six plots in the 3.5Ha field are being

Overmatter

The root of the matter

Tillage magazine caught up with Tim Chamen to find out more about Controlled Traffic Farming (CTF)



Tim Chamen has a degree in agricultural engineering and spent 25 years at Silsoe Research Institute (SRI) where he worked on tillage tool development and the effects of machinery compaction on soil and crop responses. He set up Controlled Traffic Farming (CTF Europe) Ltd in 2007 as a focus for CTF advice and now has five partners across Europe.

Is CTF becoming more widespread in the UK?

If you search on google for 'Controlled Traffic Farming' 26,000 results pop up and there is now around 6,000 results if you do a similar search on You Tube.

Why is CTF as a management tool becoming easier?

Because of the growth in GPS, top guidance equipment can now auto-steer most farm

Are many manufacturers embracing CTF in their machine designs?

In 2010 Dale Drills offered compatible working widths, Case IH introduced suitable combines in 2013, John Deere extended axles in 2013 and built compatible combines in 2015, Claas announced a CTF combine at CTF 2015 in Prague and Cultivating Solutions now offer traffic lane maintenance equipment.

So what are the obstacles preventing CTF becoming more widespread on our farms?

Current machinery fleets are incompatible and the costs of conversion are perceived to be too high and therefore do not outweigh the benefits.

Interesting, a relatively high number of farmers don't even recognise that compaction is a problem. It's basically, a 'mind-set' that has to be changed to move forward. Also people renting land or contracting are often not compliant and may have little or no interest in the soil.

The uptake of CTF in the UK and Europe needs to grow to at least a quarter of the area farmed. If not it will remain an issue that will only have to be dealt with in years to come with probably some incredulity that it wasn't tackled sooner.

RTK GPS aids Leicestershire farmer



Keith Challen manages Belvoir Fruit Farms on the Lincs, Leics and Notts border.

A diverse 1400 ha estate, it has 1200 ha arable and 40 ha devoted to elderflowers. The soil is heavy clay and the balance of the estate is park, wood and grass land.

"There has been arable farming of some type on the farm for the past 5 generations. We decided to diversify and today produce over 30 million bottles of non-alcoholic drinks a year that are distributed all over the world," said Keith.

Since the three crop rule introduced under CAP reforms Keith has moved to a six year rotation. "In the 70s we had a grass drying business so most of the farm was too heavy to farm in an arable rotation," added Keith.

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First steps

In 1995 he took his first steps into precision farming using a GPS guidance RTK Racall 12 channel on a tractor with a light bar, although the reaction time was not quick enough he could see the potential of RTK.

"We decided to park the idea and in 2000 we moved onto the John Deere brown box and SF2 straight line guidance. We used the kit 24/7 with no repeatability, still using markers. It was a great start to using guidance but it wasn't ultimately where we wanted to be," added Keith.

The real journey began in 2007 when the farm moved to Trimble and AS Communications. "They said they would work with us, so when we put up a base station

we did it with them, the same with the repeater. I think the thing for me is I could see where we wanted to be but I was nervous. The confidence given to me by the dealer was crucial and today we have RTK on all the main machines and use it pretty much for all tasks on the farm," said Keith.

Full repeatability

All Keith's machines have full repeatability, all headland operations and no markers. All field boundaries are mapped and share AB lines to give Keith repeatability and the chance to go back to the same point year on year.

"The weather is often damp and the unforgiving nature of the soil means we are causing

compaction, although we do what we can to avoid it. We have taken a tractor, fitted a Trimble FMX and gone round every single field putting in boundaries. The information goes onto the computer and a memory stick and put into all the machines so everything is running on common AB. It's been a revolution and made the whole job a lot easier," enthused Keith.

Other reasons for Keith's enthusiasm for RTK GPS is it allows him to achieve near absolute machine efficiency, reduces operator fatigue, increases output, reduces compaction and achieves savings in fixed and variable costs.

When asked whether he would farm without it Keith says, "We could but we really wouldn't want to"

Machines fitted with GPS:

- 2013 Case AF 9230 combine 12.5mCase FM2000 (FMX equivalent)
- 2015 Challenger Rogator Trimble FMX
- 2009 Case quadtrac 535 Trimble FMX
- 2001 Case quadtrac 440 Trimble FMX
- 2014 Fendt 718 Trimble FMX
- 2007 MF 3645 Vineyard tractor FMX platform kit
- 1995 Fendt 514 Trimble easy guide 500 plus easy steer (egnos)
- 2013 Arctic cat quad bike Trimble easy guide 500 (egnos)
- 25% share in base and repeater

www.tillage magazine.net



Why do you need RTK Farming?

RTK (real time kinematic) allows farmers using precision farming technology through global positioning satellite systems and fixed-base stations to improve machinery efficiency to sub-inch accuracy, repeatable year on year and without constant satellite drift during daily operations.

- **Accuracy:** using RTK you gain accuracy of +/-2cm which means overlaps can be reduced to 0.33% on all machinery passes
- **Repeatability:** Upgrading to a RTK network signal guarantees year on year repeatability ie in the same tramlines.
- **Savings:** With total accuracy on all machinery, fuel costs are dramatically reduced as well as substantial increases in work efficiency.
- **Reduced driver fatigue:** Using a GPS auto-steer system ensures driver fatigue is substantially reduced, improving the equipment's operation.
- **Input Targeting:** By having RTK GPS systems variable rate inputs can be applied tailoring the applications to the requirements of the growing crops.

7

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'HANDLE WITH CARE' IS MAIZE ADVICE

Maize is far more sensitive to soil conditions than most crops. So extra care with cultivations and sowing is vital for good results, Andrew Blake discovers.



Maize Drilling

Maize growers, particularly those considering introducing to their rotations for the first time, must be prepared to give the crop the specific attention it requires, especially when it comes to soil conditions.

That's the advice from Simon Draper of the Maize Growers Association.

"Maize is particularly sensitive to compaction," he warns. Five

years of French trials across six sites on a range of soil types found that compacted soil cut wheat yields by an average 10%. "In peas, which we always think of as sensitive, the figure was 12%."

However, compaction slashed grain maize output by 20%, and the yield of maize for silage by up to 35%, he notes.

The UK grows about 200,000ha of maize, but the crop is becoming more attractive,

particularly to wheat growers plagued with blackgrass, and those seeking a new break crop to provide material for silage or to feed anaerobic digestion energy plants.

What's it for?

A critical decision is which outlet to target, says Mr Draper. "You must decide what you want to grow it for. That's important

because the two main outlets need totally different crops."

For silage the aim is minimum methane production in animal rumens, but for feeding anaerobic digestion plants for producing biogas it's maximum methane per hectare (see table A).

For both outlets the crop should be about 30% dry matter at harvest, most of which will be starch, he explains. Harvesting too soon means not all the crops

sugars will have been converted to starch, but harvesting once the crop has turned brown means some of the cellulose will have been converted to indigestible lignin.

"One of the main lessons still not being taken up is that if you're harvesting the crop when it's gone brown that's wrong. It should still be green at harvest, unless it's being combined for grain."

In practice producers of maize

for biogas can get 12% more yield by accepting a 2% loss in starch and harvesting at 28% dry matter, he says.

"It boils down to a choice between having a 'big heap' at lower dry matter – suitable for biogas or dairy cows with more than 50% maize silage in their ration – or a 'little heap' at higher dry matter, more suited to dairy cows mainly on grass, beef cattle or other ruminants."

