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* Cost of establishment over 1250 acres using the complete CLAYDON System: £25,500 compared to min till costing £56,000 or ploughing costing £74,000. Time saving compares the Claydon System to a Plough System. Costings take account of machinery running costs, diesel, labour, wearing metal and depreciation combined. All figures are estimations and may vary according to soil type, conditions, settings and implements used.

Time to make amends



“ Passing through the stubble when weeds are at the single-leaf stage will hoe them out. ”

There's often very little time between the combine leaving the field and the drill entering. CPM explores how the Claydon system makes best use of this limited opportunity to prepare the fields for the following crop.

By Mick Roberts

All farms set out with good intentions to make the most of a field's out-of-crop time. But time itself is often a precious commodity between harvest and drilling, and with conflicting priorities it's easy to overlook vital jobs that can pay huge dividends during the rest of the year.

And it's time that's vaunted as one of the main reasons for the move away from more traditional cultivation systems. Proponents of min-till regimes and, increasingly, direct drilling straight into stubbles often cite huge savings. Time saved allows the chance to create stale seedbeds, treat weeds and pests, as well as resolve any drainage issues.

There are additional benefits, argue direct drillers. Leaving the soil unturned keeps the seedbed friable, so

why turn the goodness back into the soil, drag up fresh weed seeds and lose moisture in the process? Moreover, cultivations take time and a huge amount of fuel — often forcing a seedbed out of soil, which if left alone, was probably perfectly good in the first place.

Seedlings on the surface

When it comes to weed control, a straw harrow can be used to get weed and volunteer seedlings on the surface to grow so they can be controlled by spraying or the cultivation itself. Conversely, studies have shown that incorporating the seeds into the soil at various depths provides an uneven germination that can haunt growers later in the year.

These are all the main reasons why Jeff Claydon made the decision to switch to direct drilling on the family's heavy clay soil back in 2002.

Watching a neighbour, who was also struggling to sow a crop of oilseed rape, turn to simply subsoiling and sowing the seed, got him thinking. But once the subsoiler left the field, he noticed it was left so bumpy it would be virtually impossible to spread fertiliser and spray accurately.

That led to him to develop the drill that carries the family's name. "We saw the benefits of direct drilling but also saw the failures in the '70s where the drills didn't do enough preparatory work to the soil and allowed seeds to become waterlogged and unable to develop roots in compacted soils. This is why Claydon drills stimulate both the seeding and rooting zones, not just where the seed is placed," he explains.

At the time Jeff Claydon introduced the drill to his family farm, he did his costings and the results were remarkable: in one year the farm turned around from making a loss to a profit, as it has done every year since. Every season, the 480ha farm saves around £80,000 and cuts establishment time by 1350 hours. As well as saving costs, yields of both OSR and wheat have also increased steadily, he says.

To this day, the farm's establishment system remains almost unchanged. A good chop on the combine with a good, even straw and chaff spread is followed by a pass with a straw harrow to make a shallow tilth in which to ▶

Claydon drills stimulate both the seeding and rooting zones, not just where the seed is placed.





Jeff Claydon (left) first developed the drill, while his son, Spencer (right), is now the family firm's international development director.

▶ germinate weed seeds and volunteers. This is then harrowed again, up to two or three times, to kill the weeds and generate another flush. Before drilling, the seedbed is sprayed with glyphosate.

The only significant change to the original direct-drilling system is that the farm now uses a straw harrow manufactured and sold under the same Claydon name. "We wanted to be able to offer an affordable solution that suited the UK and European farmer and their field sizes," explains Spencer Claydon, the firm's international development director.

"Straw harrowing is a vital part of the Claydon system. While it adds another operation, it can be carried out quickly — up to 25km/h on a lightweight tractor — with fuel consumption as low as 1 l/ha, making it as cheap to carry out as a pass with the sprayer. But it produces many benefits including cultural control of weeds and pests."

The Claydon Straw Harrow comes in 3m, 7.5m and 15m working widths with power requirements of 80-180hp and produces work rates of 4ha/hr, 8ha/hr and 16ha/hr, respectively. It uses aggressive, double tines,

and there's a choice of standard 14mm thick tines or ultra-aggressive 16mm tungsten carbide tipped tines for soils that cap easily. These are arranged in five banks to provide good clearance for trash, but still with the tines on the soil at 60mm spacings.

It's possible to adjust the tine angle hydraulically and this alters the aggressiveness of their action. Ideally, says Spencer Claydon, you want to set this so it carries just enough straw and stubble to 'boil' along the bottom of the tines and this'll break it up.

