FARM BUSINESS UPDATE

STRATEGIC STEPS – ENDURING PROFIT

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

Mulwala

Wednesday 27th June

9.00am to 1.00pm

Yarrawonga Mulwala Golf Club,

Golf Club Road, Mulwala

#GRDCUpdates

Mulwala GRDC Farm Business Update
convened by ORM Pty Ltd.

Additional copies of the proceedings can be ordered through ORM for $25 (including postage and GST)

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Program

9.00 am	**Announcements**	***ORM***
9.05 am	**GRDC welcome**	***GRDC***
9.10 am	**Marketing grain – what, where, how & who of maximising profit**	***Brad Knight,*** *GeoCommodities*
9.55 am	**Identifying high costs paddocks & how they impact on your farm profit**	***Phil O'Callaghan,*** *ORM Pty Ltd*
10.40 am	***Morning tea***	
11.10 am	**Making it work across generations. A family farm case study**	***Leo Delahunty,*** *Templemore Partners*
11.55 am	**How to think about emerging technologies**	***Paul Higgins,*** *Emergent Futuress*
12.40 pm	**Close and evaluation**	
12.45 pm	***Lunch***	

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Riverine Plains Inc

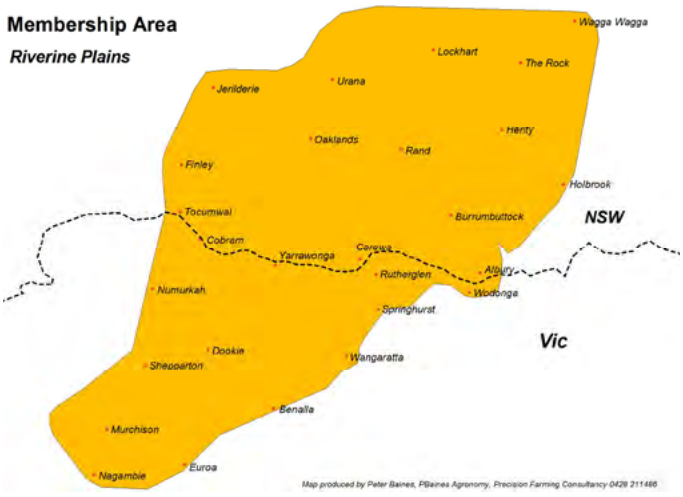
Farmers inspiring farmers

Riverine Plains Inc is an independent farming systems group dedicated to improving the productivity of broadacre farming systems in northeast Victoria and southern NSW.

Our membership (and our name) is drawn from the agro-ecological zone known as the Riverine Plain.

Riverine Plains Inc specialises in farmer driven research and extension that delivers on-the-ground benefits to the region's growers. Our focus is on providing independent, timely and relevant information through a rigorous research program and our annual schedule of events and publications.

As an independent organisation operating across state boundaries, Riverine Plains Inc works to enhance the extension of state and regionally based research results to the region's growers. Our ties to industry, research and funding organisations also means that we can design and develop new projects to address regionally specific or cross-border issues.



Providing quality information

Riverine Plains Inc delivers information and research results across a range of formats to meet the needs of our members. We publish a bi-monthly hardcopy newsletter and send out regular email communications, including our grower updates, event invitations and the Grower Bulletin which is produced on an as-needs basis throughout the growing season.

Our flagship annual publication "*Research for the Riverine Plains*" delivers the results of research carried out by the group, as well as external research relevant to the Riverine Plains region.

Sharing ideas

Central to our philosophy of 'Farmers inspiring Farmers' is our annual events program, which includes field and machinery days, paddock walks, seminars, discussion groups and study tours. Our events bring together farmers, researchers and industry experts to share ideas, seasonal information, research results, technical experience and business expertise.

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The research capacity of Riverine Plains Inc is widely recognised across the Australian grains industry and we partner with a range of leading research and extension organisations to carry out locally-relevant, farming systems projects. This delivers meaningful, local results that address the challenges faced by our members and the wider grains community.

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Riverine Plains Inc has 3 different membership options available; $80/year Farming Membership ($220 for 3 years), $30/year Student Membership or $350/year Corporate Membership.

For further information, or to download a membership application form please visit our website at riverineplains.org.au/membership/ or contact the office on 03 5744 1713.

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Supply chain evolution and the grain marketing process

Brad Knight.

GeoCommodities.

Keywords

- grain marketing, on-farm storage, bulk handling, supply chain.

Take home messages

- Narrowing, fragmented supply chains are changing the nature of price competition making the choice of where to store grain at the first point more important.
- On-farm storage profitability is very good (compared to other investments) and relatively low risk when done correctly.
- In time, on-farm grain has the potential to achieve a similar status to bulk handling grain with technological development and improved practices.
- The grain marketing process is dynamic and understanding the elements of the process helps continual improvement.

Introduction

This paper is less economic, more qualitative in regards to discussion and analysis of how the supply chain is currently evolving. Most importantly, the awareness of supply chain trends is critical to enable farmers to best position their business for grain marketing into the future. The supply chain while basic in nature is incredibly complex with lots of different stakeholders in the market. Compounding this are the numerous 'streams' that grain can flow down even if they are ultimately ending up in the same spot, and that each of these can often have its own supply and demand dynamics.

Supply chain trends

To provide context, a basic outline of the export supply chain is provided in Figure 1 which shows the links between farms, silos and export ports and the freight mechanism to transfer between each of them. Other supply chains include farm to end user (direct or via storage) and farm to packer (direct or via storage) and from the packer to port (via road or rail transport).

Supply chain efficiency is not about getting a premium but about being competitive (being able to make sales), so at any point in time you will not be able to see the difference between an inefficient and efficient supply chain. What adds complexity

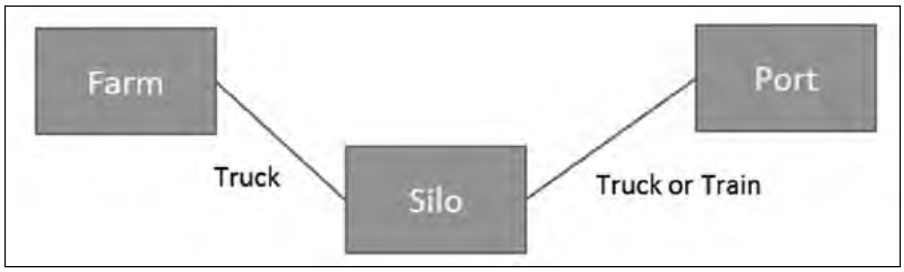

Figure 1. Basic export supply chain.

is that the supply chain cannot be analysed in a vacuum and there is always a complex array of supply and demand matters across each leg of the supply chain that makes analysis difficult. The timing of the pricing decisions across the supply chain are not always made in a chronological order. The following example demonstrates the extended view of the supply chain and in doing so highlights the complexities of running economic analyses on the supply chain.

Example of complexity within a supply chain

If we take for example, an end user bidding for grain and buying directly from growers at a competitive price for grain. To meet the end user's strategy, they decide to purchase a large volume from a grain trader as they were not able to buy enough from growers at that time (the traders' offer became cheaper than the growers' offer). Consequently, the best bid in the market into the same destination now may be from a grain trader. The trader buying may not necessarily be the one who has just sold, the end user may have purchased from another trader four months earlier and is now deciding to call that grain in. That trader then has the decision to execute stock they already own or buy new grain from someone else to deliver to the end user. Further to that, the trader may not actually own any stock in the right spot, and therefore, they now must determine where they can access it from? Grain stock bought for that market two months earlier may have already been used for a different order or now works better delivered somewhere else due to a change in freight spreads.

There are certainly ways that it can get even more complicated than this and grain trading is not a new process, but this example at least paints a picture of the complexity of the process and farm businesses are closer than ever before to this side of the market due to competition. Within a very simple end to end supply chain there can be many different market participants on either side of the market. Mix hundreds of these simple supply chains together and suddenly you can see why traders exist to profit from opportunities if markets move out of line with each other.

One of the main trades is price spreading between 'track-' (Bulk Handling Company (BCH) site grain) and 'delivered-' markets as each is governed by their own supply and demand fundamentals. While they are of course related to each other, it is the job of the market to ensure they do not get too far out of line in the long run. The 'track' market refers to grain in possession of major bulk handlers that is ticketed and when priced at port (or track level) there is a known set of gazetted location differentials (governed by Grain Trade Australia (GTA)) which are used to price that grain back to an upcountry site. More and more grain is trading as rail site only major bulk handlers as this makes it more tradeable in terms of paper, and it is this paper trade that enables many market participants to be involved which could not exist if the crop was only traded once (from farm gate to local consumer or exporter). This competition for grain is vital to drive competitive pricing to the local site or farm gate. The downside is it complicates supply chains and does make price discovery and transacting potentially more labour intensive for the grower.