Table A

Forage Maize (Cattle feeding)	Energy Maize (Biogas output)
Minimum methane production in the rumen	Maximum methane production per hectare
Dwell time: 5-10 hours	Dwell time: 50-100 hours
Maximum feed value (starch & whole plant digestibility)	Maximum biomass (yield & dry matter)
Sufficient dry matter for feed intake (30-35%)	Sufficient dry matter for fermentation (27-31%)
Long chop (12-15mm) for rumen degradability	Short chop (7-10mm) for good surface area

Each crop merits different agronomy, the big heap generally coming from high seed rates, more nitrogen, and later/grain varieties sown in May. The alternative, producing smaller amounts with higher dry matter, is low seed rates of early/forage varieties drilled in April with starter fertiliser and given less nitrogen, Mr Draper explains. "There are big differences between the two systems."

Correct cultivations important

Soil structure and drilling contribute to over half of maize yield (see Table B), according to the MGA.

"If you mess up your soil

Table B

Factors contributing to maize yield

Soil structure & drilling	55%
Weed control	15%
Variety	10%
Fertiliser	10%
Harvest	10%

The sole aim of sub-soiling should be to break any pans which are typically no deeper than 30cm, explains soils consultant Philip Wright of Wright Resolutions.

To be fully effective the legs on conventional sub-soilers should be spaced apart one-and-a-half times the actual working depth. On winged machines the legs can be set slightly wider, he says (see Table C).

During work soil should 'flow' to maximise the cracking effect. To achieve that, the vertical lift height from the front of the wing to the back needs to be between 4cm and 6cm, depending on depth worked, says Mr Wright.

The rake angle between the wing and horizontal should be between 10 and 15 degrees, he adds. "If it's more than that you start bringing breeze blocks to the surface, and if the loosening effect is not enough, make the wings longer rather than steeper."

Plough for best results

French trials comparing establishment after ploughing, min-tilling and strip-tilling have highlighted speedier emergence and better yields after sub-soiling and ploughing (see Table D).

Table D

	Fresh weight yield t/ha	% Dry matter	Dry matter yield t/ha
Sub-soil, plough, drill & roll	53.9	28.1	15.1
Plough, drill & roll	40.4	34.5	13.9
Sub-soil, drill & roll	38.8	32.6	12.6

"That's because ploughing offers better control over the depth of sowing," explains Mr Draper.

The ideal for maximum germination is 40mm (1.5in). Sowing into the less uniform and often shallower seed-beds after min- and strip-tilling led to more uneven sowing depths, delayed emergence and lower germination.

"And the effect continued

throughout the season," he adds. The crop after ploughing reached the tassel stage earlier, and its rooting was better throughout the topsoil profile.

"Maize is a very weak rooter – unlike cereals it won't push through any hard areas. It just gives up."

Optimum seed-bed surface quality differs depending on drilling date, he advises.

"It's important to have a

relatively rough seed-bed if you're drilling in April because we're after drainage then. Maize doesn't like water-logging so a rough seed-bed helps get the water away from the seed."

By May, conserving moisture is likely to be the priority, so a finer seed-bed is more suitable, he explains. "If you must use a power-narrow – probably the worst possible tool – don't use it in April."

Table C

Sub-soiler leg spacing

Conventional	1.5 x working depth
Winged types	2.0 x working depth
Winged types with leading tines	2.25 x working depth
'V' shaped types with wings	2.5 x working depth

Tillage Live



Maize crop - picture courtesy Claas



Maize harvest



Harvesting maize - picture courtesy Claas



Winged sub-soiler

Watch that sowing speed

Excessive drill speed can exact stiff yield penalties, warns Mr Draper.

As you go faster the plant population drops off. The drill bounces, you mess up the sowing depth and the gap/piness between individual seeds along the row increases.

French trials with three types of drill, run at 6, 9 and 12 kph, found that at the highest speed less than half the seeds were sown at the correct spacing.

"When you drill too fast you end up with big and little plants next to each other. We know how important weed control is in the crop, but the most competitive plant to a maize plant is its neighbour.

"If you have rows of big plants next rows of little ones you lose 20% yield. But with big plants next to little ones in the same



Philip Wright



Soil washing onto road



Maize drilling



Simon Draper

"Some new drills can get the spacing right, but they must be driven at the correct speed for the conditions."

Achieving plants that are all the same size, whether big or small, should be the aim, he stresses.

Drilling should start as soon as possible after the soil has stayed at 8C at 9am for seven days running. "That means the soil has become warm enough to withstand a sudden cold snap afterwards."

Spotlight on seed spacing & rate

The traditional standard 75cm (30in) row width came about to allow horses to pass, and plenty of recent work in France, Germany, the USA and elsewhere shows that various arrangements of closer rows offer better yields, says Mr Draper

American trials have shown the optimum 'on-the-square'

plant to plant spacing is 25cm (10in), and in France a system of twin 37.5cm (15in) wide rows with staggered seed positioning and set apart 75cm (30in) apart is becoming popular, he notes.

Replicated MGA trials last season comparing 75cm and 50cm (20in) rows using three seed rates (80,000, 100,000 & 120,000/ha) highlighted the benefits of closer rows.

"Plants in the closer rows grew taller - as you'd expect. But they also grew faster so that tasselling was about three days earlier.

The work showed no yield benefit from raising the seed rate in 75cm rows, but doing so in the 50cm rows lifted both dry matter and starch yields by up to 2t/ha and 0.5t/ha respectively at the top seed rate.

"So it looks as though narrower rows plus a high plant population is the way forward."

Earlier UK trials and those in France and Germany found yield increases of 6-8% from the close rows/high seed rate

approach, he notes.

"However, if you are sticking to 75cm rows, there's no need to sow above 80,000 seeds/ha."

Erosion concern

Growers should be aware that without care to avoid soil erosion they could be forced to ensure maize land post-harvest has an over-winter cover crop, warns Mr Draper.

At present 'agronomic justification' under GAC allows that land to remain as stubble over-winter.

"That phrase may not be there any longer if we don't do something to look after the maize crop properly. If we keep getting soil running onto roads the public is going to say enough is enough and what we have to do with our crop will be imposed on us.

"So we really need to be targeting September harvesting, mainly by choosing the right varieties and drilling early."

How to improve soil structure to reduce degradation

Soil degradation is one of the most pressing problems facing the planet. A

research group at Cranfield University estimated that in England and Wales soil degradation costs £1.33 billion annually. Half of this cost relates to the loss of soil organic carbon and the intensity of farming is a major cause of soil carbon loss. Soil structure can deteriorate through erosion, compaction, floods and landslides, salinization, sealing, contamination, loss of organic matter and decline in biodiversity.

Trust reports that farming practices can be employed to improve soil quality and increase soil carbon, including optimal fertilisation, crop-grassland rotation, hedgerow planting and animal manure application.

Good soil management is vital to improving soil structure.

The first target of the Soil Association's Soils Campaign is that organic matter in UK arable soils increases by 20% over the next 20 years.