First cultivation

"With our system, the first cultivation is actually the combine, which is best set to chop and spread the straw evenly. But even the greatest machines and operators can leave small heaps and windrows. Raking at 30° to the tramlines will spread the lumps and distribute the straw evenly across the field," he explains.

In the process, the Straw Harrow will kill any slugs

Double tines provide plenty of clearance but ground engage every 60mm to move all the soil and straw.



New lower disturbance options are available in place of the leading tine, including disc openers designed for direct drilling into cover crops.

present on the surface, destroy their habitat and also expose eggs to the sunlight where they dry out and become unviable, he adds. In the Claydons' own experience, a wheat crop in an average year, sown into straw-raked OSR stubble, requires only one half dose of slug pellets, "although growers should set slug traps and reapply pellets if necessary."

At the same time, the Straw Rake's aggressive 'double' tines create a fine seedbed in the top 20mm, helping to create ideal conditions to encourage weeds and volunteers to germinate quickly, points out Spencer Claydon. "Passing through the stubble when weeds and cotyledon plants, such as OSR volunteers, are at the single-leaf stage will hoe them out. This not only kills the plants, but also reduces the food source for slugs."

This is why it's important to use the Straw Harrow regularly, he adds. "We also recommend spraying with glyphosate before drilling to get the best possible weed control, although there are organic and traditional farmers who use cultural controls instead." ■

Preventing blackgrass becoming a problem

John Walker's taking a precautionary approach to blackgrass across the 480ha of arable crops he farms near Burford in Oxon. "I do have a handle on it at the moment, but I'm keen to ensure it doesn't become a big problem," he says.

So much so he's dropped second wheat in favour of spring barley in his rotation on the mainly Cotswold brash soils he farms from his base at Flatts Farm, Swinbrook. This now comprises wheat, oilseed rape, winter barley, winter beans and now spring barley. This he says is performing quite well, providing more time to control blackgrass in the stubble.

Two years ago, he moved to using the Claydon system, using a 7.5m Straw Harrow before sowing with a 4m wide Hybrid drill. Most of the straw is baled before he moves into the stubbles with Straw Harrow, aiming to get in as many passes as possible before spraying off with glyphosate ahead of drilling. The implement is used on a John Deere 7250 that works at about 20-25km/h producing an output of about 8ha/hr.

"We have the time now to get over quickly and get a couple of passes in before spraying off and

drilling — more depending on the weather and the cropping," he adds.

"If the baler can come in quickly enough to take off the straw, the harrow does a better job. If not, it still does do a good job of levelling out the straw clumps.

"We're not plagued with slugs, but I noticed it does kill the ones on the surface and by distributing the straw it disturbs the eggs and any that remain."

Previously he used min-till establishment with a deeper cultivator pass to create a seedbed, before sowing with a cultivator drill. "Initially we were putting OSR in behind the TopDown and I thought that on our land we could probably put the wheat in that way, too. But the Claydon drill seemed to be the easier option, which allowed us to drill both crops properly.

"Although it required a big leap of faith, it was saving money and if we didn't get on with direct drilling, I thought I could always use it like a normal drill. While we did have a 5m wide Vibroflex for making a stale seedbed, Claydon recommended the Straw Harrow would suit our soils. It's key to getting the best from the system and I'm pleased



John Walker switched to drilling with a 4m Hybrid two years ago and also uses the Straw Harrow to create stale seedbeds.

with how it's working," he comments.

He's been using the system for the past two autumns and this spring, and aside from the considerable cost savings, yields haven't gone up or down yet — a realistic average on the wheat is 8.75t/ha, while the OSR is currently averaging about 3.75t/ha.

"It's early days, and it's difficult to tell any improvements with the weather having its part to play. But I have noticed a better establishment, and we're maintaining our control on blackgrass, so that's progress in itself," he says.

Taking cover out of crop

Cover crops have come in as a useful tool in the out-of-crop period to tackle blackgrass and build soil structure for one Northants grower. *CPM* visits to find out how they fit into the picture.

By Tom Allen-Stevens

“There was a good root mass that was really well anchored and which drew the moisture out of the soil.”

As Toby Saunders strides through his spring beans, there's something different he's noticed about the crop this year.

“The ground walks much better,” he says. “I’m sure that’s down to the fibrous roots adding to the soil structure and putting it in good heart. I’ll be disappointed if that doesn’t translate into yield.”

