Controlled traffic - is coming to a farm near you

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Overview:

Controlled traffic farming leaves permanent wheel tracks when growing crops. There are large savings in costs, especially due to lower horsepower requirements, and also minimisation of compaction layer effects on the crop. Machinery with different configurations and widths of wheel tracks presents one problem for controlled traffic. Neville Gould was one of the speakers at the CWFS Seminar in 1998.

Summary:

Controlled traffic has the capacity to completely change your farming system with an impact on both your capital and operating cost structure. Some farmers have saved between $25-40/ha in operating costs with dramatic improvements in their soil structure and their crop yields as well.

Introduction

One of the most commonly asked questions by farmers, extension staff, consultants and researchers involved in broadacre cropping has always been:

"How do we farm country in a more economically effective manner (both in terms of capital and operating costs) whilst still being environmentally sensitive and sustainable? "

Well, for the first time for many years the answer to that question is perhaps available in a practical format through Controlled Traffic Farming (CTF).

Definition

Put simply in the agricultural context, controlled traffic farming means using permanent wheel tracks throughout the cropping and fallow cycles. This creates zonal management of the paddock - separate zones for inter-row management (cultivation, herbicides, fertiliser) and row management (insecticides, pre-harvest herbicides) (Yule 1997).

This can effectively reduce the paddock area which is compacted by wheels from typically over 82% in a conventional tillage system (or typically 46% in a no-tillage situation) to around 14% coverage with a CTF system.

Level of adoption

Controlled traffic fanning is a system that is being very quickly adopted by Australian farmers in most parts of the county, and according to a number of world experts, Australia leads the way in the adoption and development of practical systems for controlled traffic broadacre systems.

In central Queensland, from where much of the information on the benefits of CTF is emanating, an area of 3,000 ha was established in 1995. This grew to 9,000 ha in 1996 and then to 22,000 ha (33 farmers) in 1997. A major project, supported by the Queensland Departments of Natural Resources and Primary Industries, the University of Southern Queensland's National Centre for Engineering in Agriculture and the Grains Research and Development Corporation, has been established to assist farmers in making the transition and to monitor the outcomes of the resultant effects.

In the Darling Downs, an area of 9,000 ha has also been established, with one farmer, Jamie Grant from Jimbour Plains, claiming a doubling in output of his cropping country since the adoption of controlled traffic/no till farming system approach.

In northern NSW in the Walgett area, over 50,000 ha has been set up by 10 fanners for CTF over this 1997/98 summer and it is likely that a further increase in area will occur with favourable rains this winter cropping season.

In central west NSW, the "Conservation Fanner of the Year", Scott McCalman from Warren has also adopted CTF over 2,500 ha with incredible response in crop and soil in just 2 years.

Benefits

Lower operating costs: Farmers are already achieving real benefits through their adoption of controlled traffic farming. Thirty three (33) farmers in central QLD are currently saving, on average, $25-40/ha through the practice of CTF. Mike Mailler in northern NSW, the co-inventor of the Agsystem "Beeline Navigator" Global Positioning System (GPS), saved $33,000 in the first year over 3,645 ha due to lap savings alone (Nason 1997). Paddock areas are normally artificially high, due to overlaps, headlands and other inefficiencies. By removing these inefficiencies (for example, by travelling back and forth rather than in a "race-course" fashion, especially in contour-banked paddocks) and overlaps, areas cropped are reduced by typically around 8-15%.

With less area to crop (from less overlaps, etc), and less wheelslip (from working on compacted wheelhacks with greater trafficability), less time and labour is required to perform operations. On Rod Birch's property, a paddock which used to take 1.5 tank loads to spray now only takes one load.

Correspondingly, machinery is being worked for less time and, most often, not as hard with savings in maintenance. Fuel use, whilst less due to less area, can also be reduced through better matching of equipment.

Substantial savings in tyre costs can be achieved. Tractor tyres with lugs are currently required to aid traction in wet or loose soil conditions. On compacted wheeltracks construction tyres may be better suited, leading to less rolling resistance and longer wear.

