



MacKillop Farm Management Group

Irrigation Systems and Precision Ag in
South East Queensland

Study Tour

16th to 21st August 2009

Final Report

Tour supported by



Linking SA Grower Groups



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All participants were asked to complete a feedback booklet throughout the tour – documented on the following pages is the responses received via this booklet.

Study Tour Objectives

Evaluation of Irrigation systems and which would best sit each individual's enterprise

- Centre pivot or lateral irrigation for small seed production
- Currently using flood – lateral sprinklers could give more control of water rates applied
- Overhead systems are the most efficient irrigation methods for our area and centre pivots are the best for our operation
- Would like to see more improvement on flood systems and more research in our area on lateral movers
- Currently use drip on raised beds, the ability to vary water rate with pivot could be an advantage. Large capital investment a concern
- Lateral movers would be good – long straight runs with no wasted corners
- Furrow irrigation is too labour intensive, pivots and lateral movers more suitable
- Dripper tape irrigation very good for small, intense areas of production only
- Laterals are most efficient, pivots are easier to maintain but waste more ground. Concerns with lateral movers on overwatering ground
- Centre pivots with low slung hoses to water lucerne because flower set and pollination would not be affected as much, less evaporation and less water pressure required

What are the possibilities of improving your current irrigations practices from what you have seen on the tour?

- Change pivot on lucerne to low slung hoses for delivery very high possibility
- In Millicent area, a change to lateral movers would be beneficial
- A small lateral mover for watering broccoli with the ability to block sections not required to be watered would be useful
- Will test current pivots performance to check efficiency
- Improve moisture monitoring equipment and water application nozzles
- Look at using plastic and or mulch over beds/rows
- Site specific irrigation application and vary application using EM38 mapping results

From what you have seen what is the likelihood of growing alternative crops under irrigation to make best use (financially and environmentally) of water available on your property?

- May look at growing vegetables
- Am considering some clover and small seed grass crops
- Very low – lucerne only possibility, high salinity of water an issue
- To get best return may look at some horticulture, particularly onions, carrots or potatoes
- May look at some summer fodder crops as an alternative to permanent pasture
- vegetable seed crops possible
- Already producing alternative crop – gladioli corms

What requirements in relation to markets, infrastructure, soil types etc do you require before changing production type on your property?

- Forward contracts and market security
- understanding of markets and marketing techniques
- Infrastructure – lateral movers and pivots
- There is a good market for small seeds already. More markets to improve competition for other products.
- Soil type suits most crops at Millicent, but not so towards Kingston. Uniformity of soils important to produce uniformity of product
- Lucerne seed – markets at \$5/kg or more. Soils testing could be better for nutrients. Remote control on irrigators would be beneficial
- Improvement in commodity prices before investing large amounts of money. Start on small scale.
- Need to have a very good understanding of your own property to ensure it is suitable
- Receival sites for horticultural products
- Quality assurance program
- Transport an issue from Lower South east, distance to markets
- Knowledge on labour required to produce crop
- More storage facilities
- Trials on seeding methods, row spacings, look at fertiliser use without compromising on yield
- Knowledge of machinery available and what is required

Evaluation of sustainable agricultural practices being used in South East Queensland – how could they be used on your property?

- Soil Moisture monitoring techniques and equipment are key to sustainability by not over using resource – we are already using these systems. Monitoring of water use per hectare for applicable crops
- Already using most techniques seen
- We have low summer rainfall, they have high (reversed in winter). Sorghum main summer crop, concentrate on winter crop and view summer crop as an opportunity
- CTF and disc have huge impact on dryland, marginal country. Definite room for disc technique on our property. Less Compaction – CTF the way forward.
- Use of Disc seeders to maintain trash and moisture
- Soil moisture conservation through zero till, stubble retention , minimal soil disturbance and soil moisture monitoring. Minimisation of evaporation and maximising of water use efficiency are necessary.
- Further advanced than us with RTK 2cm guidance
- Injection of liquid nitrogen directly into soil
- Opportunity cropping