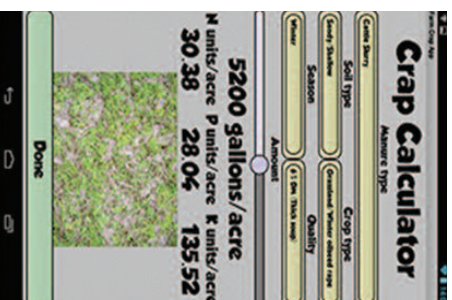
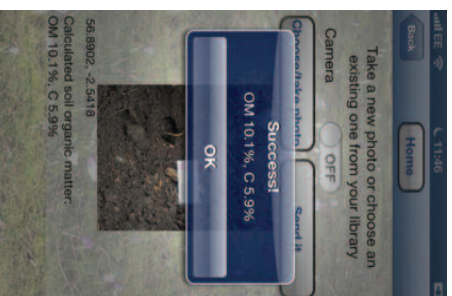
Increasing arable soil organic matter levels by, on average, a fifth over 20 years would improve soil health considerably. It will lead to more fertile soils in the long-term and will provide a wealth of other benefits alongside.

Good soil structure depends on mineral content (texture such as clays, silts and sands) 45%, air

25%, water 25% and 5% organic matter which includes soil flora (roots and leaves) fauna (macro earthworms, bacteria, fungi, viruses. The physical arrangement of these soil particles allows roots to grow, the movement of air, water and soil organisms affects soil strength and its loading capacity which is its ability to resist compaction.

action. Soil organic matter should be tested and monitored. Apps include the 'SOCIT App' - a quick, cost-effective source of information about the organic matter content of their soil, and 'Farm Crap App' - designed to help farmers and growers value the nutrients found in organic manures - can help.

So what soil management practices can farmers undertake



Find out what's going on

Analysing soils is an essential first step to support effective decision making on soil health, but some farmers neglect to do this routinely. Farmers should undertake routine soil analysis and take appropriate remedial

adequate soil strength to support surface traffic.

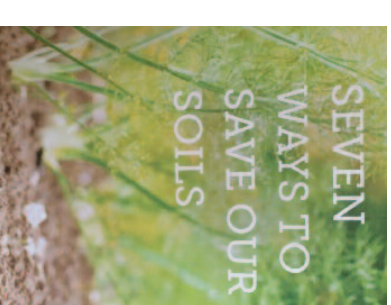
Tillage practices

Think about conventional versus conservation tillage practices such as reduced tillage, min till, strip till and zero till etc. The main reasons to use min-till are: reduces your energy consumption, labour, fuel and machinery costs, high work rates and area capability, conserves moisture, retains plant cover to minimise erosion, minimise loss of organic matter and keeps soil structure with less compaction.

Min-till needs dry ground conditions for sowing in order to avoid compaction and smearing in the final seed bed. One of the best tools in your tool box is patience, wait until conditions are excellent for sowing. Avoid sowing in a compacted or smeared seed bed. Where

appropriate use cover crops, green manures and under-sown crops, with the added benefit of improving soil fertility.

Soil structure is fundamental to healthy soils and soil management can improve soil structure, increase crop productivity and control degradation processes. The cost effectiveness of



practices will be site specific and must fit into current farming practices.

The document published by the Soil Association - 'The seven ways to save our soils' - reports things need to change, and fast and all farmers and growers should have a common goal to protect, maintain and build their most vital asset - soil.



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Farming with passion

TO CROP OR NOT

Farmers appear to be hard wired to produce. But is that the right approach on land that will struggle to produce a viable crop, and should farmers consider whether they might they benefit from taking a counter-intuitive decision – to plant nothing?

To discuss the idea, Tillage's Jonathan Wheeler talked to a farmer and a consultant who have worked together on the issue.



Caption Required

A significant part of many fields yields may be so poor yielding that the crops they produce have no hope of covering their growing costs, says Sebastian Graft-Baker from consultants Andersons.

And while not cropping such areas is an option, he warns it is not without its costs:

"From the evidence we have gathered, we would suggest that between 10% and 50% of many fields will fail to produce high enough yields to cover growing costs.

"A field of first wheat that might average 8.5 tonnes/hectare might conceal extremes of 5t/ha and 12t/ha, and the difference between the

cost of production between those points is huge.

"On the areas of the field achieving 12 t/ha the cost of production is down to £80/t – much better than the £120/t average for the field or the £113/t break-even figure that might be budgeted at the moment.

turning off production is not a 'cost free' option

"But on the parts of the field where yield dips below 8t/ha costs increasingly outweigh income. At 6t/ha production costs rise to £160/t and at 5t/ha the reach £192/t.

But turning off production is not a 'cost free' option, he warns:

"That land will still have maintenance cost of £20 - £30/ha to keep it in good agricultural condition and control weeds.

"While will you may be saving

"One thing yield mapping has shown us is just how severe yield losses can be attributed to things like rabbit grazing, and how easily they can be remedied by installing rabbit fencing.

"You must be clear about the reasons and rationale for any change. If you have a poorly yielding headland you might be tempted to exclude it from cropping.

"But it might be yielding poorly because of all the turning traffic on it. And if you stop farming it, that traffic would have to turn on the next strip in from the headland, which might have yielded perfectly well before, but start to suffer from reduced yields.

Combining forces to spread costs

One popular route to improving profitability is combining forces with a neighbour to spread machinery costs, but while many such deals work well, there are pitfalls, he says:

"There must be trust and understanding in any such joint venture. What might seem the most perfect theoretical set-up with the farmer next door is going to struggle if you do not achieve a common understanding of how to produce the greatest return.

"And you may get on very well with the neighbour, but have totally different approaches to business which make any joint system difficult to operate.

"Problems are often caused if one partner is more or less risk averse than the other. Partners need to be like minded and have a clear understanding of the economics involved. Once that is achieved the matter becomes a lot clearer and much more straightforward.

"In terms of the distance some people are prepares to travel to

work land, I am continually amazed how dismissive operators are about the cost of travelling to work land. I wonder whether road travel in tractors has become too comfortable!"

The format and length of agreements can vary widely, he adds, but they need to combine flexibility with laying down very clearly the basis of the agreement:

"How any deal works depends on the personal chemistry between the partners. Ideally there should be a central agreement that gives both parties security by defining the

limits of their exposure.

"But where the chemistry is correct, in a situation where there is a significant change of circumstances (and the current period of low profitability could be considered an example of that) the parties will be able to mutually agree to alter the arrangement or replace it with something different.

"Also, if everything goes wrong, they have a document that shows both parties entered into the deal freely, which avoids any disputes. The document should also detail how things should be resolved".

