

Can we do conservation farming in the (marginal) cropping areas of western NSW?

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Overview:

Long fallow is tried and tested. Conservation farming has the potential to avoid problems from repeated tillage, such as loss of surface organic matter, increased erosion, loss of soil structure and exacerbation of compaction zones. Water storage is also important. Conservation farming can also significantly reduce costs. Umbers describes how, for one year (1997), his costs have been reduced by up to \$40/ha. These lower costs, when yield is maintained, has given more profitable crops.

Summary:

Whilst this is not pure or applied research, it is actual farming results from a large cropping program in the Condobolin area in central NSW. Approximately 10,000ha of dryland cereals plus some canola has been grown on "Kiargathur Station" using Conservation Farming establishment methods over much of the area in the last three years. The results suggest that cropping using these establishment methods can be more profitable than more conventional techniques. They can allow more intensive cropping rotations, involving continuous cropping in some paddocks. Conservation Farming methods have given no measurable yield penalty, and generally lower cost cropping, resulting in more profitable results.

These results are dependent upon ensuring sound agronomic practices are followed, involving attention to weed control in the fallow (summer) period between crops, higher than average fertiliser use, sowing on time, stubble retention and sound seed placement. We have also established lucerne and annual legume based pasture using no-tillage with success in crop stubbles.

Introduction and Background:

Since I live and work in what could be considered marginal cropping areas in Central and Western NSW (Trundle is nearly exactly centre of the state), I thought it worth a look at how Conservation Farming is going here.

There remains considerable debate among the farmers in the western area of the state, about how these new ideas of reducing tillage, No-Till, stubble

retention etc. will go, when many have always believed that only a "good long fallow" was reliable for growing crops in the marginal areas. Even paddocks planned for sowing following a previous crop were considered best treated with cultivations as preparation.

The rainfall here is often unreliable, and unseasonal. Long term averages for Trundle and Condobolin show that the rain is evenly spread throughout the year. There is no "summer dominant" nor "winter dominant" pattern, and frequently January can be as wet as any other month. It is also often when we get the heaviest rains, as storms. The driest months are frequently March, April & May.

In any case, the "good old long fallow" worked by storing moisture from the previous spring (or winter), by keeping the paddock free of any growth from this period until sowing in the following autumn. There are also benefits from mineralisation of nitrogen, and a disease break from a period of freedom from grasses. It is likely that all these added up to making cropping over the years more reliable when they were grown on fallows, compared to those on stubbles.

Recent concerns about soil effects of repeated tillages (erosion, plough pans, structure damage, compaction from machines and sheep) coupled with the decrease in prices of herbicides relative to the costs of cultivation (i.e. fuel and machinery costs have risen while herbicide costs, notably for glyphosate, have fallen), have led many to look at conservation farming systems in these marginal areas.

These have been pushed along with an increasing number of developments in point design, row spacings, stubble handling ability and other developments that have led to many looking at ways of

etting a crop in without the time and costs of the ng fallow, or any cultivations at all.

t Kiargathur Station, west of Condobolin, the s- ysm now revolves around No-Till cereals into stub- es, and No-Till pasture establishment into previ- is cereal paddocks. It seems to be working, with elds in 1997 around or above the district average, It with considerable reduction in costs, machinery nd labour. This is leading to better profitability.

coming in to a cropping phase from several years pasture we still find a cultivation or two is need-1. These are often the only cultivations a paddock ill have in several years of cropping (two paddocks ave now grown 5 crops in a row, and continue to prove). These initial cultivations are needed to - eak old hard pans, and surface compaction from eep. After the first crop almost all crops are sown

No-Till into the stubble of the preceding crop.

Table 1 shows the general plan for cropping at Kiargathur Station. The total area cropped (dry- land) is around 8000ha, and includes wheat, barley, oats and canola.

In late 1996 some of the stubbles following harvest were chiselled (against my advice). The soil was relatively dry, and came up very cloddy, and need- ed further working to leave it suitable for sowing. This added to costs, and has not brought any bene- fit in profitability, while causing soil damage.

Results:

I will take a few paddocks for examples: See Table 2 & 3. These list paddocks sorted by costs of the crop (including harvest and cartage), in Table 2, and Net \$ returns in Table 3.

