



Ploughing min-till

Shallow approach

Typically regarded as deep working tools, ploughs can have a part to play in min-till, if specifically designed to operate shallowly. That's the message from two manufacturers when setting out the case for their implements to *CPM*.

By Martin Rickatson

Wide-working, shallow-operating, high-speed, and with a low power requirement — not words usually associated with a plough. Yet speak to the small number of companies who have developed specific shallow-working designs, and they'll point to a number of reasons why these are all characteristics of their implements and thus why they're suited to minimum tillage, particularly on thin soils.

Kverneland was a pioneer in the sector, introducing its Ecomat shallow plough in 2001 following development during the 1990s. Initial uptake, however, was steady rather than spectacular, says the company's plough specialist, Adam Burt.

"If you're growing combinable crops on shallow soils, ploughing down at 200-250mm/8-10in may be unnecessary if

the soil structure is good," he suggests.

"There are farmers on thin ground in particular who may be finding that min-till cultivators aren't burying weed seeds sufficiently, and who want to return to inversion but without the full depth of a traditional plough and its bodies," says Adam.

Speedy turnaround

In addition, he says shallow ploughing also suits some farms with vegetable crops in the rotation who want a quick turnaround after harvest. "Topping and mulching material ahead of an Ecomat pass can provide good incorporation of post-harvest vegetable matter into the top few inches where it can break down more rapidly.

"In many post-cereal cases, a depth of 125-150mm/5-6in is perfectly sufficient for inversion and burial of weed seeds. So for a number of years we worked on a plough and body design that would make this easy and initially launched the Ecomat as a six- to eight-furrow model designed for operating at 15-18cm/6-7in, with the tractor running in the furrow," he explains.

"But tyre technology was evolving rapidly at that time, and while we sold a handful of these in-furrow units, as tractors and tyres got bigger it was a struggle for the latter to fit into the furrow bottom."

In early 2023, the company addressed the issue with the launch of an on-land version of the Ecomat, making tyre size not just less of an issue, but also a distinct advantage in that the furrow bottom isn't compacted.

Operating on-land, compaction can be

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managed by using tractors with much wider tyres using lower pressures than those typically used in-furrow. Like the ▶



Shallow ploughing can particularly suit thin soils and situations where other forms of min-till leave too much unburied residue, says Adam Burt.

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Nick Clark says initial UK interest in shallow ploughs came from the organic sector, but fuel costs and diminishing herbicide options means conventional growers are looking too.

► in-furrow version, it's a fully-mounted unit despite its eight- or ten-furrow configuration, made possible by the smaller, closer-spaced mouldboards with 65cm point-to-point clearance.

For on-road travel, Kverneland incorporates its Trailer Transport Solution, a design whereby the top link is detached for transport and the plough then pivots behind the headstock to allow the plough, supported at the rear by the depth/transport wheel, to be trailed and to track true behind the tractor.

"The principle remains the same," says Adam. "The design is a blend of plough and cultivator, turning over the soil surface without working as deeply as a traditional plough. With shallow bodies pulled at high speed — up to 10km/hr — the Ecomat inverts the top few cm of soil to provide effective mechanical weed control. The faster you travel, the better the results tend to be," he explains.

Because the bodies are smaller and shallow-working, Adam says there's less

pressure on the bodies and the Ecomat requires less power per furrow to pull than a traditional plough, with the sort of 250hp tractor common today on many mid-large arable units being sufficient for a 10-furrow model.

Requirements

"While that model weighs only 2400kg, tractor lift capacity has to be at least 7600kg because of the length of the plough — it uses the same 7m beam and frame as our 7f mounted LO reversible. That's well within the capabilities of most 250hp tractors, though.

"And with a lighter plough working at a shallower depth, it's possible to operate at around 10km/hr. Covering 4.1m in every pass, this means the 10-furrow model can turn over as much as 4ha/hr depending on factors such as field size and condition," says Adam.

"The latest version can work down to 18cm where required, but as shallowly as 6cm with similar standards of inversion. And shallow, high speed, low draft operation means high workrates per hour and per litre of diesel. Correctly adjusted for the conditions, it's possible to achieve 95% inversion at a depth of 9cm, achieving far better results than a one-pass cultivator."

Shallow ploughing works particularly well on thin and light soils, suggests Adam, and short plastic bodies make ideal fitments in such conditions, he says.

"They also contribute further to the low weight of the Ecomat in relation to the width it can cover with each pass. With furrow width mechanically adjustable from 30-50cm/12-20in, working widths from 3-5m are possible depending on the number of plough bodies and the furrow width selected."

The latest Ecomat updates have been

designed to improve the implement's ability to handle higher levels of trash, says Adam. Where point-to-point clearance was previously 55cm, this has been extended to 65cm to improve performance in trashy conditions.

"Underbeam clearance has been extended from 70cm to 80cm for the same reason. The bodies fitted remain unchanged though, being the short, twisted Ecomat type that ensures full inversion of the furrow slice with no requirement for skimmers. They can be supplied either in steel or, for sticky soils, plastic."

The company has also reintroduced an Ecomat model for in-furrow use. Available in six-, seven- and eight-furrow versions, like other Ecomat ploughs it's equipped with hydraulic vari-width, allowing furrow widths to be adjusted from 25-45cm/10-18in. Auto-reset leg protection is provided by six springs, with the option of an HD spring pack for tougher conditions. Further options include Kverneland's integral Packomat press and the TTS trailer transport solution.

"This isn't a big market yet, but Ecomat sales are increasing with the introduction of the on-land models," says Adam.

"But increasing numbers of farmers who've been min-tilling for a while and are facing grassweed issues are considering the concept — even among those who are not fans of ploughing. That's the key, though — the Ecomat is more a full-inversion shallow-working cultivator than a plough," he comments.

