

Delving deep for increased yields

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Eyre Peninsula farmer Jarrod Doudle tackled sandy, non-wetting soils and poor root growth with a delving and spading operation that increased grain yield by 40%.

In 2010, the Doudle family bought 420 ha of land at Wanilla, 30 kilometres south-east of their home farm at Coult, on Eyre Peninsula, because some of the land they were share farming had been sold.

They soon found conditions at Wanilla were quite different from those on their home property, when they encountered the effects of non-wetting soils in their first season cropping the new property.

Unlike Coult's loamy soils, the Wanilla property is lighter country, with non-wetting sand over clay; a combination that prevents crop roots from reaching moisture. "I had no experience with sandy soils, as our land at Coult is loamy and the property we share farm is predominantly loam with some grey calcareous limestone country," said Jarrod Doudle.

"I knew other farmers near Wanilla who were growing reasonable crops, but the first crop we planted there had a few issues that needed addressing."

Those issues included shallow root growth across large areas of the property. "We had two to three-weeks in spring with no rain and we could see areas of crop wilting, so we started digging holes and found that the roots hadn't gone down very far. There was moisture underneath, but the roots couldn't get to it."

FARM SNAPSHOT

FARMERS: Jarrod and Sara Doudle, with daughters Maya and Layla and Jarrod's parents Peter and Sue.

LAND: Based at Coult, on the Eyre Peninsula, with 420 ha at Wanilla. Crop up to 1,600 ha, including 550 ha they share-farm.

RAINFALL: 400 to 450 mm.

CROPPING: Flexible rotation including wheat, canola and lupins.

LIVESTOCK: 200-ewe Merino flock.



JARROD AND SARA DOUDLE (CENTRE) WITH DAUGHTERS LAYLA AND MAYA.

Bleached sand at varying depths in the soil profile was part of the problem. "A layer of white sand below the top soil seemed toxic to the plant roots. We found it in the poorest-yielding areas."

In search of a solution, Jarrod spoke to farmers who had used delving and spading effectively on similar soil types. "I got some really valuable information and decided it was definitely the way to go with this property."

The first stage of the process involved delving, which loosened the soil and lifted subsoil clay to within 500 mm of the surface. The spading operation followed to incorporate the clay into the top soil; a process that also broke up the sub-surface layer of bleached sand. "The spader seems to incorporate clay better than anything else," said Jarrod. "The aim is to get clay to the surface or close to it with the delver, but where we didn't find any clay we decided it was still beneficial to rip up the bleached horizon so that it could be spaded."

The Doudles had a contractor carry out the delving and spading operations, with approximately 200 ha treated in 2012 and the remaining 200 ha this year.

The difference in yield between the treated and untreated land was like chalk and cheese, according to Jarrod. The land that had been delved and spaded yielded 40% more grain in 2012. "We had a 1.3 tonne/ha better crop where we delved and spaded as opposed to land that hadn't been touched," he said.

"We would have nearly got our money back in the first year."

The cost for the first 200 ha was \$200/ha for delving and \$125/ha for spading. This increased to \$250/ha and \$175/ha respectively this year, due to the conditions when the work was being done. A lack of spring rain made it difficult for the three-tine delver to operate in the dry soil, so one of the tines was removed.

"With three tines in the hard soil the tractor tracks were slipping," said Jarrod.

TOP RIGHT – DELVING HARD CLAY CAN LEAVE A VERY ROUGH SURFACE THAT MAKES THE Paddock DIFFICULT TO WORK WITH UNTIL THINGS LEVEL OUT.

CENTRE RIGHT – A PLEASINGLY EVEN 2013 WHEAT CROP ON A RECENTLY DELVED AND SPADED Paddock THAT WAS LEVELLED AHEAD OF SPADED. NOTE THE EVEN EMERGENCE AND THE AMOUNT OF CLAY VISIBLE ON THE SOIL SURFACE.

BOTTOM RIGHT – DELVING AND SPADED CAN BRING A LOT OF STONE TO THE SURFACE.

“Removing one of the tines made it possible to get the job done, but it was very time-consuming with only two tines. It took them much longer to do the job, so we worked out an hourly rate to ensure it was viable for the contractor.” Fuel was an additional significant cost.