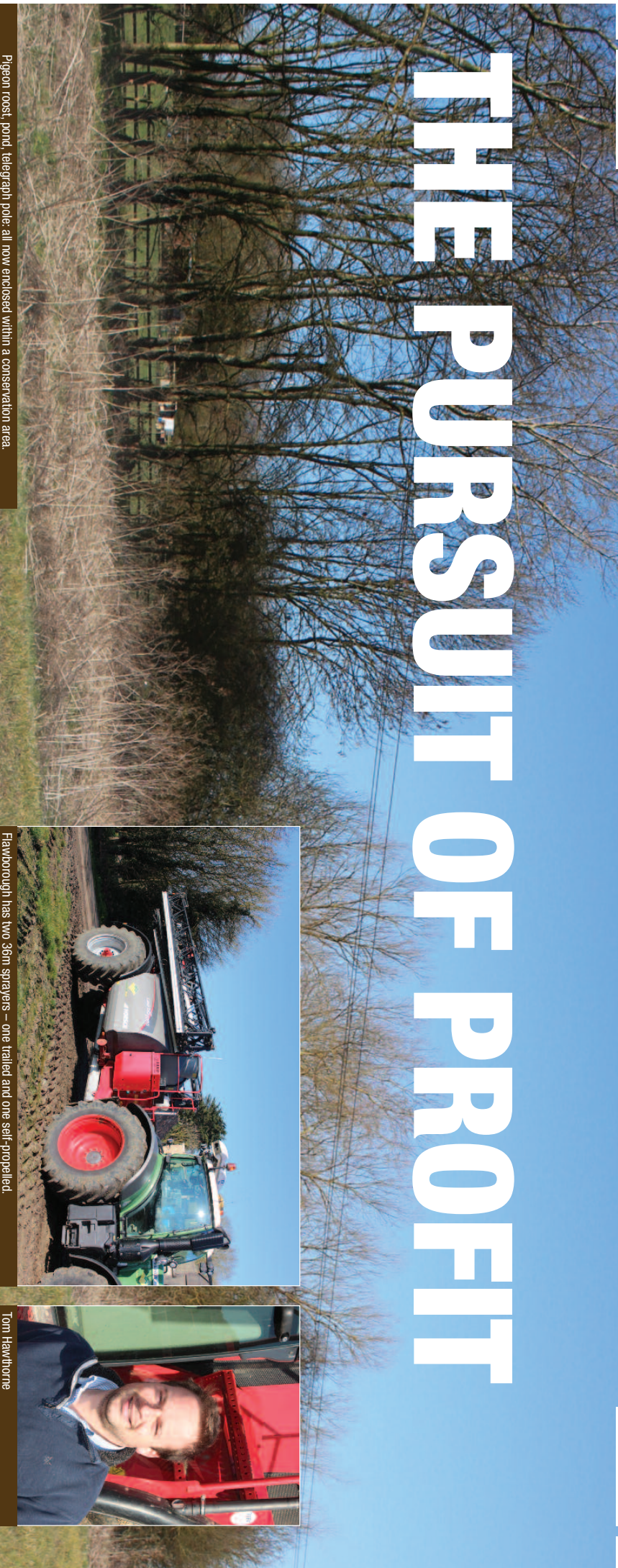


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THE PURSUIT OF PROFIT



Pigeon roost, pond, telegraph pole: all now enclosed within a conservation area.

The Hawthorne family has made a range of management decisions and investments at Flawborough Farms, Nottinghamshire to ensure the business achieves profitability.

And amid the more obvious ones of rationalising machinery usage and investing in quality storage is a less conventional one – that of deciding to stop cropping awkward areas and poorly performing fields.

The business covers 2,000 hectares, with 400 has being family owned and the remainder – all within an eight mile radius - worked on a range of contract farming agreements.

With most land being heavy clay types, cropping was previously restricted to combinable crops. "We felt we were overly reliant on the wheat price, which didn't feel secure", says Tom, who runs the business with his father, John.

So among the recent changes has been the introduction of rye and maize grown to feed the burgeoning population of anaerobic digesters in the region. That move was made from a business stand-point, says Tom:

"We can't really grow potatoes or sugar beet on these soils so had to explore other options."

"When you look at the gross margins, growing crops for AD

is attractive - rye can achieve £900-£950/ha while barley is projected to produce £600/ha."

Their heavy soils mean they still have to be selective, and grow early maturing varieties of maize and aim for a September harvest date.

Where they see advantage, they are happy to invest. Examples include the 11,000 tonnes of storage they have at Flawborough, which means they have more control over grain sales:

"Previously we had to sell much of the crop soon after harvest, because we didn't have enough storage, but now we have become much better sellers. We

may also look at using forward markets more as well.

"With the crops we grow for AD we have a pre-set price and we know – as long as we produce the right volume of crop – we have a guaranteed market, and it is a market not dependent on anyone else."

Like many other farmers, they have also removed awkward field corners from production and planted them up under ELS and other conservation schemes. "Fiddling around in tight corners with big machinery can waste a lot of time."

But they have also taken whole fields out of the rotation,



Flawborough has two 36m sprayers – one trailed and one self-propelled.

One field due to produce oilseed rape has been left undrilled because he could not see it making a profit.

"Access is difficult and it grows quite a bit of Black-grass. We decided it wasn't worth drilling because of its location and other problems. We might use one of the greening options instead.

"There are other fields where we have to think about what we plant in them and whether they are worth cropping at all."

"You can only make these of decisions if you really know what your production costs and gross margins are", says Tom,



Tom Hawthorne

adding that farmers also need to be honest with themselves over costs.

OSR cropping decision

The decision over whether to grow oilseed rape can be complex. "Some of our fields face high pigeon and slug pressure, or have weed issues. If oilseed rape was still making £400/tonne then it is worth planting the crop and protecting it".

But he questions the wisdom and business sense of sowing any crop into a field where it will face pressures when margins for a successful crop are already slim.

A different strategy for poorer areas

While that strategy aids the profitability of the better yielding parts of the fields, they adopted a different strategy for poorer areas.

These divide into two parts – awkward parts of bigger fields, due to either shape, soil or other physical problems, and whole fields that have particular problems.

An example of the former is adjacent to their main farmstead in Flawborough, where a combination of trees, a big hedge, a pond and low telephone wires make working one end of a field difficult.

The line of trees is a favourite roost for the local

pigeon population; the hedge shades the headland and beyond; the pond protrudes well into the field, and the wires prevent tall machinery accessing the area.

While the gap between the edge of the pond and the telegraph pole used to be navigable by cultivators, drills and the sprayer, as machine sizes have grown to achieve economies of scale across the rest of the farms, they have rendered it unnavigable. The headland also ensures they meet LERAP restrictions with regards to the watercourses.

Their current machinery fleet includes two 36m Horsch

Leeb sprayers, as well as 12m and 6m cultivators and drills.

Consequently Tom drew a line across the field just outside the pole and sowed the entire area between that and the boundary with a conservation mix.

That contributes towards their environmental obligations and removes several acres that could be cropped but which never yielded well.

"It is an area with several practical problems. Working around the pond was fiddly, and when we moved to bigger machinery the gap between the pond and the pole became an issue".



Flawborough Farms' two Horsch Leeb sprayers are supported by a bowser to ensure both spend as much time in the field as possible.

And the AD business may give him a way out, in the form of growing grass, which could be grazed, conserved or fed into a digester.

"That would let us improve drainage and incorporate manure or digestate. If we improve the productivity of a field we could return it to the arable rotation".

This year he has also resisted the pressure to 'patch up' one field in which 1.5ha of 8ha has

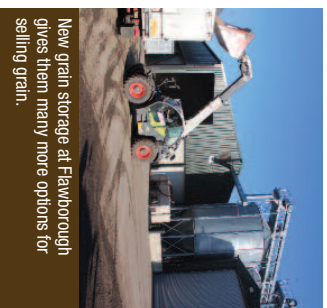


Straightening out headlands aids efficient machinery operations.

suffered very poor establishment:

"We could have topped it up or sprayed it off and re-drilled in the spring, but decided that it simply would not have made money. We decided to spray it off and leave it, although we might plant a cover crop.

"We want to be tidy farmers – but sometimes being tidy doesn't make money".

