



“ We are a very innovative sector when it comes to machinery. ”

# One system many uses

## Regenerative kit

Regenerative agriculture isn't far from many lips of late, but really knowing what's the best pieces of kit can be a minefield. *CPM* attended a CHAP webinar where experts discussed some of the top tools to use in a regenerative system.

*Melanie Jenkins*

Soil health is the driving force behind regenerative agriculture. The practices advocated as part of a regenerative system are providing farmers with the means to focus on soil health in ways they may not have done previously. It's also opening the door to new practices, management and equipment.

The five core principles underpinning regen systems are minimising soil disturbance, maximising crop diversity, keeping cover all year round, maintaining living roots and incorporating livestock into

the rotation — the means to improve soil are vast and varied. At the heart of all these principles is healthy soil, said Prof Jane Rickson of Cranfield University, speaking at a webinar hosted by CHAP last December.

And there is now a host of equipment and machinery targeted at specific jobs within a regenerative system, often doing things that conventional kit can't. But knowing what's what and whether it's worth investing valuable farm capital in isn't always a simple task.

### Beyond conservation

The concept of soil conservation stems back to the US when in the 1930s Roosevelt famously said: "The nations that destroys its soils, destroys itself." His speech was prompted by the severe weather events known as 'the Dust Bowl' and it was after this that the concept of soil conservation was born — preserving, restoring and protecting the soil, explained Jane.

For a period, soil conservation was considered the answer to decades of lost soil vitality, she said, but that just isn't enough anymore.

"We need to move on from just conserving soil, it's got to be more than

that. Why? Because in some places our soils are in a really bad state and are degraded physically, chemically and biologically.

"And that in turn means they are no longer able to function properly; cycling nutrients, infiltrating water or storing carbon. We shouldn't just conserve soils as they are, we have to regenerate them back to their natural state as much as



*Healthy soil is at the heart of regenerative farming, says Jane Rickson.*





Healthy soils are better able to sequester carbon, support biodiversity and cycle nutrients.

possible." So regenerative agriculture was born.

Jane pointed out that soils are a finite resource, yet we're asking more from them. As well as producing our food, healthy soils can be used as carbon sinks, sequestering atmospheric carbon to reduce global warming and climate change, she explained.

This is why changing management practices can be so fundamental to improving soil health and we already know how to do this, she said. Be it through reduced tillage or fewer field operations, increasing organic matter (OM), introducing grass leys, extending rotations, incorporate agri-silvopasture, buffer strips and woodlands.

"Then there's things like soil management practices; cover cropping, extending the rotation, intercropping, bringing more plant cover into our farming systems that will take CO<sub>2</sub> out of the atmosphere and put carbon back into soils to make them healthier.

"We know these practices and we know they can do good, can regenerate our soils and underpin regenerative agriculture," added Jane.

Knowing about regenerative practices is one thing, but often there's a challenge in integrating them to farming systems, said Dr Dave George of the University of Newcastle.

"The challenges tend to exacerbate themselves as you go north in the country, where days are shorter and wetter and soils tend to be heavier. So direct drilling can be difficult."

Jane pointed out that it's a case of uncertainty as to what works where, when, why or how. "We know these practices don't work everywhere or in every year. We don't know enough about the mechanisms of why these practice work

or not. One size won't fit all.

"There's a lot of variability out there. Not all soils are suited to min-till or to cover cropping, the weather varies from year to year, topography is different and even the machinery available in each barn is different," said Jane.

"There's a poor signal to noise ratio. We don't have the confidence in using some of these practices."

## Soil health

But using the latest innovative tools and machinery can help make the principles of regen ag an on-farm reality. Work at Cranfield has shown that different tillage systems affect soil health indicators, such as SOC, microbial biomass and earthworm count very differently, she said.

"We are a very innovative sector when ►



Especially suited to organic systems, the CombeCut is a mechanical weeder which can be attached to a tractor.

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## Colours of the Cameleon

Farm manager of the MacGregor Farming Partnership at Mill Farm in Norfolk, Leigh Nobes, oversees 450ha, which is run organically for the large part. He introduced the System Cameleon drill in 2018 to achieve greater weed control.

As well as combinable crops, he keeps a commercial suckler herd of grass-fed Shorthorn cattle and pedigree Poll Dorset sheep.

"I use them to provide added fertility and biodiversity," he explained.

Working on sandy loams, he operates a seven-year rotation of wheat, barley, oilseed rape and spring beans, with 60ha run conventionally to compare best practice and to provide a benchmark. "I try to only do min-till and no-till, but I will use the plough if I need to plough in a clover ley, as it can't be done any other way organically.

"We try and farm with nature and have a strong bias towards conservation and sustainability."

To get on top of weeds on the organic part of the farm, he invested in the Cameleon drill, with the help of a 40% Leader grant. Unlike his previous drill, he can inter-row with the Cameleon and the main driver behind the change was that it opened a massive window for weed control.

"We can also under-sow in spring crops. I do

this in the last pass with the inter-row hoe and use it to establish the clover ley for the following year." This can gain him an extra three months he wouldn't have had previously, he added.

He has also used it to direct drill cover crops. "Once the crop is off, we can put the Cameleon in, set so that it can go between the rows of stubble, so we don't disturb the residue. We have had very good results from doing this as it's very low disturbance and it's a cheap way of establishing cover crops."