French farmers are particularly keen on the concept of shallow ploughs and domestic manufacturers such as Bugnot sell considerable numbers in the country. The firm's Rapid Lab is an on-land reversible available in 6- to 12-furrow versions, equipped with 13in/33.3cm bodies to provide working widths of 2.0-4.0m.

Former importer Ryetec, however, found fewer buyers in the UK and now focuses on non-inversion implements such as its Restorer low-disturbance subsoiler. Spanish firm Ovlac, though, has had more success since setting up its own UK operation in the early 2010s. While regular ploughs were its initial focus, Nick Clark, the firm's UK sales manager, says its shallow plough designs are attracting growing interest.

"While the number of units we've sold over the past two years is just into double figures, a growing number of farmers are requesting demonstrations. Ovlac has offered shallow ploughs since 2003, and ►



Kverneland recently reintroduced an in-furrow Ecomat model, complementing the on-land version shown in the article's lead photo.

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Ploughing min-till



Reducing ploughing depth directly correlates to reduced power requirement and fuel use, so that halving the first cuts the latter two by 50% apiece, points out Ovlac.



Ovlac's Eco Plus short bodies work at 8cm/3.5in to 25cm/10in, producing sufficient inversion to completely turn the soil and bury trash and weed seeds.

► has sold thousands of units across mainland Europe, working in a wide variety of circumstances and applications," he says.

While initial UK interest came from the organic sector with farmers seeking a rapid seedbed creation and weed

suppression tool, issues across crop production types concerning the cost of fuel, a diminishing armoury of weed control options and the growing emphasis on locking up carbon in the soil have all helped to develop interest in shallow ploughing, says Nick.



The shallow working depth of the plough promotes the development of cavities where air and water properly decompose the straw that's been mixed with the soil particles, claims Ovlac.

"That's led to a growing number of enquiries and requests for demonstrations. Many have come from vegetable growers, who require a clean seedbed ahead of precision drilling, and often have a lot of material to incorporate after harvest, but the weed control and soil benefits work well whatever the cropping."

Reaping benefits

Like Kverneland, Ovlac points to the fact that reduced working depth of 8cm/3.5in to 25cm/10in produces sufficient inversion to completely turn the soil and bury trash and weed seeds across large working widths, but at far higher workrates than a standard plough.

The firm's Mini-N is available in sizes of from 5 up to 9+2 furrows, working on-land and covering 1.92-4.22m in each pass at 38.3cm per furrow. Power requirements ranges from 85-105hp for the smallest models up to 190-220hp for the largest, which weigh 2.0-2.5t depending on specification. Point-to-point clearance is 66cm and underbeam clearance 70cm. Shearbolt models weigh from 1,200kg up to 2,195kg.

The Mini-N range incorporates three main frame designs — the N-5, N-7 and N-9 — each of which can be extended with one or two additional bolt-on bodies. The five-furrow frame is equipped with a 120 series headstock with 110mm diameter shaft, while the seven- and nine-furrow frames are fitted an oversized 150 series headstock with a solid 140mm diameter shaft.

Ovlac suggests the shallow working depth of the ploughs promotes the development of cavities where air and water properly decompose the straw that's been mixed with the soil particles, mineralizing the organic matter to increase natural soil fertility and structure, and therefore yield potential. The mouldboards' action breaks the soil capillarity, helping minimise moisture loss from the deeper soil profile, which is especially beneficial during dry periods, says the company.

Reducing ploughing depth directly correlates to reduced power requirement and fuel use, so that halving the first cuts the latter two by 50% apiece, points out Ovlac. It suggests this means that up to 40% more width can be covered in each pass than with a traditional plough behind the same size tractor, translating to the breadth of a comparable min-till cultivator, but benefiting from full inversion yet at a

typical cultivator forward speed.

Available with either shearbolt protection or hydraulic auto-reset, the latter allows trip pressure to be varied according to ground hardness, also helping to avoid bringing up stones from lower in the profile into the surface soil. As with all the firm's shallow ploughs, the Mini-N is fitted with Ovlac's Eco Plus body with 8mm mouldboards and forged shares.

Standard specification includes Ovlac's oscillating drawbar, designed to provide automatic self-alignment by allowing the plough to move freely by +10° to -10° around a central pivoting point in the cross shaft, thereby finding a natural balance between the side pressure exerted on the mouldboards and the landsides.

The company suggests this makes it far easier to ensure the tractor, working fully on-land, doesn't have to fight the plough forces to keep the implement straight — in essence the process is automated, making work easier on the operator.

Adaptable

First furrow width adjustment is mechanical or, optionally, hydraulic, and once set at the desired point according to the tractor width it can be varied any time to move the plough closer to or further away from the furrow wall where conditions such as hilly land require it.

The company also offers the Mini-S, a larger semi-mounted version of the Mini-N suited to tractors of 300hp-plus. Using the same format as a traditional on-land semi-mounted plough, it's available in 12- or 13-furrow versions, making it possible to cover up to 5m in each pass. Working at an average 8km/hr, this allows workrates of 3ha/hr, translating to 30-35ha in a typical working day, suggests Ovlac. It's offered with the same furrow protection option.

To ease turnover of the longer plough, the Mini S features an articulation at the front which folds in the front bodies. This reduces the turnover radius thereby reducing the load imposed on both the tractor linkage and the plough headstock when reversing the bodies, says Ovlac.

"There's growing interest in both types as farmers look at the advantages offered by shallow ploughing in inverting surface soil and mixing residue without burying it at depth," says Nick.

"With continued pressure both on herbicides and on fuel prices, I think we're likely to see more demand for shallow plough demonstrations over the coming year," he concludes. ■



Nick Clark says he anticipates demand will increase for shallow plough demonstrations during the next year.

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