Combine and conquer – discs and blades give 'best of both worlds'

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An evolution from conventional to conservation farming has led the Siviour family to embrace a hybrid seeding rig they believe combines the best of both worlds.

In pursuit of a seeder that achieved optimum crop establishment without rock disturbance, Eyre Peninsula farmer Scott Siviour decided to design his own.

He had started the project and built an opener before his neighbour told him about the New Zealand-designed Cross Slot seeder, which combines discs and blades.

"I wanted an opener that would sow a crop as well as my tine machine, but with the ability to incorporate chemical without pulling up rocks," said Scott.

"After I researched the Cross Slot machine I gave up trying to build my own. It did everything I wanted it to do; it penetrated the soil like the tine, gave us enough soil throw and handled heavy residue."

Scott bought a Cross Slot seeder in 2011 and became the company's South Australian agent at the same time. In the past three years he has sold four Cross Slot machines; three to farmers on Eyre Peninsula and one in Western Australia.

Adopting a low-disturbance seeder was part of a gradual progression for the Siviour family, which includes Scott and his wife Cassie, his parents Maurice and Lyn and brother Evan who recently joined the enterprise with his wife Mandy.

The Siviours were full conventional farmers for two generations at Murdinga, almost 60km north of Cummins on SA's West Coast. In search of higher rainfall and better soils, they moved to Wangary, 45km west of Port Lincoln in 2006 and took their first step towards no-till, purchasing a DBS seeder, which they used for five years.

They have now sown four crops with the Cross Slot, which is designed to place the seed and fertiliser on separate horizontal slots in the soil.

The hybrid design incorporates two blades either side of a disc. The disc penetrates 75 to 125mm below the soil surface, cutting through heavy stubble residue, while the two blades create slots in the soil. Small wings at the end of each blade slice shelves in the soil, which keep the seed and fertiliser separate. The discs have a notched design to aid traction.

SCOTT SIVIOUR IN A HEALTHY CROP OF FABA BEANS, A POTENTIALLY PROFITABLE LEGUME CROP THAT ALSO OFFERS A NITROGEN CONTRIBUTION AND DISEASE BREAK BENEFITS.

During the past four years Scott has seen gradual improvement in their farm's soils, a change highlighted by the difference in soil conditions on a 600ha property they began share farming last year.

"When I first got the Cross Slot it was harder to pull through the soil at our home place but I've noticed it drawing less horsepower every year. This year it was noticeably easier to penetrate the soil, which tells me that it's becoming softer," said Scott.

"That was highlighted when we started seeding the new property. It's definitely harder to pull the seeder over there."

The Siviours use a 335 horsepower Case tractor to pull the Cross Slot, which weighs about 12 tonnes and up to 20 tonnes when its two 4,000 litre bins are full of seed and fertiliser. While it is about five tonnes heavier than a DBS seeder, according to Scott, they are able to seed at an average speed of about 11km/h compared to 8km/h with the DBS.

In addition to softer soil, Scott has noticed a change in the farm's soil structure.

"On the home farm I can see more soil organic matter developing from the residue. Because the disc is in the centre of the opener it cuts through the heavy residue and there's far less soil disturbance. The blades run close against the disc, so they go through the soil smoothly. It's not a bursting action like the tine."

The discs also ride over any rocks. "We used to pick rocks every year, but now the paddocks are clean and tidy," said Scott.

The Siviours run a mixed farm operation, cropping 1,100ha of their own land and 600ha of share farmed land and running Merino sheep. Since Scott's brother Evan returned to the farm last year they have increased their stock enterprise, converting 235ha of former cropping land to pasture to graze 1,400 Merino ewes.

They grow wheat, canola and lupins, and use the same 20mm seeding depth for all their crops. "I'd say our cereal establishment is at least as good with the Cross Slot as it was with the tine machine but canola

emergence has been much better," said Scott.

"Cereals are a bit more forgiving in regards to soil placement and seed depth. Canola is a smaller seed, so the more seeds you can get in the right spot, the more will come up."

The recent introduction of a legume crop to their rotation is designed to generate organic nitrogen in their soils.

Achieving the correct nitrogen input has been a case of trial and error for the Siviours since shifting to the Cross Slot seeder.

"Because the Cross Slot gives you less soil disturbance there is less nitrogen mineralised initially," he said. "That means less nitrogen is available to the plant on crop establishment."