The major trend in recent years in the supply chain has been a narrowing of focus by grain buyers (exporters and traders) to be competitive in certain supply chains rather than them all. A term for this is fragmentation where there is increased competition across supply chains rather than within them. Major BHC asset holders in Victoria are increasingly competitive in their own assets rather than other traders' assets (even though they are actively allowed to purchase in other BHCs). Further to this, there are no major bulk handling facilities or ports which are not operated by a business with a grain trading division. Those that don't own assets are also more competitive in some supply chains than others and this trend seems to be growing as they look to remain competitive against other supply chain owners. They are increasingly looking towards farm and private networks.

As market drivers change which one is offering the best price will vary. Price competitiveness will depend on which buyer and supply chain is most aggressive at the time of sale. It is not just bulk handling assets that this applies to, but also packers and ports – this season has seen some very strong competition from several traders with container packing assets. These traders have efficiency gains through their investments and have been able to share some of this (i.e. pay growers more) to get throughput. This is a great example where competition is helping the price as without competition supply chain efficiencies are mostly kept by the innovator/investor and not passed onto the grower. In the future, it will become a lot harder to compare 'apples with apples' at an aggregated level and having the right grain in the right spot will become harder to achieve as it is not always obvious which supply chain will be most competitive for certain grades and timing. To counter this, storage choices and investments by

growers need to maintain as much flexibility as possible and growers should look to reduce upfront supply chain costs – once grain has started to move down a certain stream of the supply chain its costly to change its path.

Analysing on-farm storage profitability – theory and reality

There are numerous tools and resources available to help assess the economics of on-farm grain storage. One such resource is the GRDC funded Stored Grain resource (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2018/03/grain-storage-get-the-system-and-the-economics-right). The basics of assessing on-farm storage profitability is measuring net profits per year versus initial investment (return on investment). Calculating the net profit is easy also – benefits less the costs. The costs are simple to determine as long as you don't forget to include them all such as labour and monitoring costs (amongst others) and you must account somehow for any sunk costs (i.e. those investments already made or to be made that are required by on-farm storage, for example; augers). The harder part of the calculation are the benefits in a financial sense of on-farm storage, as these are two-fold, cost savings and gains made (but compared to what). Furthermore, some of the savings are risk free every year (for example, freight savings, reduced ongoing carry costs of monthly warehousing) while other benefits of on-farm storage such as blending, improved segregations and avoiding quality downgrades due to speedier harvest are not guaranteed to happen every year. Anecdotally though, at least one year in three on-farm storage offers a major gain or cost saving through improved segregations (avoiding discounts at bulk handling sites) and blending opportunities.

One key message in this analysis is that any price gains post- harvest cannot be included in the economic analysis, especially when comparing on-farm storage investment to utilising bulk handling sites. This is because market improvements are felt in all storage systems if the underlying grain market improves. There may be some differences in timing and potential mismatch of grain location and demand (for example, domestic demand finds it harder to buy in BHC sites compared to on-farm) but the underlying market improvement is still felt in all systems.

Using actual data obtained from GeoCommodities between 2013 and 2018, trades of the major wheat grades ASW1, APW1 and H2 on a delivered buyer/ex-farm basis and in the bulk handling system were analysed. All sales in the bulk handling system were converted to an equivalent track price using GTA location differentials and ex-farm/delivered sales were marked to a delivered Melbourne (West side) price. All trades were collated on a monthly basis and the difference between Melbourne/Geelong track sales and delivered Melbourne prices for the same grades were compared. The results are shown in Table 1 and while they do show some variability, overall the average price spread of $14.34 (Delivered Melbourne over track) is approaching full BHC storage and handling costs of around $17-18/metric tonne (MT). Actual road freight costs can vary around GTA location differentials but assuming they average similar to this figure of $14.34/MT, this figure can be used in working out the benefit/value of on-farm storage. Another assumption made in this analysis was track sales were averaged across all site types – rail and road only, large BHC and smaller BHC. In reality, there is often large differences in sites depending on this rail/road status and buyer competition, so when an individual grower's site preferences are known a similar analysis should be conducted if using the same decision-making framework.

Table 1: Delivered Melbourne versus Track Melbourne/Geelong prices for the major grades: APW1, ASW1 and H2 combined.

Season	Del Melb over Track Melb/Geel (MT)
13/14	13.44
14/15	13.20
15/16	17.18
16/17	14.48
17/18	13.38
Overall Average	**14.34**

Calculation of the investment return on grain storage (Table 2, Figure 2) indicates farm storage is a very good investment. To generate an annual return, some assumptions were made around freight savings to home storage versus local BHC and a modest blending benefit (averaged out over several years across all tonnes). In terms of costs, variable costs of $3/MT (including treatment and monitoring and silo repairs and maintenance) and depreciation of $7.50/MT per year over the life of the asset. The analysis does not take into consideration tax implications (good or bad) and has deliberately left out the opportunity cost of the capital.

Table 2: Investment return of on-farm storage.	
Season	*All 2013-2018 ($/mt)*
Freight saving	$ 5.00
Blending	$ 2.00
Farm gate price vs depot price	$ 4.34
Gross Return	**$ 21.07**
Variable Costs	$ 3.00
Depreciation	$ 7.50
Net return	**$ 10.57**
Asset cost	$ 150.00
Return	**7.04%**

Figure 2 demonstrates that investment in on-farm storage compounding at around 7% per year will turn $1 in 2007 into $2 in 2017, beaten in this example only by the US share market in the same period. Australian property is well down in comparison but deserves a mention because it is a victim of the data telling a story – the years preceding 2007 had very strong growth but a correction in the housing market in 2007 saw prices drop dramatically not giving them a good start in this specific 10-year period.

Comparing returns from on-farm grain storage to other asset classes puts the investment in context and given the relatively low risk nature of on-farm storage, it compares very favourably not only against riskier assets but also conservative assets as well.

Weighing up on-farm storage versus bulk handler storage

While it is easy to do some basic maths, and show in theory that on-farm storage should allow some cuts in costs, it is obviously more complicated than that. One of the major stepping stones to adoption of on-farm storage is designing an on-farm strategy that dovetails in with existing fixed costs, labour and management that will be able to optimise outcomes. Further to this there are just some things that the BHC system can do better and some things grain on-farm can do better (Table 3) – note these are anecdotal guides only and vary from company to company and farm to farm.

To continue to take market share from BHC sites and maintain prices spreads or even drive the

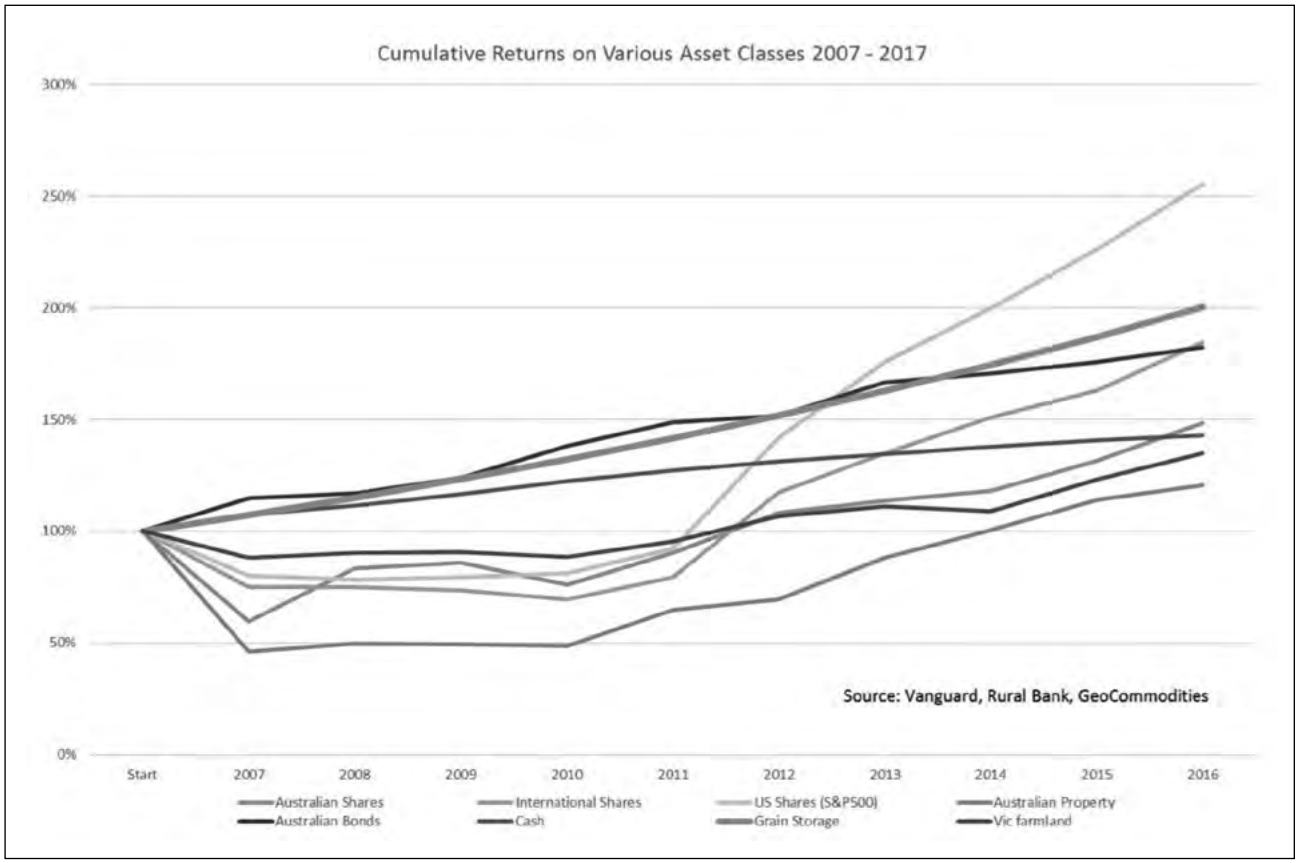

Figure 2. Cumulative returns by calendar year of different asset classes (Source: Vanguard, Rural Bank, GeoCommodities).