Another benefit of the drill is its low horsepower requirement; 150hp can pull the 6m drill and doing so uses very little diesel, according to Leigh.

The other main advantages include no-till on his conventional land. "We haven't used a plough on our conventional land in years."

In 2021, he decided to try something new, going from 250mm row spacings with a single row, to 333mm row spacings with a 100mm band sown — so there's a wider band of cereal with more space to tiller. "You are inter-row hoeing a bigger percentage of your field and still getting the same seeds/m<sup>2</sup>."

The only niggles he has had have involved crop height when inter-row hoeing, which can interfere with the guiding camera that adjusts



*Leigh Nobes has had numerous benefits from investing in a Cameleon, including better weed control.*

the hoe frame. "If the crop is tall, the camera struggles to pick up and it doesn't like wet and sticky conditions."

If Leigh had known the benefits of widening the row spacings before buying the Cameleon, he would probably have started drilling on wider widths from the beginning. "The autumn crops have come up really well and look strong this year with a lot of vigour, and more room for trash to follow around the coulters.

"I know it's a big investment, but it will save a lot of hassle in the long run — so it's definitely worthwhile."

## Lessons from the field

Over the past four years, Newcastle University Farms has been transitioning to a more regenerative farming system, and numerous lessons have been learnt along the way.

Covering 800ha, there is a 300 head autumn and spring block calving dairy herd, an indoor pig unit and arable land run for teaching, research and as a commercial enterprise.

Adjusting to a more regenerative approach was part of a business restructure to put the farms into a better place for the future, make the business more resilient and to deliver better teaching and research, explained farms director, James Rickson.

"We wanted to minimise soil disturbance, get a direct drill, use cover and catch crops, maintain a living soil, diversify cropping, integrate livestock and adapt our farming system to the local environment."

However, the changes have not been without their challenges. "The challenge has been adapting the system to our environment," said James. "Knowing what worked best and how the techniques we wanted to implement would work on our farms."

The weather has also been one of the biggest

challenges. "This is probably because our soils weren't in the right state and we didn't have the right kit or way or thinking," he explained. "And soil and weather are tied together."

He also thinks they went too hard and fast with direct drilling. "Our soil wasn't ready for it."

And though they haven't slowed their pace of transition, they've become more pragmatic. "We haven't done intensive cultivations but have tickled the surface to get rid of trash and to level out fields," said James.

Timeliness has been another obstacle. "We have really worked on being able to do cultivations when we have the weather. Our timelines for operations in the north are so tight, we needed to change our timings."

They have also invested heavily in business resilience; be that through soil, kit and getting the team on board. "We had to bring the whole team with us, to think in the same way, so our strategy and mission statements are written out for people to understand exactly what we're doing."

The next step is to try to achieve green cover and get a living crop in the soil from one season to the next.



*Using cover cropping in a regenerative system can help improve soil condition and capture carbon.*

James is also trying to get input balances right. "We aren't reducing inputs, but are changing products, timing and what we apply to get the crop what it needs in the right way.

"We want to overlay the system with precision, so we can do things in a way that gives the farms value and provides a baseline and data for research," he says.

"Above all, the system has to be resilient, environmentally and financially. Like for everyone else, the farm has to wash its face and make money."



► it comes to machinery, with a lot of innovation taking place on farms,” added Dave.

So what are some of the tools farmers could look to adopt in regenerative systems? Dave ran through some of the machinery being assessed by Newcastle University farm.

## System Cameleon drill (6m)

This drill does more than just seeding. Though it isn't a strip till drill, it has an inter-row technique which allows it to work between crop rows post-emergence. This allows it to support new field applications, like inter-row fertilisation (seed or crop), companion cropping or living mulches. It can be used to cultivate, distribute or seed between cropping rows, helping to cut machinery costs by combining operations while providing greater precision and a delivery system to support reduced or alternative input use.

## Microcast granular applicator

Designed to dispense granules or nematicides at drilling, the Microcast granular applicator can be added to any drill. Products, ranging from starter fertiliser to microgranules can be delivered through the drill, into the furrow or onto the soil surface.

## Nutristart liquid applicator

Suitable to be used on any drill, this 1000 litre liquid applicator can apply any liquid product at drilling; whether growers are looking to apply starter fertilisers, bio-nutrients, stimulants or biologicals.

## CombeCut

The CombeCut is a mechanical weeder that can be used to prevent weed seed dispersal. Attached to a tractor, it cuts off the flowers and seed heads of weeds. It can be used to destroy thistles, nettles docks and blackgrass, helping to reduce

*The Cameleon has inter-row capabilities that allow it to cultivate and distribute seeds post-emergence.*



herbicide reliance and potentially costs. It can be especially suited to organic systems.

## Avacast spreader

Available in a number of forms, Avacast spreaders can be used to apply Avadex Excel 15G (tri-allylate), a thiocarbamate that forms a chemical barrier once applied to soils to stop weeds growing. However, in a regen farming setting the Avacast may help farmers to establish cover crops in a standing crop.

Though it might be a challenge to integrate regenerative practices on farm, the importance of the world's soils cannot be undervalued, said Dave. As the soil scientist Charles E Kellogg once said: "There can be no life without soil and no soil without life." ■



*Farming is an incredible innovative sector when it comes to machinery, says Dave George.*

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