Murdeduke - Raised Beds and CTF

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BACKGROUND

The Wilson family own the 3000 hectare property "Murdeduke" and manage a further 1400 hectares in the high rainfall zone of south-west Victoria, near Winchelsea. We receive an average rainfall of 550 mm in winter/spring predominantly. There is a mix of enterprises (60% cropping and 40% livestock) including:

- 2400 hectare cropping system with a typical rotation of canola, wheat, barley and oats.
- 200 stud Angus cows and 450 commercial Angus cows, with an extensive Embryo Transfer operation
- 3000 first cross ewes prime lambs
- 800 wethers, with numbers reducing to increase prime lamb production
- 170 hectares of lucerne – providing excellent gross margins from prime lambs and great for drying the subsoil profile
- 1500 sows run on three 40ha units in the crop rotation, run as a separate business 'Pastoral Pork'

The country ranges from well drained rolling lunette's to flat swampy country. Lunettes represent the deposition sites of wind blown sands and clays from swamps and lakes. The soils on the lunette's are dominantly highly fertile deep black self-mulching sandy clays over a deep cracking clay. The majority of the lower lying soils are gradational self-mulching black clays (Vertosols), which are often sodic at depth.

WHY CONTROLLED TRAFFIC?

Soil structure and fertility is a key driver of any farming system. We believe controlled traffic farming is a common sense approach to improving our soils and thus profitability. Forget all the science and complexities associated with controlled traffic farming just look at the broader picture and the intricate details will happen naturally.

Our systems

The introduction of raised bed farming (2m centres) in 1996 has revolutionised our lives and has allowed us to expand the cropping enterprise to paddocks, which would otherwise lay waterlogged in an average season. It is basically reverse irrigation technology. This has allowed the cropping operation to expand through leasing and purchasing new land.

Raised beds forced us to have our machinery on 2 m wheels centres except the header which is on 4 m centres to straddle two beds. In 2004 an RTK auto steer system was implemented which gave us confidence that adequate repeatability could be achieved to implement a tram line system on conventional country in 2005.

The tillage system is basically no till, however we are adaptable to circumstances as no system is perfect and cultivation maybe used. Some full stubble retention and inter row sowing was achieved in 2006.

Raised Beds

- Always considered the lunette paddocks to be like 'one big raised bed'
- 1200ha 2m wide raised beds.
- Knife points and press wheels for depth control improve plant distribution and crop establishment.
- Beds lead to rapid soil improvements in just one year. Heavy sodic clays converted to friable healthy workable soil in year 1, and this happens every time! The soil structure improves due to the removal of waterlogging and wheeled compaction and thus the soil health improves through more organic matter and more frequent wetting and drying cycles.
- Gradually reinstalling beds with the autosteer to eliminate the problem of uneven bed widths, which cause trouble particularly at sowing.
- Beds improve water infiltration rates and crops achieve higher water use efficiencies. These factors limit the amount of run-off from raised beds.
- Drainage determines the layout.
- The next step is to improve the design of main collector drains which run perpendicular to the furrows.

CTF

- 1300ha in crop CTF (2005 is the first season).
- 24m tram tracks for spraying and spreading.
- Tramlines run east west to minimise wind damage to canola windrows unless impractical
- Block seeding tube off to leave visual tramline. Means not all machines require auto steer. No green seeds or inferior quality grain at harvest from wheel track damage. Weeds may become an issue in tramlines.
- Stubble management at harvest is proving a challenge?
- Believe inter row sowing to be the most efficient way of retaining stubble.
- Burning is a vital management tool, but should not be relied on every year.
- Livestock are they a useful management tool or a hindrance?
- Early stages and will evolve over time.

Paddock layouts

- Rocks are a big issue. Have cleared many rocks at great expense, but the return on investment says it is worthwhile. Improves productive capacity as well as capital gain in land value. Have crushed some rock piles and will use for internal roads.
- Need to determine CTF design to maximise harvest efficiencies. Maximum 500-600 m runs for baling and chaser bin operating efficiencies. Centre headlands work very well although initial additional cost to implement.
- Undulating paddocks are difficult to install effective raised beds. May need to laser level. (will it pay?)
- Contour maps are critical for determining paddock design for raised beds.
- Some planted tree lines reduce machinery operating efficiency and are gradually been removed. Trees are replaced on paddock boundaries and waterways.
- Property was originally fenced for livestock, thus some less than desirable paddock shapes. Causes overlap with wider applications such as spreading and spraying. Not considering refencing at this stage, auto shut off on the boom is potentially the best solution. On lease blocks will generally remove all internal fencing to achieve operating efficiencies.