Table 3: Performance of on-farm storage compared to bulk handling companies (BHC).

Category	On farm storage	Smaller BHC	Large BHC
Stock swapping	Poor	Poor	Very Good
All weather access	Average	Average	Poor
Carry indefinitely	Poor	Very Good	Excellent
Hygiene credibility	Average	Good	Excellent
Hygiene performance	Good	Excellent	Excellent
Quality credibility	Average	Very Good	Excellent
Quality control	Very Good	Excellent	Excellent
Weekend and after hours access	Excellent	Average	Poor
Traceability to farm/paddock	Very Good	Poor	Poor
Inventory finance	Poor	Average	Excellent

premium in ex-farm / delivered markets, on-farm storage needs to match BHC sites positives and think of innovative ways to deliver some of the clear benefits that BHCs have over on-farm storage.

Additionally, on-farm grain storage mustn't do anything that loses any edge over BHC grain. Quality focus and professionalism is paramount and it is likely technology and systems are improving to help manage smaller farm based setups. Furthermore, farm businesses can have several roles in the supply chain; from seller to storage and handler and potentially logistics which can all be rolled up in one package. This can reduce flexibility at times but also provides some benefits depending on the customer.

The final comment is around future proofing the storage investment. This involves choosing the right storage for the situation and being able to have flexibility in treatment options into the future. Scrutiny on chemical usages both post and pre-harvest is going to increase rather than decrease. For example, the ever-improving maximum residue level (MRL) detection equipment and pre-harvest chemical applications. This is also not about getting a premium, it's about avoiding a discount or finding a market in the long run. Customers assume that food and feedstuffs are safe as baseline, and it's the definition of safe that continues to change.

Key aspects of the grain marketing process and important considerations

Figure 3 outlines a simple model for the grain market process. The most important feature is that it is a dynamic process that continues to develop and never ends; as one deal closes and another one opens.

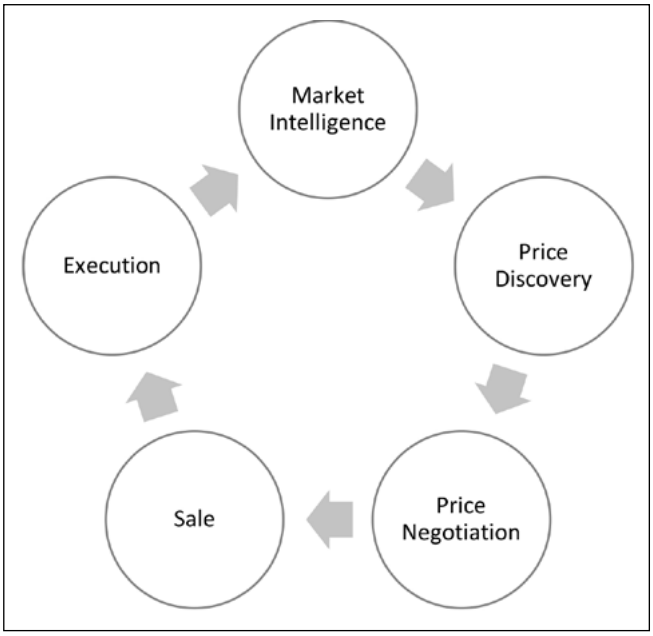

Figure 3. Simple diagram of the grain marketing process.

Market intelligence

Market intelligence refers to the concept of establishing whether the present is the time to 'play the game' or not, depending on where the market has come from and the view looking forward. By researching the market and gathering intel a decision is being made about whether the current market situation is the right one to act in. Further to this, it must be assumed that the market is efficient in that everything that is known today is priced into the market. This is especially important for the main commodities like cereals and oilseeds where very liquid global futures markets trade daily and give markets their lead. There's no beating the market by knowing information it doesn't so the next option in market intel is gathering appropriate content

from consistent sources. Appropriate meaning the information has enough depth to suit requirements and matches the timeframe in which a selling decision needs to be made. Limited information in the right context is much more valuable than lots of information that might be out of context. Finally, understand the difference between local and offshore market influences and don't mix them up. Occasionally, local Australian price drivers will be impacting global values as Australia is a major exporter of wheat but in most cases local and offshore factors move independently of one another so both need to be monitored

Price discovery

Once the decision to 'play the game' has been made, gathering information about what prices are available is the next step. Growers have never been better informed of market and price data than now with technology continuing to improve this. Market reports, online market places, social media and live pricing is increasing the accessibility of trade data. Technology will continue to revolutionise price understanding and reduce the variability in pricing day to day between different market participants. The latter is very important to consider, as trade data showing grade, tonnes and price doesn't always tell the full story and there will still be some variability in pricing due to the terms of the deal (payment terms is a good example). Further to this, as markets become more live they will be more responsive to changes in other markets day to day (for example, the FX markets and intra day offshore markets), so trade prices within a day could vary. A trait of successful grain sellers is that they worry more about if selling is the right thing to do based on information available at the time (market intel), rather than the exact price achieved.

Price negotiation

Central to improvements in price discovery is the concept of bid and offer. Traditionally grain growers have been used to seeing the bid side of the market and seeking out the best bid each day. On the opposite side of the market is the offer side, which relates to what someone is willing to sell at. Quite often it is the grain sellers meeting the bid with their offer but as technology and price transparency has improved, more sellers are able to approach the market from the offer side and increasingly buyers are accepting of this practice. This practice does push more responsibility back onto the seller, to do good market research and price discovery to know where to place the offer. However, it does have the rewards of achieving prices above bids. Further to this, understanding market sentiment becomes much more important because knowing when to hit a bid or offer at a higher price is important if the market is moving in a certain direction (i.e. in a falling market selling at the bid is often a better result than offering above and not getting a trade, only to see prices continue to weaken through the day or next day).

Market behaviour is changing more for grain in bulk handlers and differently due to the nature of how it is evolving for grain on-farm or even in private storages. Here the negotiations become as much about terms and quality of execution. The buyer wants a relationship of this nature more than a price. They want the benefits of flexible storage, accessibility or specific quality control that may only be available from smaller segregated storages. The demand for farm grain versus BHC grain can be inconsistent due to the fluid nature of the underlying markets. Sometimes in the BHC system it is advantageous for the buyer to be able to separate the pricing and execution functions. Negotiating with a storage and logistics provider who also happens to be the owner of the grain can sometimes complicate negotiations and reduce execution flexibility for the buyer. Over time it is likely that products and technology will be developed that may enable these functions to be more separated even for on-farm grain.

Sale

Offer, acceptance and consideration– that's all it takes to make a sale! These three components form the basis of a contract. Naturally there is a lot more to selling grain than this though. The overarching component missing from this classic contract law statement is terms. The consideration (price) for a certain quality (bin grade) is the main focus of many market participants market intel gathering, but there are many more important aspects of the terms which must be considered and put into context around price and quality. The main additional components of the terms other than price are tonnes, bin grade and quality, location and delivery period. Other components include payment terms, carry's, tolerance, conveyance (buyers/sellers call/option) and contract terms and conditions governing the trade. It is only once all terms are agreed upon that price can actually be negotiated.

Once the key components of any contract are agreed upon it is vital to check documentation associated with the sale. This includes the contract itself to make sure all is as agreed and then any associated documentation.

Execution

As the line between trader, grower and supply chain narrows so does the responsibility of seller and buyer to act in terms of reference of the trade. Contracts written often include a clause that states a specific tonnage and tolerance percentage, and delivery at a time nominated by the buyer (buyers call). This is done to assist buyers; however, they are difficult for growers to adhere to. Buyers are increasingly holding growers to contractual obligations.