Table 1. The General Plan for a cropping paddock:

Old Pasture:	Spray Top one-two years prior to cropping to reduce grass content.
First Crop Preparation:	Cultivation for compaction and hard pans. Once soil in condition suitable for sowing herbicides used for weed control.
Crops following this:	Summer rains and subsequent weeds controlled with herbicides. Crops No-Till, pre-plant herbicide if needed.
Crop Rotation:	Includes canola, on more fertile paddocks, either at start of rotation, or after cereals. Something like: Fallow-canola-wheat x 2-barley, then assess paddock for more crops or out to pasture. Will try legumes, e.g. Lupins, chickpeas, but some doubts about profitability
Weed Control strategy	Pre-plant knockdown when needed. First cereal also gets Glean or Logran. Subsequent crops as needed post emergent. Will look at Trifluralin in No-Till in 1998. Work on weeds in pastures prior to cropping phase.
Fertiliser	All wheat has at least 80kg/ha DAP applied. Barley 60kg/ha DAP. Canola 100DAP +120 Sulphate of Ammonia. Sulphate can be spread in front of sowing, thus saving a working.
Key Management Points:	Summer weed control, plus in-crop and pasture weed control. Sow on time. Dry sowing of canola, oats in 1997 was successful, allowing better timeliness of the sowing of wheat and barley. Solid fertiliser rates, e.g. 60-80kg/ha DAP on all cereals. Improved Pastures to follow a period of cropping. Aim to establish quality legume dominant pastures into the final crop stubble (No Till) in winter after the last crop. Use of contractors for timeliness, reduction on capital and labour costs.
Seeding machinery	Cat Challenger 75D + Flexicoil 820 54 ft planter, Primary Sales Superseeder points, 22.5cm spacings, presswheels. This rig used for sowing cereals, canola, pastures (lucerne + medic + clover).
Use of Contractors:	Approx. 50% of seeding done by contractors (same machinery set up), almost all spraying, and 80% of harvest & cartage.
Area of crop (dryland)	Approx. 4800 ha wheat, 1900ha barley, 500ha canola, 600ha oats (grazing), 1300ha new pasture establishment.

Table 2. Paddocks from Kiargathur Station in 1997, ranked by Costs / Ha.

Paddock Name	Area (ha)	Crop	Yield (t/ha)	Gross Income (\$)	Costs (\$)	Net return (\$)	System	Crop No
Burtons	500	Wheat	3.25	\$601.25	\$195.00	\$406.25	Cult L Fallow	1st
Bimbilla	400	Wheat	2.39	\$442.15	\$165.00	\$277.15	Cult L Fallow	1st
Franks	380	Canola	0.8	\$321.60	\$165.00	\$156.60	Pre-Sow S Am	5th
Glenderry North	620	Barley	2.62	\$432.30	\$155.00	\$277.30	Cult S Fallow	2nd
East Glenderry	860	Wheat	1.45	\$268.25	\$150.00	\$118.25	Cult S Fallow	2nd
Glenlee Workshop	395	Barley	1.37	\$226.05	\$135.00	\$91.05	Cult S Fallow	4th
Beaconsfield	502	Wheat	2.01	\$371.85	\$110.00	\$261.85	No Till	4th
Top Paddock	340	Wheat	2.47	\$456.95	\$110.00	\$346.95	No Till	2nd
Glenderry West	970	Wheat	2.13	\$394.05	\$105.00	\$289.05	No Till	2nd
North Stewarts	180	Barley	2.9	\$478.50	\$101.00	\$377.50	No Till	5th
Hessians	560	Barley	2.84	\$468.60	\$95.00	\$373.60	No Till	2nd

Table 3. Paddocks from Kiargathur Station in 1997, ranked by Net Return / Ha.

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The points to make from the above results are:

- A good long fallow following some years of lucerne remains one way of producing high yielding and profitable crops (Burtons Paddock).
- However, fallow by itself, where the fertility of the paddock may not be this good (e.g. Bimbilla), has not yielded any better than Top Paddock next door, that grew a canola crop in the year previous, and was sown no-till into this stubble.

The No-Till paddocks were the lowest in terms of gross costs. This reflects the savings that can be made by reducing or eliminating cultivations in stubbles. They have given yields similar to those from the other systems. However, when ranked in terms of net \$ returns, they have come back to the top of the table. This shows the importance of No-Till in reducing input costs, and providing profitable returns.