But he’s not referring to the roots of the bean crop itself. In between the rows, you can still make out the withered black oat plants of the cover crop planted in the previous autumn, and it’s this that’s credited with improving the soil structure.

“I was worried when we sprayed it off with glyphosate, we might not hit all the blackgrass and a lot would come through in the crop. But I’ve been very pleased with the results.”

It’s the first year that Toby Saunders has tried cover crops on the 800ha of combinable crops he grows, based at Teeton Grange Farm near Northampton. With a soil type that ranges from light red ironstone to heavy clay — “nasty stuff that won’t give you a second chance if you don’t get it right first time” — the rotation’s changed in recent years to bring in spring beans.

“We used to have just oilseed rape and wheat, but we changed, mainly because of the dreaded blackgrass and because OSR doesn’t stack up so well these days.” So 53ha of spring beans were brought in last year, and that’s

been stepped up to cover 20% of the cropped area for 2015 harvest.

“Half of the farm is cropped with wheat, and we aim to grow all first wheats for the premium markets — we’re well placed to access those,” notes Toby Saunders. Skyfall and Cordiale find a home with the ADM mill at Wellingborough, while JB Diego is destined for Weetabix. HOLL OSR lines V316 OL and V295 OL partner Campus and Harper, while Fanfare and Vertigo spring beans have come in this year, alongside Fuego.

Change in approach

But if the cropping’s shifted, that’s nothing compared with the focus that’s now placed on what happens between the crops. “We bought our first Claydon SR drill, and then traded it in for the 4.8m Hybrid about five or six years ago, once we were confident the system was working. We’ve developed it over the years, and it’s really changed how we approach management in between crops.”

That starts before the combine is even brought out of the shed, points out Toby Saunders. “Most of the wheat tends to get a pre-harvest glyphosate — that really helps to speed up the harvest. Modern fungicides do a great job at keeping the crop green, but you need to kill it off before harvest starts.”

This is brought in with a Claas Lexion 760. While much of the straw is currently baled, the plan is to chop more of it to help maintain soil organic matter levels. “It’s



The fibrous roots of the cover crop are adding to the soil structure and putting it in good heart.

important to have a fine chop to get the best outcome from the Claydon system, and we get good results with the chopper on the Lexion,” he says.

Wheat and OSR stubbles will then receive a pass with a 7.5m Claydon Straw Harrow, pulled at an angle to the tramlines. “We’ve learned it does the best job when it’s dry. The harrow creates a bit of tilth to encourage the blackgrass to germinate, as well as disrupting the slugs and exposing their eggs so they dry out. You want to go at a fair speed to break up the trash and level it out — about as fast as you can sit on the seat.”

He covers up to 100ha/day, with one pass in front of OSR, while aiming for three in front of the wheats. “As soon as you see the cotyledons come through you want to hit it again. That’s usually a gap of about two weeks, but it could be as little as a week if there’s been plenty of damp weather.”

When the decision is taken to drill, glyphosate is



Drilled at 25kg/ha, the black oat, berseem clover and vetch mix is designed to encourage the blackgrass to grow.



So last autumn, some of the land destined for spring beans was ploughed while they drilled cover crops on the rest, straight into the wheat stubble with the Hybrid on 9 Sept.

“We went for an Agrovista mix of black oats, berseem clover and vetches. The main thing is to treat it as a crop, so while it gets going well on kinder land, where we’d put it into heavier soils, we applied 150kg/ha of diammonium phosphate (DAP) to help it along.”

Encouraged to grow

Drilled at 25kg/ha, rather than trying to suppress the blackgrass, the mix is designed to encourage it to grow.

“In places there were some very heavy populations of blackgrass, but the most noticeable aspect was the rooting of the black oats — there was a good root mass that was really well anchored and which drew the moisture out of the soil,” he notes.

“But the ploughed land slumped and we had a massive flush of broadleaf weeds after the beans emerged, which we didn’t have where we’d direct drilled after cover crops. Here we applied glyphosate shortly before drilling, then went straight in with the Hybrid — it just sliced into the soil that was noticeably more friable.”

He dismisses concerns that the cover crop may have held back some blackgrass from germinating in the autumn, pointing out the benefits to crop establishment the better soil structure brings. “But there’s a fine line between a seed rate and mixture that bring the blackgrass on and a crop cover that smothers it,” he admits.