Useful resources

- http://aegic.org.au/wp-content/uploads/2016/04/The-cost-of-Australias-bulk-grain-export-supply-chains-Full-Report.pdf
- https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2018/03/grain-storage-get-the-system-and-the-economics-right
- http://insights.vanguard.com.au/static/asset-class/app.html
- https://www.ruralbank.com.au/assets/responsive/pdf/publications/afv-2017.pdf

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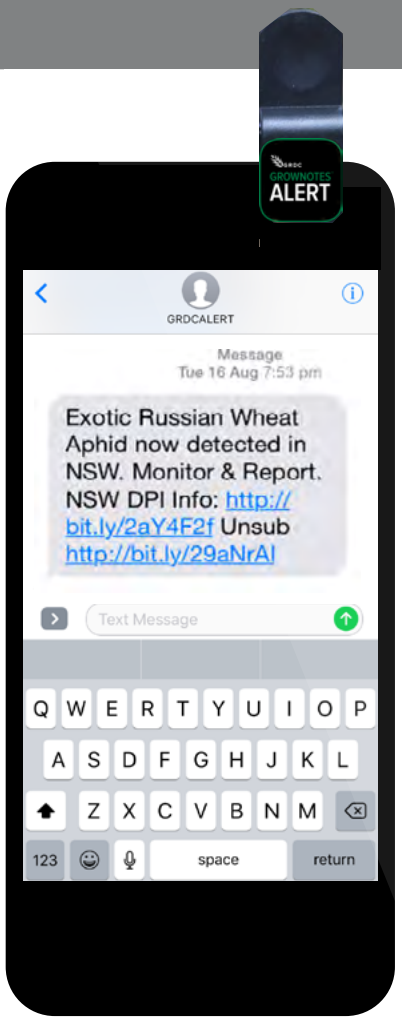

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AGRICULTURE VICTORIA

GRDC GROWNOTES ALERT

Measuring sustained profitability, allocating resources more efficiently and reducing financial risk

Phil O'Callaghan.

ORM Pty Ltd.

Keywords

- land values, return on capital, debt, equity, crop income, livestock, machinery cost, finance cost, financial risk.

Take home messages

- Victorian farmland 20 year investment return to 2016 was 9% per annum and includes a return on capital shown as land lease of 4% and capital growth of 5% as reported in Rural Banks Ag Answers May 2016. When compared to other investments this is very strong, suggesting farmland in Victoria has been a good investment option.
- Return on capital now averages 2-3% due to land values increasing faster than profits.
- Australian wheat cost of production five year average of $169 per tonne is 9% higher than overseas producers.
- The loss years now impact overall average profit more than the good years.
- Financial risk reduces when high cost paddocks are not cropped.
- Income volatility can be reduced by enterprise selection, seasonal carryover (water or $$) and timeliness of operation.
- Machinery investment has increased faster than income and has resulted in labour efficiency.

Australia competing in a global market

Results from an international benchmarking study, GRDC project AAM00001 titled 'National and International Regional Crop Benchmarking Network', referenced at GRDC Groundcover Issue 133 March-April 2018, which in summary can be interpreted as follows:

- Australian wheat yields are lower than other countries.
- Our farm gate prices for wheat are relatively good.
- We have higher seasonal variation in yield.
- Our wheat gross margin per tonne is comparable to our competitors.
- Our production cost per tonne averages about $169/tonne for wheat. The international average is $155/t with Argentina being the lowest at $109/t.

Victorian Wimmera/Mallee historical performance

AgProfit™ long term data includes a 20 year continuous subset of North Western Victorian cropping businesses. Analysis of this subset is similar to results from other areas and indicates the following:

- Equity (Net Worth) for family farms has grown from $1.3 million in 1995 to $5 million in 2017.

- Land values have increased faster than farm profits, hence Return on Capital has reduced to an average of approximately 2% to 3%.
- Average business debt has increased to around $1.5 million in 2017.
- On average farm income has increased 2.6 times over the last 22 years to around $1 million, and is due to growth in land area and an increase in crop intensity.
- Cost of machinery, overheads and finance are rising faster than income.
- Cost of fertiliser, sprays and other inputs are now more efficient relative to income.
- Labour efficiency has resulted from extra machinery investment.
- The financial loss in low income years has tripled, and is the result of larger total expenditure when combined with seasonal volatility of income

Managing financial risk

A generation ago it was the profit in a good year that more than covered a loss in the poor year. Now the tripling of costs results in the size of a loss in the poor year being harder to manage and not recovered by the profit from a good year. As a result a large portion of these losses are converted into core debt, hence some of the debt increase is from trading losses.

Seasonal volatility impacts on yield hence income. If income reduces then costs are converted into losses which then becomes new debt. Farming systems that operate profitably in more years than not demonstrate lower income volatility and lower total costs per $ of income and their losses in 'tough' seasons are not as large hence debt from loss years is less.

The Top 20% for profit (before interest)

The Top 20% farms from the Victorian Wimmera/Mallee AgProfit™ data subset make an extra $62 per hectare profit and achieve profits in most years compared with the average grower within this data subset. Hence for a 2,000 hectare farm there is $124,000 extra to spend on equity growth, debt reduction, capital replacement, land acquisition and lifestyle or family choices.

The profit drivers are a combination of attention to detail, timeliness of operation, cost control and efficient resource use. Extra profits can be the result of:

- Flexible management between seasons for crop area (intensity) and enterprise mix.
- Focusing the dollars where the return is best. For example, extra fertiliser and weed/pest control on best paddocks.
- Machinery costs is less per hectare both for operating and capital.
- Labour is doing more with less, i.e. machinery efficiency drives labour efficiency.

Less can be best

If profit is impacted by high costs and volatile income, then a farming system that achieves the same profit with lower costs and less fluctuation of income will be 'best'.

Farm managers are dealing with a range of variables specific to each individual farm. These variables influence which is the best farming system for that business and include variables such as soil moisture holding capacity, soil fertility, problem weeds and pests, herbicide resistance, and climatic factors such as frost or heat. Profits are about managing these variables to achieve the best outcome.

It may be that a reduction in crop area (intensity) can achieve similar profits with a lower financial risk. This can be illustrated as follows:

- Reduce crop intensity to 75% to 80% by dropping out of crop in one in four paddocks. This is achieved by selecting the high cost per hectare paddocks and/or the high income variability paddocks and choosing not to crop them.
- Utilise the 20% to 25% non-crop area to control problem weeds and build fertility.
- Cropped paddocks will increase their yield by on average by 10% (through moisture carry over and/or less weed competition).
- Costs per hectare of crop will reduce by 15% on average.
- Livestock can be introduced to utilise the 25% non-crop area. Livestock profit will improve overall profits to be higher than the 100% cropping system.
- If there is surplus machinery and labour then income from contracting can be considered.

- Less crop hectares can reduce stress, improve timeliness and enhance lifestyle.

The financial risk is greatest in the high cost paddocks

The high costs paddocks are where the risk resides in a low-income year. The low-income event could be drought related or due to an unexpected event such as frost. Where production costs are high there is a limited ability to absorb reductions in output before you are 'under water' in terms of the cost of production. The better financial outcome would have been achieved from 'doing nothing'. Costs of production relate only to the direct variable input costs, seed, fertiliser and herbicide, etc, it does not refer to the other fixed expenditure items which occur regardless of how much you produce.

So why is it important to avoid production that is loss making:

- It depletes the operating profit available to meet the fixed costs associated with operating the business.
- It accelerates the depletion of financial resources.
- Labour and equipment resources could be allocated to areas making better returns.

Summary

Making farm profits is influenced by:

- Management of volatile income due to seasons.
- Dollars spent per farming enterprise has tripled which equates to large losses in low income years.
- Debt which has tripled. The cost impact of this debt increase has been buffered by low interest rates.

Top 20% group make consistent profits (i.e. profit during most years), this is critical to maximising the long run operating returns from farm enterprises and the financial sustainability of their business.

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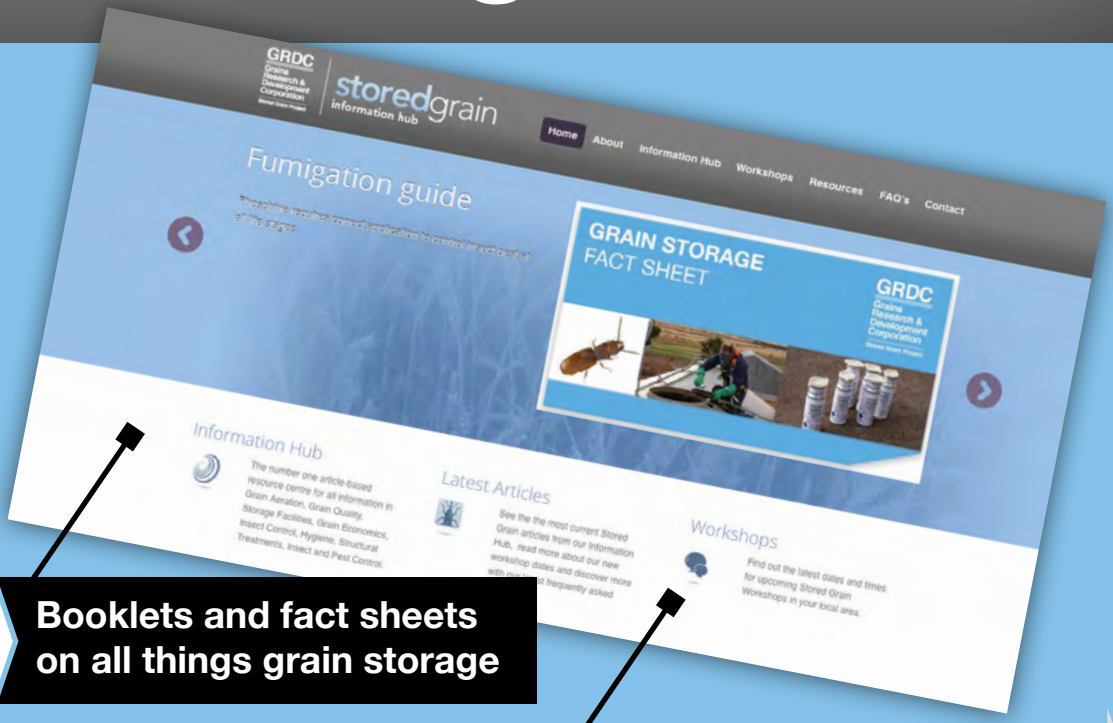

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Effective management, monitoring and succession processes within a large family farm - a family farm case study

Leo Delahunty.