Wider implements can also be used for the same Horsepower (HP.) Rod Birch "Mt Wilkin", Kilcummin in central Qld, in moving from conventional farming to controlled traffic and no tillage, reduced his fuel use at planting from 8 L/ha to 2.1 L/ha, because he was able to double his planter width without changing his tractor (Jensen et al, 1997).

Savings in capital costs: Lower HP and lighter (cheaper) tractors are needed. Typically 50% of the tractor's power is being wasted in producing and then ploughing up wheel tracks (Walsh 1996). Under a CTF system, that power is not required or can be put to better use (see below). Alternatively, present machinery should have a higher resale value because it is not subjected to the same stresses. Tillage machinery need not be as heavy because smaller penetration and draft forces are required in soils under a CTF system not compacted by wheel traffic. Additional weight and strength are usually built into a tillage machine to aid in penetration and resist soil-induced forces.

No need to till prior to seeding: Except for control of difficult weeds, fertiliser application (say pre-applying N before canola planting) or in difficult soil conditions (eg hard setting red soil coming out of pasture), there should be no need to work the ground. Unless trafficked by stock (see later), the soil in a CTF system will naturally become softer and allow better moisture infiltration, root penetration and create less draft on seeding points.

Handle higher stubble loads: The first place straw blockages occur on tillage and planting equipment is usually where a tine is located near to a tyre. As there are no (or fewer) tyres in the frame on a CTF planter or tillage implement (all tyres are in-line and usually outside the frame on the permanent wheeltracks), stubble handling ability is substantially increased.

Precision plant, fertilise, spray, tillage: Precision placement of equipment in the paddock (new DGPS-operated systems enable location within +/-2cm; Mailler, 1997) means that inputs can also be placed in the required position. This enables such operations as directed spraying (insecticide use cut by up to 60%), inter-row cultivation, chemical application and inter or over row planting, side-dressing of fertiliser, banded cultivation (killing sorghum or dryland cotton post-harvest), furrow planting (giving increased planting opportunities, increasing trafficability and greater timeliness). The intrinsic accuracy and guidance provided by the permanent wheeltracks allows a number of operations to be performed in a more timely fashion, including ground spraying at night (allowing more effective action of the chemical). Greater trafficability, also due to the permanent wheeltracks, allows seeding sooner after rain and seeding around the clock.

Reduce seed, fertiliser and other agronomic inputs: An equivalent saving in seed, fertiliser and other agronomic inputs is possible due to the reduced area. This equates in Rod Birch's case to a saving of $24,000.

Potential yield increases: Despite the reduced area planted (with unplanted wheeltracks = 14-20% of area), reduced competition from double rate planting/chemical application resulting from no overlaps (some estimate that areas overlapped when planting suffer a 50% yield reduction), and more stored water from increased water infiltration are capable of increasing yield. Increased cropping frequency is also possible with the greater potential for water storage and improved soil conditions.

What compaction looks like

HEADER - ONE PASS, SIDE A (North - South)