Comparison of machinery available and how it would be suited to our requirements

- Our seeding systems compare favourably, more suitable to our local constraints
- Machinery seen to specific for our systems and hard to justify
- Autosteer and tractor tyre spacing are essential
- Disc seeding system could be implemented in time, due its constant changes to suit conditions. Trialling essential. Soils maybe too sticky in some areas for this to work however
- All machinery seen is available in 3 metre centres
- Control traffic, interrow sowing, stubble retention suited to build soil health
- Machinery seen for controlled traffic does not suit our operation, currently undertaking most other practices seen however
- Most work contracted out. Contractor chosen firstly for availability and then chosen system

- Investigate the use of a shrouded sprayer further
- Lateral mover would be well suited

Any additional or unidentified learning?

- All on tour were able to spend time talking to other participants about their own operations and techniques they have employed. Tour participants properties ranged from Keith to Millicent and across to Dergholm (Victoria), a distance covering 250 kilometres north to south and 150 west to east in the South east of South Australia. This opportunity to network and exchange information was as valuable as the knowledge gained from visiting sites throughout South East Queensland.
- Labour – the use of labour is seen to be a very limiting factor as a good, qualified and reliable workforce is something to be treasured.
- Profitability – this was an area which some participants felt needed to be further investigated prior to making any changes to their operations from information learnt



Precision Irrigation techniques Dalby



Some of the pumping equipment Cubbie



Disc seeder at Daybreak Equipment

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Learning Diary Entries as made by Tour Participants

Monday 17th August Cubbie Station

Cubbie Station is situated in a flood plain between Culgoa and Balonne minor rivers, which has an irrigation area of 22,000 hectares capable of producing an annual average of 180,000 bales of cotton (valued in excess of \$100 million). Cubbie Station has a water storage capacity of 75,000 megalitres, but is currently only holding enough water to plant 1000 hectares of cotton this season which equates to approx 7000 megalitres

Who spoke?

Simon Graham, who is one of 4 farm managers. In 2009, approx 20 full time staff are employed including grader drivers, boilermakers.

What do you believe were the key topics/issues?

- Environmental issues relating to water and genetic modification
- Land clearing
- Water availability, security, management and efficiency
- Ability to control so much irrigation with few staff
- Large scale infrastructure does not lend itself to diversifying
- Publicity received is not always correct

What was new/unusual or particularly interesting to you?

- Cotton production
- Large scale of the property – 19,000 ha available to crop but due to water only 1,000ha being sown to cotton in 2009
- Volume of water that is required to irrigate 20,000 ha
- Flatness of land and soil quality
- The rates of Nitrogen applied per crop (250 units)
- Contractors used when possible
- Network of banks and channels constantly managed. Managers can drive up to 400kms day around property
- Lack of diversification in “tough” times

What do you feel you learnt from today?

- Gm cropping has many benefits
- Turn grazing country into cropping
- Large scale operation broken down into manageable proportions increases efficiency
- In terms of nutrition, do not leave anything to chance to ensure growing the best crop
- Climate change is affecting everywhere
- Cotton is a very easily grown crop
- Importance of timing
- Big is not always better
- Despite publicity received Cubbie Station does not have much water available
- More earthworks required at home to increase efficiency

What are the implications of this learning?

- There is the no opportunity to change if season does not go as planned when scale is so large
- Government pressure and unprofitability have now forced this property onto market
- Become more informed in relation to the water rights debate
- Large operators are unpopular
- Prepare where possible for a series of bad years
- Be efficient with irrigation water, reuse of tail water
- Keep operations simple
- Appreciate value of groundwater in SA

What will you do with this information?

- By dividing large tasks into smaller more manageable portions you can be more efficient
- Pass onto other growers that “big” should not always be the aim
- Use water more wisely
- Share information on what we have seen with growers at home – less impact on other areas than thought

How can you apply what you have learnt to your own farm?