Templemore Partners.

Keywords

- productivity, people, open communication, management structures.

Take home messages

- Production is key and productivity enhancement vital.
- People skill set — striving for continuous improvement.
- Empowerment of all involved in the operation.
- Get farm structures right.
- Risk management.
- Measure and benchmark.
- Have an open and trusting relationship with all stakeholders (partners, service providers, etc.).

Background

Templemore Partners is a family owned and operated farming business based at Murtoa in the Wimmera region of Victoria. Farming 5500ha of mainly black and grey clay soils comprising of 4540ha family owned and 960ha leased.

The farming activity is based around cropping with some trading of livestock. Crops grown (in 2017) were: wheat (1720ha), barley (950ha), canola (650ha), lentil (1820ha) and faba beans (430ha). There was another 340ha of long fallow. The business generally trades sheep over the summer months, buying, fattening and then selling off in the autumn.

The partners in the business are: Leo (65 years old) and Bernadette, Andy (56 years old) and Lyndel, Chris (36 years old) and Brooke and John (28 years old) and Eve. Their partnership interests are represented by individual family trusts. Chris and John are sons of Leo and Bernadette.

There is also a full time employee who joined the business in November 2017.

Issues that have been front and centre of the family business over the last five to 10 years include:

Production

- Improving production.
- Managing increasing cost of inputs.
- Managing consequences of the millennium drought.
- Management roles and responsibilities.
- Changing grain market structures and price volatility risk management.

Farm and people structures

- People empowerment and job satisfaction and responsibilities.
- Succession/progression planning.
- Enabling new entrants into the business.
- Long term sustainable business structure.

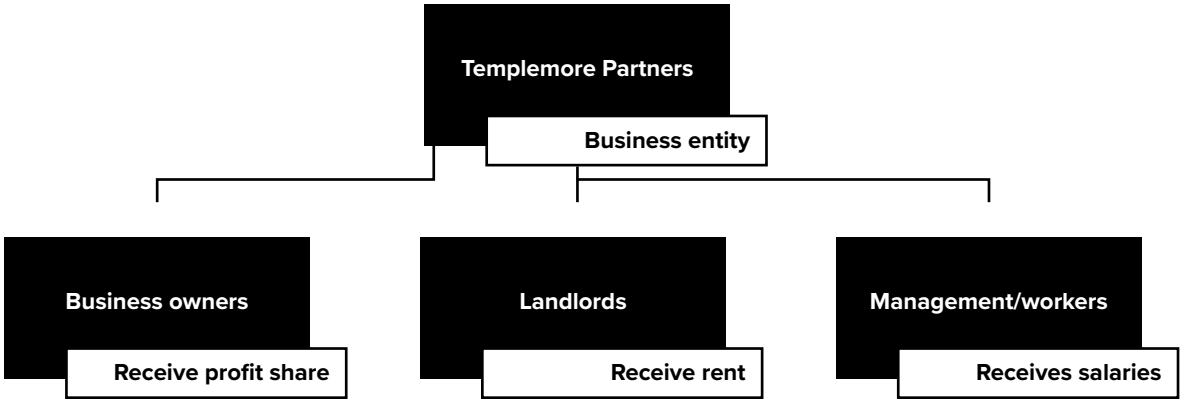

Figure 1. Reward according to contribution to the business.

Current issues include:

- The ever increasing challenge of herbicide resistance and appropriate management techniques.
- Climate change and its consequences — what changes are ahead for our farming system?
- High land prices — are they really high? What/where is the next investment?
- Managing labour shortages during peak periods.

The Delahunty family business (Templemore Partners) operates from a clear and agreed base of business and personal principles. These are stated within a set of guiding principles.

Guiding principles of Templemore Partners

The founding members of the Templemore partnership have agreed to the following core principles, which form the basis of the deed of partnership and the operating agreement:

- The roles, responsibilities, risk and reward for all partners and employees should be transparent and fair.
- Roles should be clearly defined and should facilitate partners and farm employees to move between roles subject to their ability, aspirations and the business's needs.
- People should be rewarded according to their contribution to the business, and as such, a clear differentiation (Figure 1) should be made between:
  - o Business ownership, taking on of risk and share of profit.
  - o Employment by the business as a manager or worker and receipt of a salary or pay cheque.
  - o Land ownership and the receipt of rents.

The business entity, Templemore Partners, is a partnership of individual family discretionary trusts. This entity pays commercial salaries to operators, rent to landlords and profit to entity owners.

These people in many, but not necessarily all cases, may be the same people.

Agreements

There is a formal partnership agreement (deed of partnership) in place that is supported by an operational agreement. The operational agreement is an appendix of the partnership agreement. The partnership agreement is reviewed infrequently; usually when a change in partner status occurs. In contrast, the operational agreement is a 13 page document and is reviewed annually. Within the operational agreement there are statements that include, but not limited to:

- The guiding principles under which the business is conducted.
- Decision making methodology and voting power.
- Structure of the partnership; including proposed roles, managers and workers, landlords and business owners and review of annual partner responsibilities.
- Operating processes; work in progress, financing of entrants to the partnership, assets and liabilities, dividend policy, insurances and retirement planning.
- Additional processes that include policy statements behind much of what is written above.

Other sections include individual needs and aspirations and their implications on the business, business values and relationship principles, and farm business performance objectives.

The farm has a clear set of values that are recorded and placed in a publically visible location in the office.

Values and relationships

Throughout all processes of progression, productive and constructive relationships must be maintained. To achieve this, open, written ground rules are required. These ground rules are important to resolve conflicts and make judgements about which behavioural matters are acceptable or unacceptable.

All family members agreed that they want to treat and be treated by others in the group:

- Openly,
- honestly,
- with trust, and
- transparently.

They also want to:

- Have fun.
- Be appreciated and appreciative.
- Be respected and respectful.
- Have confidence in others.
- Be acknowledged and acknowledge others.
- Respect differences; skills, interests of others, etc.
- Provide opportunities to learn, grow and make mistakes.
- Be pro-active in conflict resolution.
- Have regard, support and be conscience of the communities in which we operate.

The farm board

On reflection, over many years, planning has been at the forefront of the way business has been done at Templemore. In 2008 we formalised some of this when we established a farm advisory board. The board comprises of all family members and three independents with finance, production and strategic management experiences. Its charter is to act as though it has a governance role (even though advisory in nature) and to focus on the areas of strategy, finance and governance of the farm business. One of the independent members chairs these meetings.

In our opinion, it is essential that there be three independent advisory board members rather than only one in our multiple family farm business. This number has the advantage of keeping the topic of conversation wide and enhances a focus on business performance and opportunities. The risk of a lesser number is that an independent could end up primarily as a family arbitrator. The key success measurement of a board should be continual business development.

Examples of board outcomes include:

- A deliberate resolve to focus on investing in cropping land locally, after considering three different regions, resulting in a 260% increase in land equity over the last ten years.
- A rearrangement of the farm ownership and business structures that gives all participants a clear understanding of their personal position within the farm at any particular time.
- There are many other issues that have been dealt with including the value of farm storage versus GrainCorp, owning versus contracting machinery, sheep feed-lotting, other agricultural investment opportunities and internal land ownership adjustments.

The board usually meets between 8.30am and 1.30pm four times a year. The agenda typically consists of an operational report that focuses on issues of management and safety, seasonal outlook and grain market report including a current Mark to Market, finance reports that look at cash flow, profit forecasting and a balance sheet review. The agenda will often include guest speakers that usually give a detailed overview of their business and the issues they encounter. These businesses are usually family based but not always in agriculture. There is always time set in the agenda for structural and strategic opportunities that then might be investigated.

These planning examples have gone a long way towards the success that comes from a satisfying and rewarding workplace.

As well as the high level strategic approach of farm board meetings, the farm has operational meetings on most Monday mornings that includes all involved at the operational level. The agenda is made up of paddock specific issues, equipment and input management, general maintenance and a grain marketing status review. There are priorities placed against each item with the responsible person nominated to oversee implementation. These meetings are less likely to happen during cropping and harvest.