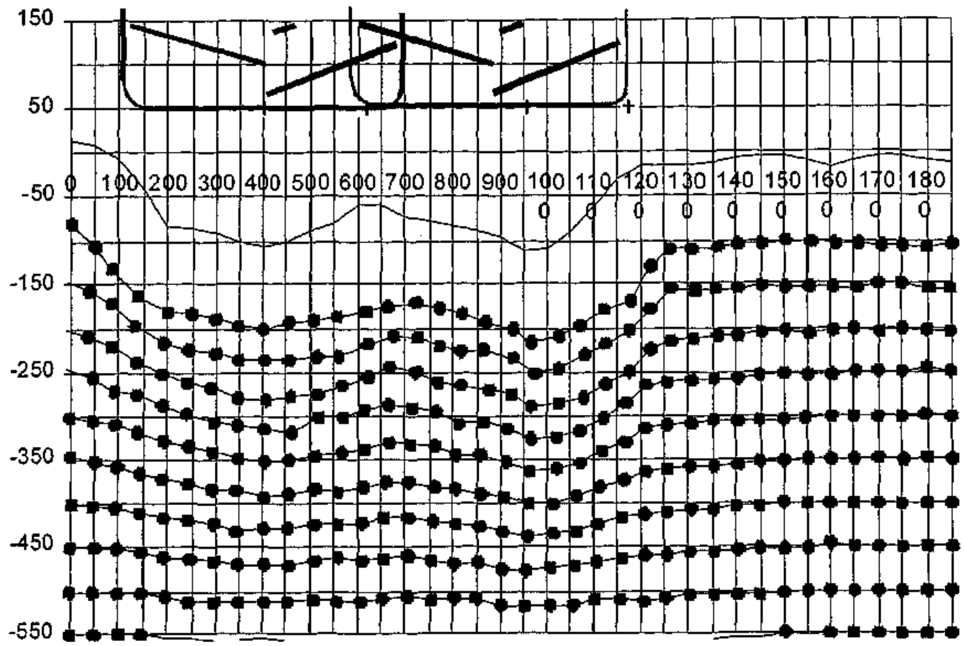

Figure 1: Soil displacement due to the single passage of a header with dual tyres over wet clay soil in the Darling Downs area, Qld

Will it work?

A question which is most often asked is *"Will it work on my place?"*

The answer to that question is, more often than not, YES, even for farmers with large articulated tractors, headers with greater wheel spacing than their tractors and trailed implements. Issues such as trees, contours banks and uneven country have already been addressed with positive results in QLD and northern NSW.

CTF, whilst being mainly adopted on self-mulching soils, is perhaps more suited to non-repairing soils, such as our hard-setting red soils and again more suited to large, flat areas, such as exist in central west NSW.

Why has it been adopted so quickly in Australia?

Australian farmers are by far the greatest adopters of controlled traffic farming (Chamen, WCT, *pers. comm.).* The reason for that is that Australian farmers have the greatest to gain in terms of reducing their costs. The process used has been one of "action learning", with a large group of researchers and advisers of various backgrounds and disciplines starting with 6 farmer cooperators in central Qld to develop a workable CTF model.

There have been minimal changes required to machinery in this case, but instead major changes to layout, with fanners now trafficking their undulating fields up and down the slope, rather than within the contour banks across the slope.

Most of these farmers "had a go" - starting with one or two paddocks, but have subsequently converted all their property over to CTF, such was the success and ease with which the transition was made.

What are the major challenges?

CTF, like any fanning system, has its challenges. The principal challenges in central NSW would be:

Trees - the fact that many properties retain a number of trees in paddocks as shade for stock, which is not as pertinent in central Qld or northern NSW, may be an issue that needs addressing. Some farmers, like Scott McCalman from Warren, are now excluding all stock from their CTF cropping paddocks and are removing problem trees (within regulations).

Guidance - a number of guidance systems which enable marking out of paddocks and even direct steering of equipment have been developed. These systems have yet to be fully proven over a wide range of circumstances, but have tremendous potential.

Machinery uniformity - as yet the largest problem with machinery is the issue of "what track width" should I choose. Should it be 2 metres to match my tractor or 3 metres to match my header? Until a decision is made which provides some uniformity, the large machinery manufacturers will be hesitant to develop the new technology to fit into these CTF systems. The three biggest areas of need here are extended axles (beyond 2.4 m) for FWA tractors, large 4WD's and header axles.

Conclusion

There is a huge potential and much to be gained by central west farmers through trying controlled traffic farming. Our soil types, large paddock sizes and shapes, large machinery size and lack of trained itinerant workforce lends itself perfectly to CTF, perhaps more so than in northern NSW and Qld. Even if only a part of the potential capital and operating cost savings are realised, the economic benefits could still be attractive.

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