- Recycling of water
- Gm cropping
- Watch spending
- Corporate farming is far from efficient, smaller operations are more easily able to change direction if the season dictates
- Replication is the key when managing large scale operations – focus on one unit and then replicate
- Use contractors to improve efficiency
- Trial higher value crops under irrigation

Other comments

- The property is state of the art, earthworks to keep it all functioning is huge
- Interesting to see a property that has been in the news, and learn that all is not always as reported
- GM technology has reduced insect spraying from 15 to 4 passes!
- Scale of property is amazing



Monday 17th August
Ian Todd – guest speaker and host for dinner

Ian Todd, cottongrower based at St George, along with a handful of local operators, from growers to aerial spraying contractors, provided dinner for the group alongside the Balonne river in St George.

Ian gave an insight into how his operation works and some of the political battles that they are fighting. Ian is also part owner of a local machinery dealership and highlighted some of the issues involved with this.

What do you believe were the key topics/issues?

- Water availability and harvesting for irrigation, last decade has been dry
- Importance of public relations
- Controlled traffic, timing, deep sowing and moisture retention
- Scale of production
- GM cotton is the way to go – major savings due to pesticide application reduction

What was new/unusual or particularly interesting to you?

- How the Murray Darling water system works
- Deep Sowing down to existing moisture - chick peas down to 8 inches and beans to 10 inches
- Volume of water when river is in full flow
- 20" spacings
- 24D application – still applied by air
- Land potential if water available – poor dryland yields

What do you feel you learnt from today?

- Traffic compaction has a large impact on production
- How much government decisions can impact growers
- Importance of new technology
- Importance of chasing moisture and timing – irrigation scheduling and seeding
- Farm to your conditions
- Better yields from deep sowing
- Inaccuracy of media reports in relation to water

What are the implications of this learning?

- Consider adopting some of these practices after trialling
- Every grower in area must share resource
- Become better informed on water management
- Tram lines may be of benefit in our soils

What will you do with this information?

- Keep width of implements in mind when planning for the future
- Better understand Qld growers situation
- Apply post sowing pre emergent knockdown earlier but sow beans deeper when possible
- Investigate "tram lines" from local sources
- Investigate other methods of testing for soil moisture prior to irrigating
- Encourage young farmers to have another trade or profession as well, climate variability can hurt

How can you apply what you have learnt to your own farm?

- Diversifying interests more
- Maximise dollars returned from dollars invested

Other comments

- Self confident man who runs both of his business' well along with being involved in local government and committees



Tuesday 18th August
Moonrocks

David Moon escorted us on a tour of their family owned enterprise, growing onions, rockmelons, pumpkins, lucerne and table grapes which is situated 20 kilometres from St George.

Moonrocks currently employs approximately 14 full time staff, along with administration staff. In the peak season up to 250 casual labourers are employed to harvest produce.

Trickle irrigation is used for onions and rockmelons. Approx 503,000 onion seeds are planted per hectare returning approximately 18 tonnes/ha.



What do you believe were the key topics/issues?

- Utilizing water and management
- Importance of marketing
- Efficiently manage a smaller block to make a profit
- Irrigation techniques – applied direct to root zone
- Staff Management
- Bed forming and seed planting

What was new/unusual or particularly interesting to you?

- Use of plastic on planting beds to reduce water use from 6mgs to 2mgs/ha, through dripper tape
- Melon management and nutrition
- Good labour hard to hold – housing provided to help retention
- Use of liquid fertiliser

What do you feel you learnt from today?

- Do not grow vegies – high inputs
- Differentiate yourself from competitors to become more profitable in niche markets
- Due to continuous production – managers vulnerable to burn out due to no down time, appear tired and losing drive
- Water savings that can be made using latest technologies
- Deal direct with big supermarkets – much better option
- Understand your markets and their needs – and their ability to pay
- How much of a role technology plays
- Better water security than Cubbie Station – land is worthless without water

What are the implications of this learning?

- Keep investigating alternatives for better water use
- Try different things, think outside the square
- Encourage farmers to have time off
- Be aware of production costs

What will you do with this information?