Key management and production dates

Key dates in the management and production planning year of Templemore Partners family business:

- November (before harvest) — review and preliminary planning for new season of paddock by paddock performance.
- Early January — formal production planning meeting with agronomists and partners.
- Late January — first of four advisory board meetings:
  - o Financial performance review.
  - o Sign off of previous year's financial accounts.
  - o Agree on distribution of profits from previous financial year, if available.
  - o Preliminary budget of new production year (March to February).
  - o Review of debt and investment approach for coming year.
  - o Grain marketing and weather forecast.
- January/February/March — paddock and plant preparation for new season:
  - o Paddock renovation, gypsum cartage, etc.
- April — second of four advisory board meetings:
  - o Sign off on new season budget.
  - o Review of safety procedures.
  - o Guest speaker timeslot — looking to learn from others experiences:
    - ☐ Typically other businesses talking about their issues and how they are tackled.
  - o Other policy development and review.
  - o Benchmarking performance review.
- April — commencement of cropping program (allowing up to six weeks).
- June — tax planning, in-crop monitoring and management (through to harvest).
- July — third of four advisory board meetings:
  - o Similar to other meetings.
- October — last of four advisory board meetings:
  - o Harvest preview along with previous meeting agenda.
- November — commence harvest (allow six weeks).

People skill set

The combined skills and experiences of the partner's within the Templemore Partner ensures the business works well. They include; people management, production, financial and strategic capacities. Some of these skills are stronger with some over others and is usually reflected through the job descriptions where a lead and a secondary responsibility is assigned to each person.

Benchmarking

The partnership participates in a regional benchmarking program run by Agripath Pty Ltd that looks at the farm's operational performance and compares it to a number of like-minded farms. These benchmarking figures are then referred back to our long term data to test our performance over a longer period of time.

Long term farm and paddock production performance is monitored and used as part of the assessment process in determining the value of land purchase or lease opportunities. This historical data is also used in reviewing the performance of different crop types over the years. It also is used to validate internal land valuations for rental purposes.

Software systems

All paddock operational and grain production data and much of the marketing data is accessible via cloud based software systems. This is very important for management decision making and very helpful with communication between partners. Group messaging has also become a vital method of communicating actions by the partners to all partners in 'real time'.

Identified outstanding matters

Tasks that still need to be implemented include a formal partner review process and a review of how the partner's spouses are included when they find it difficult to attend board meetings due to family commitments.

Conclusion

There is a high level of personal satisfaction within the farm business that needs to be at the forefront for a successfully run family farm business.

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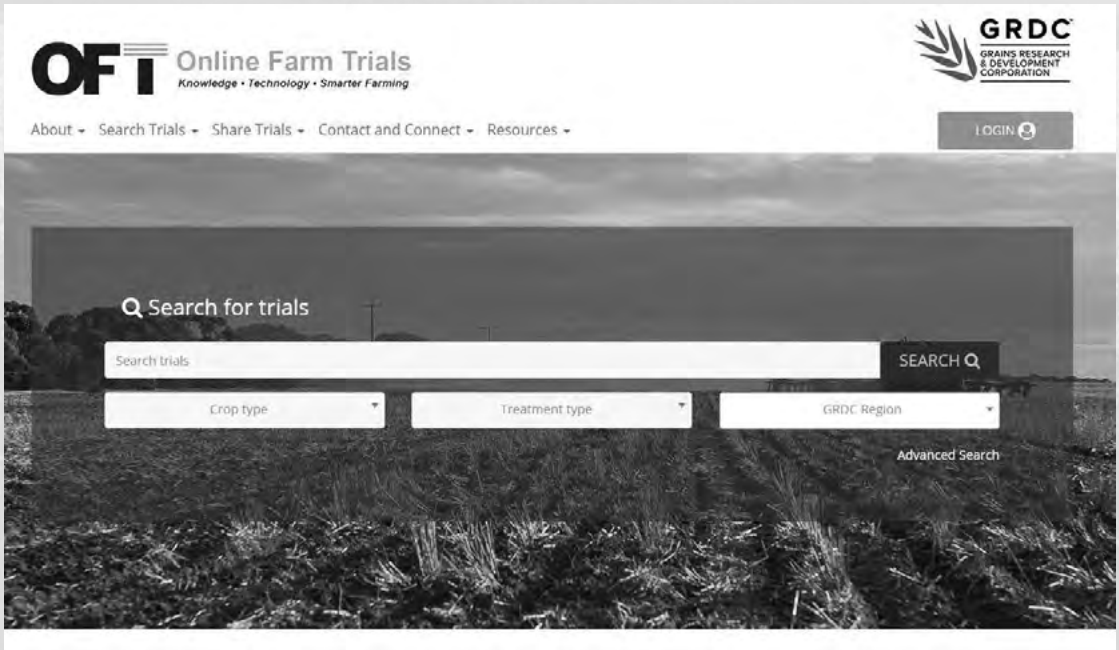

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How to think about emerging technologies

Paul Higgins.

Emergent Futures.

Keywords

- artificial intelligence, drones, big data, blockchain, innovation, technology.

Take home messages

- Drones utilise the technologies of smart phones and tablets, this mean rapid advances are already imminent and will develop quickly over the next five years.
- Artificial intelligence (AI) systems are at the beginning of their evolution, the important aspects are ability to deliver real value and data ownership.
- Blockchain technologies have an application in agriculture (beyond the hype of cryptocurrency), this could lead to increased transparency on the movement of commodities through the value chain. The potential for manufacturers to impose production specifications becomes an increasing probability with the take up of this technology.
- Advisers will continue to play a critical role on-farm; industry knowledge with local understanding as well as networks of expertise to draw from on the latest technology and data services will be important in the future.

Introduction

Emerging technologies have a long arc from the genesis of the original idea, to custom built models, through to industrialised models and finally to utilities or commodities. Think of the development of computers from the early mechanical concepts of Charles Babbage and Ada Lovelace in the 19th century, through to the custom-built models of the fifties, sixties and seventies, on to the industrialised models of Hewlett Packard and Dell, and now to a world where you can hire computing services by the second from Amazon or Google. The same cycle applies to electricity, or cars, or a myriad of technologies.

The arc is a way to think about change although the time frames for each stage differ. In the present day there is an acceleration of the time frames, but even things we think about as being relatively recent developments have a long history. Take artificial intelligence (AI), research on AI started in the forties or fifties depending on who you listen to and how you define the term. Real developments of any significance had to wait until the further developments of computers. There was much excitement in the eighties over the possibilities for AI. However, the technology failed to live up to its promise and an 'AI winter' descended for about 20 years before the field accelerated again. Now we are seeing many AI products and the big technology companies supply machine learning as a service on top of their computing services. Both computers and AI are an example of the 'adjacent possible'. What this means is that while the concepts of a technology may be strong sometimes a technology has to wait until the underlying components are developed enough to make it a practical reality. The design that Charles Babbage created in the 19th century is still the basic architecture for computers today, but he had to build it from mechanical parts. We had to wait for the development of silicon, and integrated circuits before the actual applications could take off.

For those that want to think more about this I would recommend Steven Johnson's excellent book; Where Good Ideas Come From: The Natural History of Innovation (https://www.amazon.com.au/Where-Good-Ideas-Come-Innovation-ebook/dp/B0046ZRZ30/ref=sr_1_1?s=digital-text&ie=UTF8&qid=1518657389&sr=1-1&keywords=Where+Good+Ideas+Come+From).

A story of early innovation in agriculture was when farmers in the USA used barbed wire fences as telephone lines. Grabbing adjacent technologies and making something new out of them.

So, when we think about emerging technologies in agriculture, we should think about:

- The arc – where is this technology along the arc from idea to utility/commodity?
- At what stage of development are the underlying and adjacent technologies that are needed to make the technology a practical reality?

And just as importantly in the case or agriculture, how 'hardened' is the technology? It is fine for the technology to work in a laboratory or in a comfortable city environment but is it too fragile to stand up to practical applications on-farm or along the supply chain. Barbed wire as telephone wires worked because it was an already installed technology that was resilient in the real world.

So with these concepts in mind, let's look at a few emerging technologies and where they might be heading.

Drones

Drones have been around in agriculture for a while now with some early adopters having drones on their farms for years. Where they sit on the arc of technology development is somewhere between custom built and industrialised models. This applies to the drones themselves, the software components, and the applications for farming operations. Where they are likely to head is a utility of a commodity model that is akin to Uber today. If we look at what is happening in the mining and construction industries we can see some clues about what might happen. Drones are being used in more and more sophisticated applications to map environments. The drones are being used to get three dimensional pictures of mining sites and construction sites which can then be compared to previous data, and 3-D plans. Computer systems can then use this data to track development, mining volumes, consumption of materials, etc. A good example of this is Site Scan from 3DR (Figure 1). This system is being continually improved to make it into an industrialised model that is intuitive to use via simple interfaces.

Where we are heading in the medium term is best represented by Airobotics (https://www.airoboticsdrones.com/) who provide an automated drone service for the mining industry (Figure 2). This is an automated drone airport that can be towed to a site. The drone inside is automatically fitted with programmed hardware that will carry out the required tasks. The drone then flies on a pre-planned flight, goes back to the automated airport, docks with the airport and downloads the data it

Figure 1. 3DR Site Scan Capabilities (Source: https://3dr.com/features/).

has collected. Within a few years I believe that a system like this will be deployed across agriculture. Farmers will be able to order a specific service and ask for the drone to access a particular paddock from a touch interface. The drone will automatically carry out the required work before going back to the automated airport. The drone can then either be refitted for other work on the same property, or moved on to another farm.