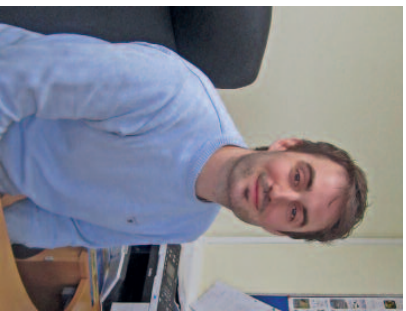


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A high quality approach

When Olly Neil, founder and managing director of OJ Neil Contracting Ltd, was approached in 2010 to harvest maize by a client that was building a biogas plant, he felt confident that this was just the start of a growing sector of the market. Originally asked to harvest 400 acres near Risby in Suffolk, the business has grown to 8000 acres of maize in the past six years, helping to fuel eight biogas plants from Colchester in Essex to Spalding in Lincolnshire.

Employing two harvesting teams, each with around eight people running a harvester, two clamp vehicles and between four and ten trailers, they move from the heavy land in Essex to the lighter soils of the Lincolnshire fens. The extended growing conditions to the north give the teams time to move 'along the line of clients via Bury St Edmunds and Chatteris.'

Olly originally sub-contracted the maize drilling but as the acreages grew, it made sense to take it on themselves. 'We had the skills in the business to do it,

we just needed the equipment, so in March 2014 we purchased the Horsch Maestro," explains Olly. "We now drill about half of what we harvest, so that's 3500 acres annually with one drill."

Having completed two seasons with the drill Olly has been very pleased with its performance and reliability. "We had overseen the maize drilling for five seasons with subcontractors using a variety of machines, so we knew what we wanted from a drill."

After demonstrations he chose a Horsch Maestro 8.75 CQ, a 6m maize drill with eight planters set at 75cm row spacing. Olly was impressed by the ease of use but it was the consistent precision drilling across his customers' wide variety of soils and conditions that was key.

"We specified auto row shut-off to individually manage the seeder units are using the tractor's RTK positioning system. On headlands, each row shuts off as required: it looks neat and saves seed. It's a precision technique that shows customers you're taking extra care rather

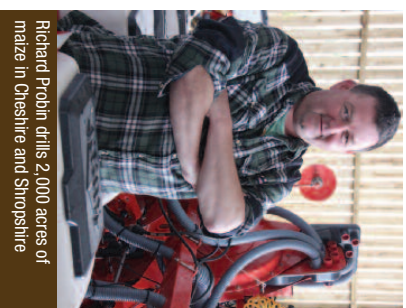
than big overruns. It just looks right and a visual indication of our high quality approach."

Each seed hoppers holds 70 litres while the 2800 litre fertiliser hopper is mounted ahead of the axle for good weight distribution. "Being able to apply fertiliser at the point of drilling is key and makes a big difference. We apply between 85 to 100kg of DAP /Ha and we see a significant improvement in the speed of emergence and healthy crop condition, so we use it on 95% of the land we drill."

On FastTrac 4420 with four-wheel steer and floatation tyres, the Maestro can be folded to a 3m transport width without having to empty the metering units, hastening the move to the next field.

In addition to easy movement, the four-wheel steer and RTK guidance allows the Maestro to be turned without missing a row, minimising compaction on the headland.

Along side the Trimble RTK control unit sits the Horsch Comfort 2 Terminal that allows the operator to



Richard Probin drills 2,000 acres of maize in Cheshire and Shropshire

Wide drill makes light work of heavy workload

Richard Probin has been drilling maize in Cheshire and Shropshire since 1989 and over the last few years has seen a significant increase in the area planted. That growth has been due, in part, to an increased demand for maize into AD plants, but is also a factor of high yielding dairy cows being butter fed all year round. With competition from other local contractors a constant threat to his one-man operation, providing a fast, reliable and accurate maize drilling service is paramount to his own business' continued success.

Richard sows around 2,000 acres of maize per year, often with as many as a dozen farms requiring his precision seed-drilling services at any one time. "I specialise in maize drilling during the spring and early summer so its vital I have the right kit to get the job done as efficiently as possible," Richard explains. "With a high concentration of dairy farmers in



The 12-row Kuhn Maxima 2 drill was supplied by Malpas Tractors

the area, workloads during the drilling season can go off the scale. At any one time I could be following several power harrows on as many as a dozen farms."

Following two seasons using an 8-row trailed drill, Richard switched to a Kuhn mounted drill and has just completed a third season using a 12-row Kuhn Maxima 2 supplied by Malpas Tractors.

"I was struggling to keep pace using the 8-row drill so needed to upgrade to a larger machine," he explains. "At first I wasn't sure if my Fendt 718 would be big enough to lift and operate a 12-row machine, but it has proved to be more than adequate."

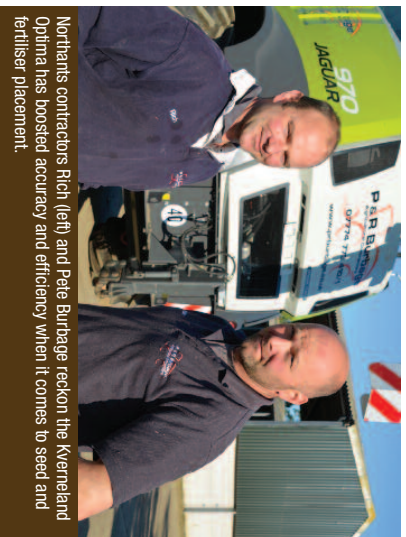
Richard has moved back to a mounted drill because in his opinion they offer greater manoeuvrability and cause less soil compaction than their trailed counterparts. "Using a mounted drill makes it easier to turn on headlands and to avoid wet

areas of ground," he says.

"Mounted drills also lend themselves to less tracking on headlands and less soil compaction as a result. I typically run my tyre pressures between 8 and 10 psi, and even with 3.5 tonnes of empty seed drill on the back of the tractor, there is very little adverse effect on the seed bed."

Transport size

Richard grows 300 acres of maize on land which he rents and also has maize customers across North Shropshire and Cheshire, working ground up to 30 miles away from his base near Whitchurch. Machinery dimensions when folded for travelling are therefore a key concern when choosing a drill. "It's a big machine, but folds into a surprisingly compact profile for transportation," he describes. "It folds down to a narrow width, but is still quite tall, so I need to be aware of any low bridges or obstructions."



Northants contractors Rich (left) and Pete Burbage reckon the Kverneland Optima has boosted accuracy and efficiency when it comes to seed and fertiliser placement.



Maize drilling contractor P & R Burbage

When it comes to maize establishment, Northants contracting brothers

Pete and Rich Burbage believe in getting seeds precisely placed at an even depth, to encourage crops to get off to a good start.

It is second only to seedbed preparation, and the range of soil types that the firm encounters means there is no set system.

The firm will use any combination of plough, plough, press and power harrow to make sure seedbed preparation is carried out to the highest standard.

"You do get out what you put in," explains Pete Burbage. "So we carefully apply a range of cultivation practices to suit soil types. For us and our customers, the key is to open the soil and create a loose seedbed, with firm surface into which the drill can accurately place seed and let roots establish."

"Depth control is vital for accurate seed and fertiliser placement - and of course we demand reliability and

productivity from all our equipment, to withstand seasonal pressures."

With a maize drilling workload of almost 700ha each spring, P & R Burbage relies on a Kverneland Optima eight-row trailed drill. It is the firm's second such drill, and was bought two seasons ago to replace an identical model that had covered six seasons and over 4,000ha of work.

"We have been very pleased with the accuracy and efficiency of the Optima drill," says Pete. "Its running costs have been very low, and despite the sophisticated technology it offers, it remains a very simple, straightforward maize drill."