- Differentiate myself from others to offer better service
- Investigate application of liquid fertilizer through pivots

How can you apply what you have learnt to your own farm?

- Water monitoring to improve water use efficiency
- Discard enterprises that are not so profitable
- Use of RTK GPS on tractors to plant vegetable crops
- Sell direct to markets, avoid resellers
- Implement vertical integration to enterprises
- Seems to be continuous investment costs to enable growers to keep up to speed

Tuesday 18th August
Coggin Family at Westmar

We toured the Coggin Family property at Westmar, situated between St George and Dalby. The Coggin Family have entered the Guinness World Record book for planting the largest paddock of wheat in the world – 905.48 hectares. This was achieved with a planting rig consisting of a non modified 120 foot Multiplanter, coupled with a 12000 litre Simplicity Air Seeder and pulled by a John Deere 9630T, with 530 horsepower.

Phil Coggin, accompanied by daughter Emily, conducted a guided tour over the property which consisted viewing of the 8000 head feedlot, machinery and equipment, grain drying and storage facilities, pivots, water storage areas along with general cropping sites.

What do you believe were the key topics/issues?

- Importance of sourcing good quality cattle for feedlot
- Winter cropping – sow on time
- Diversity

What was new/unusual or particularly interesting to you?

- Size of machinery
- 1000 – 1500 ha paddocks
- Automated Cattle yard and feedlot – 100 days to fatten cattle
- Rainfall variance – 8 – 38 inches
- Forth/Fifth generation farmers
- Use of waste from feedlot under pivots
- Chains on airseeder wheels to clear mud
- Some irrigation from surface run off

What do you feel you learnt from today?

- Methods of value adding
- Soil water storage
- Staff –percentage of reliable staff is low. Look after good staff
- Simplicity of large scale cropping – you can become to big!
- Large family businesses can work
- Farm to your area
- OH&S issues eliminated with cattle due to automation –but cost high
- Stock and cropping can work together

What are the implications of this learning?

- Make greater use of grain produced
- Improve soil water holding capacity to insure against dry periods
- Must have money to begin farming this way – can't be done from scratch

What will you do with this information?

- Investigate dietary requirements in feed lot – use a stock nutritionist

How can you apply what you have learnt to your own farm?

- May look into establishing a feed lot
- Increase stubble retention
- Is bigger better – not necessarily
- Need to be more efficient
- Feedlot lambs to use lesser quality grain



Wednesday 19th August
Simplicity AirSeeders

Simplicity Australia head office and factory is based in Dalby in SE Queensland, about 200kms west of Brisbane. This is the home of the most comprehensive and innovative range of Air Seeders in Australia with a reputation for quality that has attracted solid national and international markets.

Simplicity Australia employs around 80 staff and is preparing to further extend its manufacturing capabilities with the construction of a major new complex. Plans to invest in a purpose-built manufacturing plant reflect the company's confidence in the Dalby region.

Simplicity Australia is a major production company producing an extensive range of Air Seeders and cultivators.

What do you believe were the key topics/issues?

- Employees difficult to access and keep
- Engineering, design and building of air seeders
- Efficiency and attention to detail
- Ability to design according to requirements

What was new/unusual or particularly interesting to you?

- Technology used and computerized machines
- Management of business as individual components for efficiency
- The size of the operation and efficiency
- Metering system on airseeder
- Stringent quality control programme
- Building of a quality, proven product

What do you feel you learnt from today?

- Why they are so expensive
- Make sure plan is right before construction
- Flexible work hours
- Better appreciation of process involved in manufacturing machinery – everyone has a job to do

What are the implications of this learning?

- Confidence in product

How can you apply what you have learnt to your own farm?

- Modify the equipment I already own
- Try to plan work better
- Consider simplicity equipment for next purchase

Other comments

- Noise level in factory made it very difficult to hear presenters



**Wednesday 19th August
Daybreak Equipment**

More emphasis is being placed on sustainable agricultural practice. Milne Industries, manufacturers of Daybreak Equipment have developed highly specialised planting and fertilizing equipment for modern Zero Till agricultural applications.