Figure 2. Airobotics Automated Drone Airport (Source: https://www.airoboticsdrones.com/).

In the longer term the vehicle towing the airport will be a driverless vehicle so that no humans are required to deliver the service. The farmer will be able to control access to the data. They will issue permissions to share the data with agronomists (or even competing agronomists who bid for the work), researchers, suppliers of fertilisers and chemicals (see applications under Big Data and Artificial Intelligence in later section within this paper).

This means development of a utility service that is easy to use and has the capacity to reduce the capital needed for multiple hardware requirements. The business model also centralises the need for technical support and provides redundancy in the system. If you only have one drone and it breaks down, you have a problem. If you are part of a cooperative with 30 drones than this is much less of an issue.

Summary

As drone technologies are built on top of components from the global supply chain for smartphones and tablets many of the underlying technologies are already at the industrialised/commodity stage. This makes the platform stable and well developed and means that we should see rapid advances in services over the next five years. Farmers should be on the lookout for applications that are easy to use and avoid being drawn into services and arrangements that lock them into a multi-year contract, or do not allow them ownership over their own data.

Big data and artificial intelligence

If we take the wider application of drones and the implementation of broadacre sensor systems, for example, what The Yield (https://www.theyield.com) is marketing, then the next five to ten years will see masses of more data being produced in broadacre agriculture. Big data is both the basis for AI and the reason we need AI to get value. Models are emerging for practical applications of AI. Some of these are simple; for example, AI is being used to power a phone application to help farmers spot disease in Cassava plants in Africa (https://www.wired.com/story/plant-ai/). One of the interesting facets of this application is that due to improvements in phone capabilities and machine learning applications, all of the processing for the application is done on the phone. No need for cloud storage or internet access for it to work in the field. In the development of many emerging technologies, applications often emerge from simple systems and the offerings become more and more complex and valuable as the underlying technologies improve. Along with those changes we get better at understanding what works and why, and customers come to be comfortable with what they are using, making the next step of adoption easier. Applications such as this Cassava plant disease recognition system are likely to develop further into applications that cropping farmers can use to make decisions on-farm in more complex environments and also to capture data that can be analysed by advisers.

At a more complex level the startup company Ceres Imaging has shown promise in using AI for applications that can identify problems with nutrition and disease in crops before they are obvious to human eyes (http://money.cnn.com/2017/12/14/technology/corn-soybean-ai-farming/index.html). This means that problems can be addressed before they either become more expensive or impossible to respond to. The system uses planes rather than drones but the concept is just as applicable to drone technology. The system is able to recognise changes for two reasons. First of all it records data on wavelengths that humans cannot see, and secondly it is able to recognise patterns that humans do not necessarily recognise. This is analogous to the Google AI that beat the world champion at Go (https://techcrunch.com/2017/05/24/alphago-beats-planets-best-human-go-player-ke-jie/). The AI made

moves that the humans did not understand. The great thing about that example is that it improved the play of the world champion in subsequent months. He was able to recognise new patterns and new ways of playing. The same is likely for AI that identifies patterns in agriculture. They will make us better farmers.

These systems are by no means perfect at this stage of their development. They will improve as time goes by as they are able to look at the data they have collected and examine and compare it to real world results. In a biological system this will take years to build up enough data. The systems will also improve as data from in-ground sensing systems can be tied to the aerial data. Networks of farmers using the same system will gain more value.

Summary

Artificial intelligence systems are still at the custom built/early industrialised part of technology development. However, they are built on top of a long history of research and huge investments are being made in lots of industries which should flow over into developments in agriculture. The value of applications will grow in time as we get more data over long periods of time. Farmers should look for applications and farmer networks that have value now or are at least break-even now, will grow in value as more data is available to them. Farmers need to ensure that they retain ownership of the data and the capacity to export it in a format that can be used by other applications.

Blockchain enabled systems

While all the attention in recent months has been on the Bitcoin bubble and investment frenzy (which should be avoided at all costs), the underlying technology of Bitcoin and other cryptocurrency is still a completely valid technology development. There are several emerging applications which show some promise.

Outside of agriculture, the Australian company Power Ledger has developed some interesting trading applications for renewable energy. These started by using the blockchain as a system to allow trading of renewable energy between small networks in housing developments and retirement villages. They are also trialling an application with cane growers in Queensland. They are now conducting trials with Origin Energy to use the system over the existing grid in Western Australia, which also includes water applications. What this means is that anyone could trade with anyone over the network using the blockchain technology to automate and verify the process and transfer funds, as demonstrated in Figure 3.

If you have an electric car and are five hundred kilometres from home, you can use your own energy to charge your car through a technology enhanced charging system.

The price of solar energy in particular has dropped dramatically over the last decade with large scale installations now cheaper than coal fired power stations. At low scale, the costs are still fairly high. The key to reducing these costs is to increase

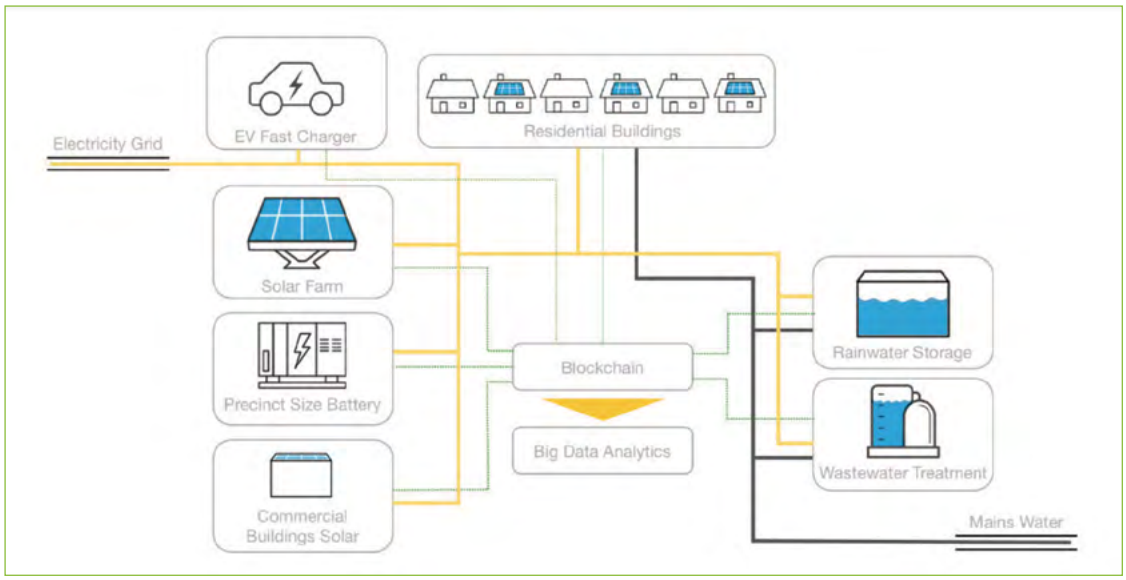

Figure 3. Power Ledger Fremantle project.

the size of installations. The sort of trading systems enabled by the Power Ledger initiative allow that to happen with a share ownership system, rights to a minimum percentage of the power generated, and an automate trading of any surplus. Opportunities will arise for agricultural operations to utilise land for larger scale systems that use this process.

Beyond that application there are two possible applications:

1. Models are already emerging for using the blockchain technology for the verification of high value products such as wine (https://cointelegraph.com/news/italian-wines-will-be-recorded-on-blockchain-authenticity-guaranteed) and fish (http://www.abc.net.au/news/2018-01-22/how-blockchain-is-being-used-to-combat-illegal-fishing/9344376). These are also being trialled as a food safety system for retailers (https://www.forbes.com/sites/rogeraitken/2017/12/14/ibm-walmart-launching-blockchain-food-safety-alliance-in-china-with-fortune-500s-jd-com/#2f76da77d9c5). Care needs to be taken about hyped up schemes as opposed to real applications, but it is likely that the applications will develop with the move to lower value of agricultural products.
2. Scope for the applications that have been developed for energy trading to be applied to grain trading. For example, if you are a producer of feed grain that you store on-farm you could trade a blockchain verified product with an end user such as a feedlot or a piggery. The specifications and price can be built into a smart contract which is traded in the marketplace, this is triggered on acceptance at the feed mill, based on the delivery meeting the volume and quality specifications. Money is transferred via the trading application and the ownership is only transferred once payment is received.

On a wider scale, if the trials that Power Ledger is carrying out with the energy grid are proven to be workable and economic, there is scope for the same sort of system to be applied across the whole grain network; placing more control and flexibility in the hands of the grower.

Summary

Blockchain technologies and applications are still in the idea/custom built stage of the technology arc. They are also attracting a large number of startups and some unscrupulous individuals. This means that there will be high levels of failure in the space over the next few years but what emerges has high potential for agriculture. Farmers should take a cautious approach unless they are high risk takers/early adopters, and only engage with reputable organisations and even so, be prepared for failure. Farmers will probably have to accept that the food chain will start to apply requirements on them for these sorts of technologies over the next five years.