“It’s early days with cover crops and we’re still learning. We know they’re doing a good job, but the mix probably needs fine-tuning — I’m not sure about the berseem clover, for instance. But our direct-drilling system in itself is saving us about 30,000 litres/year of fuel, and cover crops are certainly no detriment. As we learn more, I can see there’s great potential for them as an increasingly important tool in between crops.” ■



While surface-soil disturbance is the main aim with the harrow, Toby Saunders aims to minimise this with the drill.

applied as soon as 24 hours beforehand. “We don’t believe in late drilling,” states Toby Saunders. “The Claydon system works best if you establish your crops in the right conditions, so we aim to be done before the second week of Oct. If the weather turns against us, it’s best to leave the drilling and wait until spring.”

While surface-soil disturbance is the main aim with the harrow, it’s very much minimised with the drill. “The temptation is to treat drilling as a cultivation, but you shouldn’t bury the tines too deep as this will just bring up clods. We’ve found that if you judge it right, you get brilliant seed-to-soil contact and even emergence across both heavy and light land.”

OSR is drilled to a depth of about 1cm, with the leading tine set to 15cm. With wheat, the tine pulls through at a 10cm depth, with the seed placed at around 3-4cm. Following up with the rolls is then a critical step.

“While we’re aiming to take out as much blackgrass as we can before the drill goes in, it’s crucial to get the crop drilled in the right conditions, and then we throw the kitchen sink at it (see panel). To give the pre-emergence herbicide the best chance, we aim for a fine, firm seedbed.” This is achieved with an 8m set of Cousins rolls, fitted with both a slug-pellet and Avadex applicator.

They’ve followed a different approach with the beans, however. Last year, these were direct drilled into land left fallow until spring. “We found the heavier ground had gone a bit sad and took a long time to dry out. It was quite tight when we came to drill it.”

Farm Facts

CR Saunders and partners, Teeton Grange Farm, Northampton

- **Arable area:** 800ha
- **Cropping:** Winter wheat, winter oilseed rape, spring beans
- **Staff:** one full time with extra help at harvest
- **Harvester:** Claas Lexion 760 with a 9m cut
- **Mainline tractors:** John Deere 7280R; 2x JD 7530
- **Drill:** 4.8m Claydon Hybrid
- **Cultivation:** 7.5m Claydon Straw Harrow; 3m McConnel Shakaerator; 5m Opico HE-VA Disc Roller; 2x 4m Kuhn rotary tillers; 6f Vari-Width Kverneland plough
- **Rolls:** 8m Cousins rolls with slug pellet and Avadex applicators
- **Sprayer:** Bateman RB26 3000-litre with 24m boom
- **Spreader:** Kuhn Axis 40.1 with 3000-litre hopper

Optimum soil condition target for pre-em efficacy

The battle against blackgrass is the main focus for growers in the area, reports Indigro agronomist Roger Davis. “We’re also looking to improve soil structure and organic matter levels, so we’ve developed some on-farm trials to explore how best to use cover crops.”

He believes that while the black oats encourage the blackgrass to germinate in the autumn, their roots have an allelopathic effect that suppresses further germination in the following spring crop.

“The result is a much cleaner bean crop than you’d get otherwise, although we’re looking closely at when best to spray off the cover crop as there’s evidence it can suppress a following cereal. It’s important to apply a robust rate of glyphosate, tailored to the cover you’re looking to knock down,” he says.

Minimum disturbance in the spring is also the key to best results, he reckons. “Toby’s drill works

well in that respect, but otherwise a direct disc drill is ideal. You make the seedbed with the cover crop, then spray it off and direct drill.”

A pre-emergence herbicide of clomazone, linuron and pendimethalin is applied to the beans, mixed with glyphosate to remove anything that may have emerged since the cover was sprayed off.

Elsewhere in the rotation, Avadex (tri-alleate) is a key tool. “What Toby achieves well is a fine, firm seedbed, ready for the pre-em. In the winter wheat, we’re currently getting really good results using flufenacet mixed with pendimethalin and/or diflufenican, then other pre-em herbicides are swapped in and out to ensure a broad range of mode of action.”

For oilseed rape, Avadex is applied off-label, but otherwise pre-em weed control can rely solely on the pre-harvest glyphosate in the preceding wheat. “This ensures a clean stubble. Again the minimum



Roger Davis believes that black oats roots have an allelopathic effect that suppresses blackgrass germination in the following spring crop.

disturbance from the Claydon system keeps it that way. So we tend not to need metazachlor and any weeds germinate from the surface, and are taken out by aminopyralid plus propyzamide later on.”