Isobus allows the eight-row drill to communicate seamlessly with the tractor, while satellite guidance handles the tractor's auto-steering. Maize rows are planted with the precision they deserve.

"Maize drilling was one of those jobs where you needed all

your concentration just to drive straight," he says. "But since the arrival of GPS guidance and electric drive seed metering, every seed is accurately placed and correctly spaced."

"The Optima has delivered a marked reduction in seed doubles over our previous make of drill and more importantly, the technology creates time for to watch what's going on with drill," says Rich Burbage, who handles the firm's maize drilling workload.

GPS control and auto-steering has also helped the firm to continue drilling in conditions that have been so dusty, that others would have been forced to stop through lack of visibility.

"Once you've drilled the first pass around the field boundary, the in-cab screen gives you an outline so it really doesn't matter how poor the visibility becomes," he says. "Dust and darkness are no longer enemies."

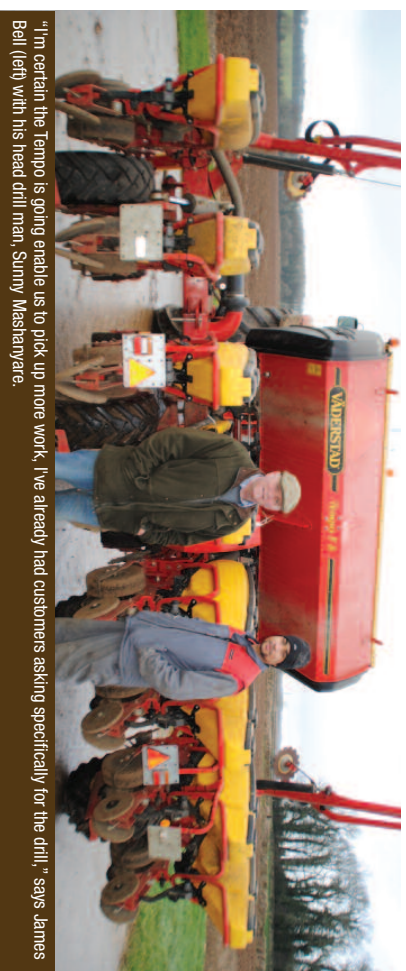
"With electric drive, the drill doesn't use chain drives for seed metering," he says. "This has

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"I'm certain the Tempo is going enable us to pick up more work, I've already had customers asking specifically for the drill," says James Bell (left) with his head drill man, Sunny Mashanyare.

Precision at a high tempo

James Bell believes that in the future a considerable percentage of drilling and harvesting the UK maize crop will be to meet the demands of the biomass industry, rather than that of dairy and beef farmers.

"I can see the push for an expanded maize acreage coming from that sector," he says. It is a crop Gloucestershire contractors J Bell and Son is heavily involved in. Depending on the season its general contracting operation currently

grows and harvests 3000 – 4000 acres of forage maize within the 40km radius it works in from its base at Shipton Moyne.

Its two harvesting teams also typically clamp 12,000 acres of grass silage a year. In the arable sector J Bell and Son farms 6000 acres in a mix of stubble-to-stubble and share farming agreements, and individual jobs.

Where the maize crop is concerned, half is on a stubble-to-stubble basis, on the other half the farmers prepare the seedbed, and do the fertilising and spraying, explains James, who

bought an 8-row Vaderstad Tempo TPF8 precision drill last year, the first time the make of drill had been changed from the one it had been using for the 20 years it has been involved in the crop.

"We were running two 6-row and a 12-row drill, but we wanted greater accuracy in terms of seed rates, placement and drilling depth, and reduced misses and seed bunching," he says. "We saw the Tempo at the LAMMA show and were extremely impressed by the metering unit."

In conventional 'drop type' drills, the singulated seed falls from the seed meter through the seed pipe under gravity. At high drilling speeds, when vibrations increase, the seed bounces in the pipe and much of the precision of the seed meter is lost, Vaderstad says.

On the Tempo, this is overcome through the use of 'Power Shoot', where pressurised air is used to move the singulated seed at high speed down a short seed pipe. A soft press wheel stops the seed as it

leaves the seed pipe, to prevent it rolling along the slot and ensure there is good seed to soil contact. 'Pressure- and angle-adjustable closing wheels shut the slot.

Vaderstad argues that controlling the movement from meter to soil and the rapid transport of the seed decreases the effect of vibrations and slopes, and allows precision drilling at high speeds.

"Although the concept is relatively new to the UK, we could see the logic of the system," James says. "We bought the Tempo TPF8, with a bulk fertiliser hopper and micro-granule applicators, to replace the two 6-row drills, without a demonstration."

The Tempo drilled 2000 acres of forage maize last season, when theory proved itself in practice: to the extent that a second Tempo TPF8 has been purchased to replace the 12-row for this year's drilling campaign. Output increased dramatically. "We almost doubled drilling speed and went from 60 – 70

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Tillage Summer 2016

Medal winners take tillage technology forward

Among the gold and silver medal winners in the DLG awards for innovation handed out at Agritechnica last November were a number with direct and indirect implications for cultivations and crop establishment. Martin Rickatson reports.



Fendt's Grip Assistant is designed to maximise drawbar power by taking into account not just tyre pressures but weights fitted and ground speed.

Not only can Agritechnica safely lay claim to the title of the world's largest and most comprehensive farm equipment exhibition, but its awards scheme is widely acknowledged as more meaningful than many, being based on machines, features and concepts that are not only new, but also innovative.

The organising body sets comprehensive entry and qualification criteria, with products considered for gold medals only if the product concerned incorporates 'crucially

modified functions' which allow a task to be done in a new or improved manner. To win gold, the product must have practical application and an impact on farm and labour management, the environment, safety and energy use. Meanwhile, silver medals are awarded for products which have been developed to improve their process and/or performance – and which are immediately available on the market. Judging is by a panel drawn from a spread of farmers, researchers, scientists and engineers. And at the last event in

November 2015, among the 49 medals they presented to 311 entries were a number conferred on tillage concepts.

Jointly awarded to tractor maker Fendt and tyre maker Mitas, the VarioGrip Pro system for Fendt's largest tractor models, designed to speed up re-inflation of tyres for road travel, received a gold medal. While the technology of variable tyre pressures is not new, the slow speed with which they can be brought back up to road pressures, has until now meant uptake of the idea has been relatively slow. Add to this



A gold medal winner for Fendt and tyre maker Mitas was VarioGrip Pro, which uses a tyre within a tyre to speed up re-inflation before road travel.



TruSet, from John Deere, is claimed to be the first implement control system that controls and calibrates all implement tools from an in-cab ISOBUS terminal.



Väderstad's automatic machine adjustment alters implement settings in real time and relative to the current soil conditions.

the need for high engine rpm to provide the necessary drive power for the compressor while the tractor is stationary, and the system has some significant drawbacks.

The Fendt VarioGrip Pro development uses an additional high-pressure Aircell internal tyre,



Peccot's silver-winning hydraulic folding dual wheel transport system is claimed to be the first of its type.



By hydraulically adjusting the point of draft on its semi-mounted ploughs, Lemken's new system can shift it towards the middle of the tractor's rear axle, altering the side thrust.