When using a tine machine the Siviours added 28 units of nitrogen (N) a hectare at seeding; a rate they continued for two years after converting to the Cross Slot machine. This worked well but meant they needed to refill the 4,000 litre fertiliser bin on the NZ machine every two and a half hours, so in their third season with the Cross Slot Scott decided to reduce the rate to improve seeding efficiency. However, this proved the wrong thing to do, with all the crops showing signs of nitrogen deficiency and requiring extra urea in crop.

"It's a bit of a balancing act between having enough nitrogen for the crop and getting the crop sown in good time," he said, "but when we backed off the nitrogen in the third year, it was noticeably the wrong thing to do."

This year Scott has increased the N rate at seeding to 48 units a hectare. "Because we've got good seed and fertiliser separation with the Cross Slot, we put 150kg/ha of 32:10 down this year."

He hopes that, in time, the combination of low-disturbance seeding and including a legume in their rotation will boost the amount of organic nitrogen in the soil. "I think when I get the organic nitrogen in the system I may be able to back off my nitrogen inputs again."

In addition to softer soil, Scott has noticed a change in the farm's soil structure.

Since changing to the Cross Slot machine the Siviours have been able to retaining all their stubble residue. They previously burnt some paddocks but now leave them all untouched. During harvest, they reap at a height that works best for the header, without needing to consider residue loads and trash clearance or hair-pinning at for seeding. "There's zero hair-pinning," said Scott. "The seed is placed either side of the disc, so while the disc still hair pins, seed placement is unaffected because the seed sits in a slot to the side of the disc."

Maintenance is one factor that takes the shine off the Cross Slot. "The biggest downfall of the machine would be the cost of the ground-engaging tools – the discs and the blades," said Scott. They have had to replace two sets of discs and one set of blades every 2,000ha, costing money and time. It takes about half a day to change the discs on the 9m seeder bar, which is set up to sow on 310mm spacing.

Some of Scott's Cross Slot clients have invested in a second set of disc hubs, which he says reduces seeding changeover times by a third. The hubs, which incorporate the disc bearings, are bolted to the discs. To change a disc the hub needs to be unbolted and re-attached to the new disc, a process that can be done before seeding if there is a second set of hubs to bolt to new discs. "We'll probably get a second set of hubs for next season to save time during seeding. With hubs already bolted to new discs a change-over would take about an hour compared to about four hours," said Scott.

The Siviours also had to replace the press wheel bearings on their machine this year.

The Cross Slot has required modification to cope with the abrasive nature of the sandy loam over clay soils on the Siviours' property and on the properties of Scott's Cross Slot clients. Using a system developed by TACA Australia, the discs are welded and coated with tungsten granulated carbide. This provides protection against wear and is expected to extend disc life by approximately five times. "The other farmers using Cross Slot machines have used tungsten on my advice, but some are finding that it starts to pull the seed to the surface in sandier soils," said Scott. "We may have to consider using the disc without the tungsten, but we're yet to nut that out."

At this stage, the Cross Slot blades with tungsten match the 559mm discs, but Scott prefers the larger 610mm discs. "I found the 610mm discs gave me much better traction and residue handling, up to the point where I had zero blockages," he said. "We just need Cross Slot to use tungsten on the longer blades that match the 610mm discs. All of my clients can see that will make a big improvement to the machine's performance."

The Siviours will also replace the machine's load cells – industrial weigh scales – which measure press wheel pressure, with a hydraulic ram. "We've found that the load cells break down in really stony country," said Scott. Other technology in the Cross Slot seeder includes a camera inside each bin to monitor the flow of fertiliser and seed, with the footage displayed on a screen in the tractor cab. "You can see right to the last cupful of grain," said Scott.

EACH SEEDING UNIT ON THE CROSS SLOT COMPRISES AN L-SHAPED BLADE ON EITHER SIDE OF A CENTRAL DISC THAT CUTS THROUGH SURFACE RESIDUE AND OPENS THE SEEDING SLOT. THIS PROVIDES GOOD CONTROL OF SEEDING DEPTH AND SEPARATION OF SEED AND FERTILISER, WITH MINIMAL DISTURBANCE OF THE SOIL SURFACE AND WITHOUT DISTURBING STONE IN THE SOIL.