Apart from Burtons, the No-Till paddocks in 1997 were the most profitable on Kiargathur. This is in my view due to savings in costs, while maintaining weed control and moisture preservation from harvest onwards, plus sowing at the right time (if rain permits), and using higher than average rates of fertiliser. The presswheels seem to assist with getting better germinations especially when moisture is getting marginal.

- Economically attractive results can be obtained in a "marginal" environment with No-Till or minimum tillage techniques, but only if the basics are also followed. This means weed control (especially in the couple of years prior to entering a crop phase, and following summer rains for moisture storage), sowing on time, good rates of fertiliser (e.g. 80kg/ha DAP), and well set up seeding so that placement is correct. Presswheels here seem to have a benefit in assisting placement, and when moisture is marginal.

Beaconsfield has yielded two good crops in a row, following two crops before this. This has been using no-tillage, and more than makes up for a disappointment in 1994, where money was lost.

Burtons Paddock should be able to grow another two or three crops with little costs other than seeding and harvest, and some weed control. By not cultivating from now on we will save around \$40/ha on costs.

- Franks and North Stewarts paddocks have been real successes, and the soil continues to improve, getting softer, and more friable each year. Grazing is kept to a minimum. These paddocks have made good money since the disaster of 1994, and should be able to keep it up for some years more. Fertility will now be monitored, and probably increased to account for what has been taken out, e.g. 100kg/ha of DAP for this years wheat crop.

We have successfully established lucerne and other legume based pastures into stubble

using existing machinery and a no-tillage approach. This usually means that after the years cereals are sown those paddocks planned for new pasture are sprayed to control any growth in the stubbles, and then sown. This occurs through winter when rain allows.

There are other hidden cost savings from adopting a program of reduced tillage in cropping in western NSW. In not spending as much time on tractors savings are seen in lengthened tractor life, less labour requirements, and lessened need for cultivation equipment. The capital tied up in machinery is an important cost that can be reduced by going to a no-till or reduced tillage program.

Results from Euabalong:

Another farm that has been using no-till techniques on some paddocks is "Big Red", Condobolin. This farm is further west from Kiargathur, and is run by Nigel and Obbe Martin.

The soil is a red clay loam, carrying box, currajong and pine. Growing season rainfall is estimated at around 350mm.

Results:

Nigel's paddocks have given some interesting results in 1997. We have looked at four paddocks for interest (Table 4).

The yields from the long fallow paddocks were essentially similar to each other, and only marginally in front of paddock 3. Paddock 3 is a bit of a trial and has grown wheat now for four years straight, in an attempt to gauge the degree of disease that may occur under an intensive cereal rotation. Paddock three had a wheat crop in 1996 as well, and received one cultivation in the autumn of 1997.

Interestingly when we look at profit we see that the long fallow has not necessarily made any more money than the short fallow or the no till paddocks. The most profitable paddock in 1997 was the no-till barley. This is also the fourth crop in a row.

Table 4. Results from four paddocks from "Big Red", Condobolin in 1997.

Paddock	Size (ha)	Crop	Costs (\$/ha)	Yield (t/ha)	Profit (\$/ha)
1. Cultivated Long Fallow	160	Wheat	\$161.55	2.2	\$184.38
2. Herbicide Long Fallow	160	Wheat	\$158.39	2.4	\$204.00
3. Wheat on wheat (one cultivation)	50	Wheat	\$117.64	2.1	\$201.51
4. Barley (No Till)	160	Barley	\$110.23	2.4	\$285.13

The figures above are from Nigel's actual returns and costs, and I would suggest assist in reinforcing those from Kiargathur, where crops sown with little or no tillage have returned attractive economic returns in 1997, as well as in previous years.

Cereal crops sown using no-tillage methods may not have been the highest in terms of crop yield, but have shown a strong tendency to be among the most profitable as measured by Gross Margin.

Conclusions:

My conclusion is that Conservation Farming practices are just as applicable in a marginal environment as in a more reliable one, perhaps more so. The trick here is to establish a blend of the existing knowledge

(e.g. need to store moisture when possible, weed control, fertility management, sound pasture phase, timeliness of sowing, disease management), plus the newly available technology of seeders and herbicides that can continue to grow solid yielding, but importantly more profitable crops into the future.

Sustainable cropping can only be so if it is profitable. Reducing tillages can have an important effect in reducing costs. What we have to do is to ensure we also do the rest of it right to allow these crops to still be high yielding. It is even more gratifying to realise that these methods are also those that put the most attention to the soil and preservation of this asset through the use of minimum or no-tillage techniques.