The delver is an aggressive machine, ripping deep into the soil profile, and often brought up stones with the soil. Consequently stone-picking was a necessary but time-consuming task for the Doudles following the delving. “We spent many hours stone picking this year. We did a bit every morning and were glad when it was all done,” said Jarrod.

They also decided to level the ground after delving the second half of the property to improve trafficability for the spader. “In the first year we didn’t level the land before spading because we were told it wasn’t necessary. But we found the ground extremely rough because the delver brings large clods of dirt to the surface. Levelling it out allowed the contractor to operate the spader at a reasonable speed and left the paddock in better condition,” he said.

The soil disturbance caused by the spader as it mixes the soil leaves the paddock bare and at risk of wind erosion. “After the spader has gone through the soil is extremely loose and quite bare. Any residue that was there is mulched up, so the soil is prone to drift until the next crop is established,” said Jarrod. “I’m probably lucky I live 30 kilometres away, because I didn’t have to witness the erosion on windy days.

“This type of operation obviously conflicts with a no-till philosophy. It goes against everything I believe about farming, but at the same time, I felt like we were doing the right thing. I just hope we only have to do it once.”

Jarrod is aware of farms where the effectiveness of delving and spading has waned over time. He believes this may be due to compaction caused by large



numbers of livestock and random traffic patterns with heavy machinery.

The Doudles have only a small, 200-ewe Merino flock and in 2011 Jarrod moved to controlled traffic farming (CTF) to keep machinery off his cropping soils.

“Sands are one of the worst soil types for compaction, so I’m hoping controlled traffic farming will reduce this issue. With the soil loosened up by the spader, it’s a good opportunity to develop a good amount of root matter. Confining the machinery to permanent wheel tracks will hopefully ensure crop roots are able to continue penetrating to depth in the cropping soil between the wheel tracks,” he said.

The Doudles use a John Deere Guidance System and their machinery is equipped with autosteer. Their seeding and spraying machinery is on three-metre wheel bases, with the sets of permanent wheels tracks spaced nine metres apart; the working module width of nine metres requiring fewer machinery modifications than a 12-metre module, which they also considered.

They removed two tines from their 9.8-metre air seeder to bring the working width back to nine metres, converted their tractor from dual to single wheels and fitted the wheels from the tractor to the air cart to extend its wheel base out to three metres.

New machinery purchased to fit the system includes a 27-metre fertiliser



JARROD DOUDLE IN THE DRIVER'S SEAT.

spreader. “Our existing spreader wouldn’t spread evenly at that distance,” said Jarrod. “Plus we were probably due for a higher-capacity machine.”

A self-propelled sprayer and chaser bin were also bought as part of the conversion to CTF.

“Spraying and windrowing were our biggest headaches. We grow a reasonable amount of canola and windrow it every year, so we bought a Miller Nitro self propelled sprayer and adapted it for our spraying and windrowing operations. It runs pretty close to a three-metre track.”

All of their machinery now fits the controlled traffic system and Jarrod has already noticed a difference in the property’s soil health. “The top five centimetres of soil is definitely more friable,” he said. “I hope that condition will gradually move down the soil profile, making it looser and better for root growth.”

He will continue to monitor the wheel tracks, which have become rutted in places. “You can certainly see that the wheel tracks sink over time and it’s something we have to manage. In the middle of winter, water pools in some places, making trafficability difficult for a couple of days. Eventually I’ll need a renovator to level them out.”

Not everyone in the Doudle family was convinced about converting to CTF. According to Jarrod, it isn’t widely-adopted on Eyre Peninsula and his father Peter and their workmen were initially sceptical.

“Dad was probably the hardest one to win over. He couldn’t see the sense in it for a long time. But now it’s all set up and easy for everybody to know where they should be driving in the paddocks.

“I think at the end of the day we’re just trying to farm in a more sustainable way; trying to work out how to grow more on less.

“I think the main driver in everyone’s budget is production, so that’s what we’re trying to do; work out how to produce more from the same amount of effort.”



THE DOUDLES' SELF-PROPELLED SPRAYER OPERATING ON PERMANENT CTF WHEEL TRACKS.