Since 1988 Milne Industries has manufactured automotive tray bodies, slashers, front-end loaders, three-point linkage tools, hydraulic folding harrows, soil sampling devices, and small linkage toolbars. Capitalising on the past experience with imported zero till farming equipment, Milne Industries began to develop their own Disc Opener under the adopted brand name of Daybreak Equipment.

Trials of the first prototype commenced in July 2000. As a result of using sophisticated 3D-design software and the latest CNC equipment prototypes were produced to be assured that the Daybreak Disc Opener was ready to tackle the zero-till planting market. Milne Industries has exported the Daybreak Disc Opener and toolbar systems to South Africa, Zambia, Sudan and the United States. Other markets are currently being developing in all parts of the world.

Ross and Jordy Milne discussed the advantages of using this equipment with participants, following a tour of the factory they then travelled with us to view several properties that have been employing this technology around Dalby. These farmers were growing wheat, sorghum, cotton and chickpeas.

What do you believe were the key topics/issues?

- The use of discs to minimize soil compaction
- Zero soil disturbance – is a whole system not just using a disc seeder
- Minimal compaction, controlled traffic
- An alternative to tyned seeders
- Continued evolution of the disc
- Double cropping – zero till
- Use of disc for nitrogen application
- Wider row spacings – may not affect yield

What was new/unusual or particularly interesting to you?

- The use of discs
- The local soil type – deep loams and clays
- The Milne family's passion for what they do – son involved from very young age in all aspects of design and construction – now ideal business partner
- Does not use a dealer – goes direct to purchaser

What do you feel you learnt from today?

- Discs may be an option in our heavy, black soil
- Maybe we could obtain similar or higher yields with lower plant populations
- Give family members more responsibility
- Inter row sowing techniques
- Seed tube design can affect seed placement
- Use of discs can save horsepower and fuel, ie input costs
- Controlled Traffic has huge advantages

What are the implications of this learning?

- More efficient production
- Soil moisture conservation
- Savings on chemicals and other costs – due to less disturbance of weeds
- Would a disc seeder fit into our system?
- Possibility of improving yield as well as improving soil health
- Retention of stubbles for carbon farming
- Wider row spacings work well with Precision Agriculture
- Modify seed tube to get better placement

What will you do with this information?

- Research funding opportunities for trials
- Attach a couple of discs to seeder to trial in my soil
- Research disc seeders operating in our area
- Use information to remove myths in SA re discs

How can you apply what you have learnt to your own farm?

- Conduct trials and more research
- Attempt to sow some areas with varying rates and row spacings
- Sow urea prior to seeding to avoid toxicity
- Look at row spacings on conventional equipment

Other comments

- Rhizotonia control is a major issue with this equipment, needs some research to be carried out



Wednesday 19th August

Michael Burgis from Conservation Farmers Inc

CFI's membership of 550 receives independent information via a bi-monthly newsletter, field days and a website. To compliment the on-farm activities CFI has been participating in training programs such as the soil and water and spray management workshops and an on-farm business management program. CFI currently collaborates with Partners in Grain in a novel and innovative farm-base training program that is capturing members and other family farms enthusiasm.

CFI activities are funded via project submissions through government institutions such as GRDC, DAFF, Farmbis, and Catchment Authorities. The activities are directed by a board of management of eleven members consisting of 5 farmers, 3 industry and 2 government agency people. CFI employs 2 permanent and 1 part-time staff based in Moree, and Toowoomba.

CFI continues to share ideas and experiences between farmers, agribusiness and the public sector to improve sustainable economic management in agriculture.

Lloyd O'Connell from Australian Grain

Australian Grain is a bi-monthly publication containing information on local and international grains research and issue,s of which Lloyd is the editor.

What do you believe were the key topics/issues?

- Sharing of information
- Growing high value produce
- Water security
- Commodity prices
- Mining in area is a concern for primary production
- Soil erosion due to heavy, sparodic rains and impacts of direct drilling
- Importance of supporting farming groups

What was new/unusual or particularly interesting to you?