MACHINERY SYSTEMS

- Own all machinery. There is significant capital invested in development machinery. A contractor is used to provide a second header and only at others times when timeliness is becoming an issue. There is a management advantage is doing your own work, although it can impact on lifestyle at times.
- All tractors, spreader, chaser bin and baler on 2 m wheel centres.
- Header on 4 m wheel centres with a 10.9 m front. (only use 10 m on beds)
- Tillage implements 8 m and spraying and spreading at 24 m thus a 3:1 system. A 3:1 system is ideal as it fits perfectly on boundaries. Most limiting constraint is spreading urea due to windy conditions. Historically can get wet, so minimising weight is a consideration.
- Did consider a 10 and 30 m system but became costly due to stability issues with a 10 m seeder on 2 m centres. So sacrificed operating efficiency for less capital investment and the reassurance the job was done properly!
- Guidance (2cm RTK *GPS-Ag* autosteer) fitted to 2 tractors. Proved it's worth – a fantastic initial investment. Less fatigue, less inputs, and no delays from fog and dust. You know exactly where you are – allows site specific management
- 2 sub metre lightbar guidance systems from pre auto steer days. Great stepping stone in learning the capabilities of GPS. Now partially a luxury in auto steered country but still very useful on pasture and lucerne paddocks.

AGRONOMY

- Independent consultants employed who do fortnightly inspections.
- Based on UK/NZ production model.
- Canopy management.
- Strict monitoring and thorough understanding Zadock's growth stages.
- Timeliness critical especially with fungicide management.
- Rotation of Canola, wheat and Barley or oats. A reliable profitable legume would be very welcome. Lucerne is working well but it is 3 year phase minimum.
- Integrated pest management, understanding levels of beneficial's. Only use insecticide when necessary. Involves strict monitoring and employment of a consultant.

PRECISION AGRICULTURE

- The collaboration of CTF, autosteer and yield monitoring allows for accurate strip trials
- Spatial info includes 5-6yrs yield data, EM surveys, contour maps, aerial photos and satellite imagery.
- Managing spatial data requires technical support. Computer systems include PAM, AgriMaster (financial) and Farm Works. Getting different software to talk the same language is a challenge.
- Will begin this year to test consistent trends in paddock variability to determine potential for variable rate (VRT). Pig paddocks introduce significant variability, which may be worth managing?
- Yield data is good for identifying large scale differences such as large scale trials such as lime and manure (pig paddock) responses.
- Satellite imagery provides a more intense picture of responses and should be useful for understanding and then managing spatial variability.
- Purchased IKONOS satellite imagery last 2 years and found it to be valuable at highlighting problems.

- Will not continue at this point in time as it is only reinforcing what we already see and we are not getting any economic gain at this point in time. Probably will do some progress updates every few years.
- Satellite imagery provides a more intense picture of crop responses and should be useful for understanding and then managing spatial variability.
- Satellite imagery is a great management tool for absentee owners.
- Will play with real time imagery this season using a green seeker. Can envisage if mounted to sprayer prior nitrogen application, the image could be used to apply variable rate nitrogen.
- Basically have built up a data bank of info, trying to find ways of using info and pip pointing which variable is causing the problem.

CTF AND OTHER ENTERPRISES

- Where do livestock fit? A proportion of the country is rocky basalt unable to be cleared. A National Landcare Program funded project 'Grain and Graze' has five integrated projects to help mixed grazing and cropping farmers increase profits and enhance the environment – stubble management, lucerne on beds, integrated pest management, native grasslands and pastures on beds. We are part of this project particularly focusing on lucerne.
- Diversification of enterprises is an integral part of our production and economic risk management strategy.
- There is no doubt livestock hinder the cropping enterprise but our gut feeling is the economics do not stack up to remove livestock from the crop system. I believe it would reduce our carrying capacity by at least 2 dse/ha.

CHALLENGES

- Getting people to adhere to CTF principles when time is an issue as it usually involves the slow way around.
- Management of runoff water.
- Will weeds become an issue in tramlines.
- In some paddocks deep wheel tracks may become a problem.
- Maximising operating efficiencies with layouts.
- Fitting fodder machinery to the system, incidentally a fodder crop returned the highest gross margin last year.
- It would be ideal to get the harvester in the CTF system which would mean going to 3m centres. Would 3 m beds still prevent water logging? Would the capital investment required to change machinery system be justified?
- Trash management.
- Interested in determining ideal press wheel pressures. How should it vary with soil moisture?
- GPS technology is a specialised field, you need a company which offers good backup and support when your whole farming system relies on it.
- Finding ways to utilise the spatial data we have collected. Will we ever be able to pin point which variable is causing the problem. It may change from season to season.
- Getting software which all talks the same language.
- To make all enterprises work together to achieve the most sustainable and profitable outcome.