Class won silver for its route-optimising software, which computes the optimum route for a machine given the specific geometry of the field.

pressured at 8.0 bar, inside a bespoke and newly-developed but otherwise-conventional Mitas tyre, with the internal unit serving as an accumulator and occupying 30 per cent of total volume. This allows the inflation pressure to be altered very quickly, with the air pumped into



John Deere's TTC AutoLearn detects similar heading sequences automatically, and after detecting that the last sequence was repeated three times, suggests it should be automated.



Lemken's automatic calibration system for pneumatic drills fully adjusts the metering units by calibrating the seed amount and bypass-weighting the seed.

the internal tyre through a simple rotary union which also ensures it cannot escape. The valves involved and the pressure sensors are powered through inductive transmission inside the axle. Dispensing with extra compressors, pressure tanks and control lines, this technology is able to increase the inflation pressure from 0.8 bar to 1.8 within 30 seconds – around ten times faster than usual – by exchanging the pressure directly and without being dependent on engine speed, says Fendt. The result is fast re-inflation, reducing unproductive time spent standing still waiting for the process to be completed. The system will be available on Mitas SFT and 710/70

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Soil compaction

Marion King recently attended a workshop organised by the Smart Agri Systems Platform to learn about soil compaction and ways of managing it.

Concern about soil compaction is growing and can be associated with field operations that are often carried out when soils are wet and more susceptible to compaction. Heavy equipment and tillage implements can damage the soil structure. And, the structure of soil is important because it determines whether it can hold and conduct water, nutrients and air, which is essential for plant root activity.

What is compaction?

Compaction occurs when soil particles are pressed together, reducing pore space and reducing water infiltration and drainage which means roots have to exert a greater force to penetrate the compacted layer.

There are natural and man-made forces that compact soils.

Pressure on soil and weight of machines is a major factor. Pressure dominates effects in topsoil and weight dominates subsoil. The impact of rainfall is a natural cause of compaction and can be seen as a soil crust that may stop seedlings getting through. Tillage operations such as continuous moldboard plowing or disking at the same depth causes serious compacted layers just below the depth of tillage. But the major cause without a doubt is wheel traffic. Tractor weights have increased dramatically since the 1940s and this is of particular concern during spring planting as it's often done before the soil has had time to dry out enough to support the equipment.

Compaction makes soil management more difficult and costly so what can we do about

it? Tim's advice is to try and avoid wet soils. Look at maintaining and consider introducing new drainage systems and add as much organic matter as possible to the soil.

Tyre and soil interface

The main interface between vehicles and soils is also very important. Tires and tracks result in similar surface compaction if the tires are inflated properly. Contact pressure in the main determines the potential for compaction in the plough layer, while total axle load determines the potential for subsoil compaction. It's crucial to learn the principles of tyre pressures and a tyre data book that the majority of tyre manufacturers

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Identifying opportunities for direct drilling

Hanslope series clays mean the suitability for direct drilling of Martin Jenkins Farming's land varies by season to season. But the business uses just one drill and one surface cultivator to switch between min- and no-til, discovers Martin Rickatson.



Cambridgeshire has a reputation as one of the worst counties for blackgrass. Heavy soils, drainage challenges and break crop issues such as flea beetle control in oilseed rape make it particularly difficult to strike a balance between holding out for a good weed flush ahead of winter crops, and finding that land has become too wet to work on as the autumn progresses, creating herbicide application difficulties into the bargain.

Since Martin Jenkins came to run the family farm at Boxworth, Cambs, a decade ago, ploughing hasn't played a part in cultivations, the business having used a non-inversion system using a Vaderstad TopDown cultivator and Flexus press to create a weed chit, followed by a power harrow and an 8m Sulky FWA disc drill. But significant soil disturbance created meant blackgrass continued to emerge for a sustained period each year among autumn-sown crops.

A visit to Bourne, Lincs, based no-til farmer Tony Reynolds

convinced Mr. Jenkins that moving the minimum amount of soil when establishing a crop was key to improving both soil structure and blackgrass control, particularly as the two are closely linked in that poorly structured soils tend to result in the high moisture environment beneficial to blackgrass. But given his predominance of heavy clay, he was uncertain a complete switch to direct drilling would work in the immediate term – or indeed every season.

"In a good year with a dry

summer, our Hanslope series clays will restructure to a great extent of their own accord," says Mr. Jenkins, who oversees a total of 1,160ha (2,900ac).

"But those have been in short supply recently, and there's still a need as we improve some of our less-forgiving soils for regular deep loosening, while disturbing the surface as little as possible. I've never run a cultivator drill, and I'm not keen on tine-type strip-til drills – I think both move too much soil.

"I didn't want to risk trying to

force one system to fit the whole acreage, and felt that while some of our land would be fairly immediately suited to direct drilling, other areas would take more time to restructure. I want to direct drill as much as possible, but where it's necessary to adapt to the soil type and correct the structure, I also want a drill which will work into moved ground, as part of a system that's adaptable according to soil type, moisture and blackgrass levels."

Back home, Mr. Jenkins' proximity to ADAS Boxworth and

NIAB TAG's HQ at Cambridge means he is rarely short of parties seeking land for trials, and in order to further assess the potential benefits of direct drilling on his own land, he agreed to host a NIAB TAG multi-year direct drilling experiment, beginning in 2013-14, to gauge the effects on blackgrass establishment of soil movement. This saw the research firm using a John Deere 750A single disc drill to sow wheat plots following a variety of different cultivation regimes, varying from full pre-cultivation and soil

full pre-cultivation and soil



Given his predominance of heavy clay, Mr Jenkins was uncertain a complete switch to direct drilling would work in the immediate term – or indeed every season.



The John Deere single disc coupler design, with a seven degree angle on a 457mm disc, is rated for creating minimal soil disturbance. Gutter closing wheels have been retrofitted.



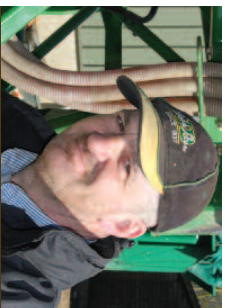
With close-spaced, 320mm discs, a 12m Kelly harrow is used to redistribute chaff and create a shallow weed flush tith pulled at 27-28km/hr by a dualled 375hp John Deere 9320 artic.

loosening through shallow surface cultivation only to no pre-treatment before direct drilling. Early results suggested a strong correlation between soil movement at drilling and blackgrass establishment and competition, says Mr Jenkins.

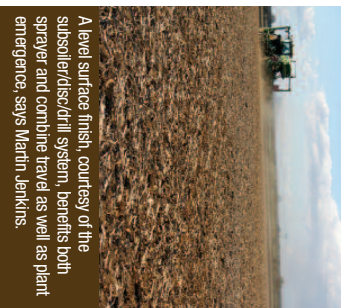
"We were also able to use the drill to establish some of our own commercial crops in spring 2014, both directly and, where it was necessary, onto land which had been cultivated to restructure it. The 750A's disc coulers did a

good job of penetrating the ground and placing the seed at the required depth, but at the same time with impressively minimal soil disturbance. When compared to the Sulky, the drill also provided better protection of the germinating seed to pre-emergence herbicide, especially on land that had slumped after heavy rain."

The success of the trial led to Mr Jenkins purchasing a 4m 750A for spring 2013, joined by a 12m Weaving/Kelly stubble disc, to create a shallow tith and encourage a pre-drilling weed flush. Its secondary role is to redistribute chaff – all straw is sold, as there is a good local market. P and K indices are generally high, and baling removes slug-harboring straw and aids blackgrass seed removal, while combine fuel use



The 750A needs more seed capacity, a better metering system on the 6m, easier inner drill frame access and a true 6m working width on the 6m model, suggests Paul Downie.