- Organizing study tours world wide
- If no rain in 10 days crops in area will be ruined, which will drive wheat prices up
- NSW and Qld have no cross border issues re pricing – unlike SA
- Reduce tillage has had big impact on moisture holding and soil health
- Belief that Australian will become a basic grain grower – wheat, barley, sorghum
- CFI does no field work – extension activites only

What do you feel you learnt from today?

- Encourage farmers to look more closely at grain pricing and marketing
- Subscribe to Australian Grain
- MFMG has an important role

What are the implications of this learning?

- Watch supply and demand
- Pay more attention to grain prices
- Skilled labour is hard to find – need to find ways of needing labour
- Attend more field trips to increase learning

- Consider fencing of trees and shelter belts

Other comments

- Australian Grain looking for SA correspondent
- Concern for lack of funding for CFI

Thursday 20th August
National Centre for Engineering in Agriculture
University of Southern Queensland, Toowoomba

Hosted by Graham Harris, Extension Officer for Irrigated Farming Systems, the following presentations were made at the University:

Rod Smith – National Program in Sustainable Irrigation review on Precision Ag

Jack McHugh & Steve Raine - R&D in South-East Queensland Irrigation Futures including EM38, NDVI mapping work

Alison McCarthy - Precision Irrigation Application – VARIwise - Various Tools, Technologies and Training

The group then travelled across the Darling Downs to tour the following properties

Brett and Liza Crothers, Breza Farming, “Benalla”, Dalby.

In partnership with Brett’s father and mother (Bevan and Helen) they farm 1520 ha of which 1320 is irrigable.

Traditionally they have used furrow irrigation but in the past 5 years they have invested in overhead irrigation systems in response to limited water availability. They currently have three lateral irrigators (710m, 900m and 1000m machines) and a 455m centre pivot. They source their water from overland flow, Condamine River and Oakey Creek licenses and groundwater licenses. They produce cotton, grain crops, lucerne and cattle.

Russell and Jenny Clapham, “Balmoral”, Brookstead.

They irrigate 800ha on which cotton and grain is produced. They have been converting their furrow irrigated farming system to an overhead irrigated system. They currently have three different overhead system – a 1100m channel fed lateral move, a 470m hose drag lateral move and a newly commissioned lateral-swing pivot irrigation system. These have the latest in guidance and control technologies. They use GPS guidance systems and precision agriculture in their farming operations.

What do you believe were the key topics/issues?

- Precision irrigation application to maximize efficiency
- Controlled application of water in a timely manner
- Mining in area is affecting agriculture
- Emphasis on labour saving devices and reducing in water wastage

What was new/unusual or particularly interesting to you?

- Site specific irrigation
- Lateral racetrack irrigation
- Water solenoids on irrigator
- Lateral movers with GPS technology

What do you feel you learnt from today?

- Keep a close eye on technology – have seen latest available at moment
- Our region is already fairly advanced in Precision irrigation
- Drip tubes are good, but you need the ground to crack so water runs into soil
- Overhead irrigation is the most cost effective
- Methods of avoiding over watering
- Don’t try to cut costs upon establishment
- Every drop counts
- Know moisture status of soil and requirement of crop through all growth stages

What will you do with this information?

- Contact local precision irrigators for information
- Magnetic testing
- Wait for technology to be more accessible
- Retain Graham Harris as a valuable contact for irrigation technology

What are the implications of this learning?

- Seek more knowledge from our area to improve efficiencies
- Bubblers are a must with pivots
- Being more aware of what is available
- More research
- Need to be more computer literate – good science can fix almost all problems
- It needs to be cost effective and beneficial for farmers to continue

How can you apply what you have learnt to your own farm?

- Use irrigation technology with EM38 mapping
- Use a centre pivot
- Trial moisture probes and sensors – improve water scheduling
- Use of crop monitoring with response to application of nitrogen
- Calibrate pivot and change nozzles