A level surface finish, courtesy of the subsoiler/disc/drill system, benefits both sprayer and combine travel as well as plant emergence, says Martin Jenkins.

is 70% of that when chopping, calculates Mr Jenkins.

With its close-spaced, 320mm discs, the main role of the Kelly, though, is to create a shallow tith for creating a pre-drilling weed flush. Aside from a pair of subsoilers to aid soil restructuring where necessary, this then formed the sum total of the crop

establishment fleet, with the farm's other cultivation equipment sold. The 8m Sulky drill was retained in the short term, though, to give the farm another option should it be required.

"The 4m 750A was bought to match the 8m Sulky which I planned to gradually phase out. But good early results with the Deere convinced me it was a drill which would work well on both moved and unmoved ground, which led me to sell the Sulky

earlier than planned and add a second 750A, a 6m model. John Deere don't offer an 8m 750A, and I didn't want to drop total drill width, while with a team of four we have sufficient staff to run a pair of drills supported by one man on the seed

trailer/telehandler, and the ability to do 400ac (160ha) or so of contract drilling in autumn and the same in spring. We delay drilling first wheats until late September and seconds until early October to deal with blackgrass, so need plenty of capacity to get them in quickly."

Following a pass with the Kelly harrow, around three-quarters of the farm is subsoiled at 10-12in each year, a team of three subsoilers being available. On a crop and seasonal basis, where soil is deemed sufficiently well-structured the remaining 25% is direct-drilled without any soil

loosening, and Mr Jenkins hopes to see this proportion increase as soil structures improve – although a dry summer or two is on the wish list to crack the ground and speed the process.

"Working deep with the subsoiler while taking care not to disturb the upper profile leaves a more level surface than shallow loosening," maintains Mr Jenkins. "As we progress with trying to reduce cultivations, that's

important – it's already had a noticeable effect on combine header and sprayer boom stability. We then make a second pass with the Kelly harrow, which again aids soil levelling as well as weed chitting. Our own trials have shown four times more grassweed germination from a single Kelly pass than none at all, and six times as much from a double pass. Our fields aren't massive, averaging 45-50 acres (18-20ha), but working at 27-

28km/hr behind a dualled 375hp John Deere 9320 artic, we can cover 30ac (12ha) an hour, at a shallow angle to the tannines. Unless the heavier land is still a little rough, in which case we roll, that's all we do before spraying off and drilling."

The 6m drill is drawn by a 210hp John Deere 6210R, which farm manager Paul Downie reckons is just man enough on the heavy if flat land, while the 4m model works with a 180hp 7550 from the same maker. They are used for drilling all the farm's crops, including wheat, winter and spring barley, oilseed rape – although that's now been dropped from the rotation – and winter and spring beans, added to the farm's cropping this year to replace failed OSR.

"The single disc couler design, with a seven degree angle on a 457mm disc, is excellent, creating minimal soil disturbance,

and the hydraulic pressure system keeps seeding depth accurate and even," reckons Mr Downie.

"The 4m drill's discs were replaced after two seasons, although that machine did a lot of work before we got the second drill to pair with it last year.

"We've retrofitted Gutter closing wheels, which work well filling the slot with soil in dry clay, though they aren't so good in wetter soil. But if the top inch or so of soil is dry, then we can go, when others might still be in the shed. And we can push on until days get too wet in late autumn, then leave remaining ground for spring drilling."

After three seasons working with 750A drills, he has identified a few areas for improvement.

"There isn't enough seed capacity – the 1.5t hopper on both machines id be longer. The 6m

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The three stagger Genius mulch cultivator offers a wide scope of application from shallow stubble tillage right through to top soil deep loosening. The tine spacing of 27 cm ensures the intensive incorporation of organic matter; the frame height of 80 cm and the layout of the lines providing the optimum passage of soil and trash for a blockage-free operation. Mounting to the tractor is via Cat. III lower link pins but, by simply reversing the pin, the wider Cat. I/II can be also utilised for bigger tractors. Two mounting heights for the lower links and top link are available to ensure an optimum matching to the tractor.

Optimised release force curve

The system is designed in such a way that, in order to protect the entire plough, the release force is progressively reduced as the lift height increases when negotiating obstacles. When the obstacle is passed the release force again is increased, ensuring the quick and reliable pulling of the plough body back into the soil. The shock-free and elastic release of the stone protection system protects both the plough and the tractor.

Amazone Cayron 200VS-100: the new stone release plough



Following on from the successful introduction of the Cayron shear bolt ploughs at Cereals 2014, the new hydraulic auto-reset plough will make its debut this year at Chrislall Grange.

The 240 hp headstock, 100 cm point to point and 83 cm underbeam clearance are brought over from the standard plough to maintain its ability to cope with excessive amounts of surface trash, as is its unique

feature of pulling true at any furrow width. Still available in both 5 & 6 furrows, the auto-reset system is based on a hydraulic system that enables the central release force to be adjusted from the tractor cab. In this way the plough is operated at the lowest possible release force relevant for that location, resulting in the maximum structural protection and effectively preventing the ploughing up of stones.

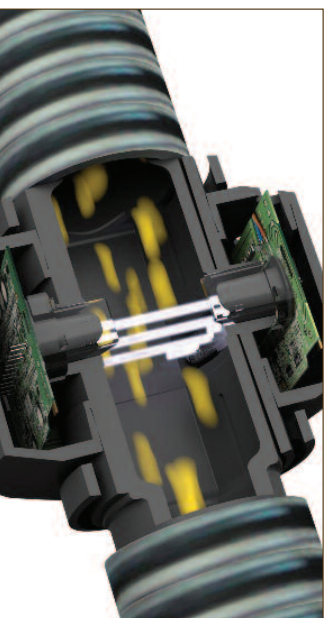
Lighter, Less Maintenance, Simple Adjustment & Unique Performance with New NG-H Evo Power Harrow



Kverneland is introducing the new NG-H Evo rigid power harrow. It is an updated and evolved version of the existing NG-H which has been improved following demands and requirements of professional farmers. Starting from the well known and reliable NG-H models, designers have been able to reduce the weight (by 65kg on

a comparable 3m NG-H) and increase strength of the horizontal transmission whilst keeping the interchangeability of the main components and integrations with all Kverneland seeders. Simpler adjustments together with excellent field performance will make the new mid sized, NG-H Evo series power harrow a worldwide success.

Väderstad breaking new ground with SeedEye



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In the next edition we look at Maize in the arable rotation.

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- Engage discs, tines, levelling discs and roller for one-pass cultivation.
- Discs only with roller for surface cultivation.
- Tines only and roller for sub-soiling function.
- Roller-free for non-consolidation work.

KUHN's Performer deep tine disc cultivator offers an effective single-pass solution as well as the versatility of disc-only or tine-only functionality to suit individual requirements.

Available in 4 and 5 metre working widths for tractor power up to 500hp in its wider format, the Performer comprises twin independent disc gangs (10cm working depth), four rows of tines (35cm working depth), levelling discs and the new 700mm diameter HD-Liner roller.

Robust in construction, the Performer is designed for the toughest conditions with 800-1,200kg non-stop hydraulic tine safety and 225kg/m pressure on its roller. The machine is fully hydraulically adjustable and folds to a transport width of 3 metres.

www.kuhn.co.uk



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