The changing nature of the adviser

In my time in agriculture the nature of the adviser for cropping operations has changed. From a labour-intensive model of visiting farms at set intervals, the business model has evolved into one that uses technology to record crops on a more regular basis and targets physical visits to a need rather than the stage of crop development. Precision agriculture applications have further increased the level of data that is available. With the advent of drones and broadacre sensing systems, and the possibilities of blockchain based applications increasing the transparency of information throughout the supply change, we are on the verge of a seismic shift. The new paradigm will be defined by masses of data, increased transparency, increasing value of networks, and increasing use of AI. This means that the role of the adviser for cropping operations will alter. Some of the characteristics of that change will be:

- Developments of AI agents as, at least, partial advisers to farmers.
- Increased competition in the advisory services area as the pictures formed by data and our ability to share it anywhere in the world allow farmers to go further afield to look for services.
- Advisers with AI systems to assist them in their work.
- Increased activities in trading systems that require more specialised advice.
- Increased value of the adviser that can facilitate networks of farmers to get more from their data rather than being a font of knowledge.

Having said all of that, nothing replaces common sense, a strong personal knowledge of farming and business models that have a presence on the ground.

Summary

Farmers should be wary of technology and data led services that do not have a strong grounding in agriculture, and a local presence. Farmers should look to advisers to keep them informed on

new systems and technology. The ideal adviser is an independent one with a local presence and understanding, who has the ability to access a wider network of support, technology, and data services.

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Notes

THE 2017-2019 GRDC NORTHERN REGIONAL PANEL

FEBRUARY 2018

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

CHAIR - JOHN MINOGUE

John Minogue runs a mixed broadacre farming business and an agricultural consultancy, Agriculture and General Consulting, at Barmedman in south-west NSW. John is chair of the district council of the NSW Farmers' Association, sits on the grains committee of NSW Farmers' Assn and is a winner of the Central West Conservation Farmer of the Year award. His vast agricultural experience in central west NSW has given him a valuable insight into the long-term grains industry challenges.

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DEPUTY CHAIR - ARTHUR GEARON

Arthur is a grain, cotton and beef producer near Chinchilla, Queensland. He has a business degree from the Queensland University of Technology in international business and management and has completed the Australian Institute of Company Directors course. He is a previous vice-president of AgForce Grains and has an extensive industry network throughout Queensland. Arthur believes technology and the ability to apply it across industry will be the key driver for economic growth in the grains industry.

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ROGER BOLTE

Roger Bolte is a fourth-generation farmer from the West Wyalong area in NSW, operating a 6500 ha winter cropping program with his wife and family focussing on cereals, legumes and hay. During his 35-years in the industry, Roger has been involved in R&D in various capacities and has had the opportunity to travel abroad and observe a variety of farming systems. He believes that R&D and education are the cornerstones of the industry and feels privileged to be afforded the opportunity to share his experiences.

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ROY HAMILTON

Roy Hamilton operates a 4400 ha mixed family farming enterprise near Rand in NSW's Riverina. He was an early adopter of minimum till practices and direct drill and press wheel technology and is currently migrating to CTF. The majority of the property is cropped while the remainder runs ewes and trade lambs. He has held roles on the south east NSW Regional Advisory Committee, the GRDC's southern region Regional Cropping Solutions Network and was a founding committee member of the Riverine Plains farming systems group.

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DR TONY HAMILTON

Tony is a grower from Forbes, NSW and managing director of an integrated cropping and livestock business. He is a director of the Rural Industries Research and Development Corporation. He has worked as an agricultural consultant in WA and southern NSW. With a Bachelor of Agricultural Science and a PhD in agronomy, Tony advocates agricultural RD&E and evidence based agriculture.

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ANDREW MCFADYEN

Andrew is a grower and private agricultural consultant near Lake Cargelligo NSW with more than 17 years agronomy and practical farm management experience. He is an active member of the grains industry with former roles on the Central East Research Advisory Committee, NSW Farmers Coolah branch and has served on the GRDC northern panel since 2015. He is also a board member and the chair of Grain Orana Alliance.

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PETER MCKENZIE

Peter operates a private agronomy consulting business based in Quirindi NSW. Prior to this he was facilitator/agronomist for AgVance Farming group, a communications conduit between industry and growers. He is a passionate supporter of research and has been active in extending weed management research information to industry, particularly in central west NSW, is a former director of Conservation Farmers Inc., a former member of the North East Regional Advisory Committee and a participant in Northern Growers Alliance local research group on the Liverpool Plains.

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GRAHAM SPACKMAN

Graham has been Managing Director of a private agricultural consultancy at Emerald, Queensland, for the past 28 years, providing advice on the agronomy and management of summer and winter, dryland and irrigated crops in grain and mixed farming systems. He has extensive involvement in RD&E having participated in two decades of GRDC and DPI-funded farming systems research, particularly in weed management, soil fertility and adaption of agronomic practices in CQ farming systems. Graham was a member of the CQ Research Advisory Committee for over 10 years and Chairman for five years.

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BRUCE WATSON

Bruce and his family operate a 3400 ha family grain growing business near Parkes NSW, which produces a mixture of dryland winter cereals, pulses and oilseeds as well as summer dryland cereals, pulses and cotton grown on a 12m zero till CTF platform with full stubble retention. Bruce holds a Bachelor of Agricultural Economics from the University of Sydney and previously worked with PricewaterhouseCoopers in its Transfer Pricing practice. He is an active member of the grains industry and was awarded a Nuffield Scholarship in 2009.

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DR JO WHITE

Dr Jo White is an experienced researcher with over 15 years' experience in agricultural research programs based at the Department of Agriculture and Fisheries in Queensland (DAFQ) and the University of Southern Queensland (USQ), including 10 years' experience in the field of plant pathology of broad acre summer crops. Jo has a keen interest in developing and delivering on-ground practical research solutions to growers which improve productivity and profitability of their farms and is now working as a private consultant based in Queensland.

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LUCY BROAD

Lucy Broad is the General Manager of the Grains Research and Development Corporation's (GRDC) Grower Communication and Extension business group. Lucy holds a Bachelor of Science in Agriculture, majoring in agronomy, and prior to working at the GRDC spent the last 13 years as Director and then Managing Director of Cox Inall Communications and Cox Inall Change, Australia's largest and leading public relations agency working in the Agribusiness and Natural Resource Management arena. Her entire career has been in communications, first with the Australian Broadcasting Corporation and then overseeing communications and behaviour change strategies for clients across the agriculture, natural resource management, government and not-for-profit sectors.

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NORTHERN REGION GROWER SOLUTIONS GROUP AND REGIONAL CROPPING SOLUTIONS NETWORK

FEBRUARY 2018

The Northern Region of the Grains Research and Development Corporation (GRDC) encompasses some of the most diverse cropping environments in Australia, ranging from temperate to tropical climates – it has the greatest diversity of crop and farming systems of the three GRDC regions.

Implemented, to provide structured grower engagement, the GRDC Grower Solutions Group projects and the RCSN project have become an important component of GRDC's investment process in the northern region. The Northern Region Grower Solutions Group and the RCSN have the function of identifying and, in the case of Grower Solutions Groups managing short-term projects that address ideas and opportunities raised at a local level which can be researched demonstrated and outcomes extended for immediate adoption by farmers in their own paddocks.

GROWER SOLUTIONS GROUP AND REGIONAL CROPPING SOLUTIONS NETWORK CONTACT DETAILS:

NORTHERN GROWER ALLIANCE (NGA)

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Northern Grower Alliance (NGA) was established in 2005 to provide a regional capacity for industry-driven, applied agronomic grains research. NGA is currently working on a five year Grower Solutions project, fully funded by the GRDC, focussing on cropping areas from the Liverpool Plains to the Darling Downs and from Tamworth and Toowoomba in the east to Walgett, Mungindi and St George in the west. A network of six Local Research Groups, comprised of advisers and growers, raise and prioritise issues of local management concern to set the direction of research or extension activity. Areas of focus range from weed, disease and pest management through to nutrition and farming system issues.

GRAIN ORANA ALLIANCE (GOA)

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Grain Orana Alliance (GOA) is a not for profit organisation formed in 2009 to help meet growers research and extension needs in the Central West of NSW to support their enduring profitability. Currently operating under the GRDC Grower Solutions Group - Central NSW project, one of the key priorities is to identify and prioritise R,D and E needs within the region through engagement with local growers and advisers. This grower engagement helps direct both the GRDC investments in research projects and GOA's own successful research programs. GOA's research covers a wide range of relevant topics such as crop nutrition, disease management and weed control. The structure of the project allows for a rapid turnaround in research objectives to return solutions to growers in a timely and cost effective manner whilst applying scientific rigour in the trial work it undertakes. Trials are designed to seek readily adoptable solutions for growers which in turn are extended back through GOA's extensive grower and adviser network.

CENTRAL QUEENSLAND GROWER SOLUTIONS GROUP

ROD COLLINS

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The Central Queensland Grower Solutions project, is a GRDC and DAF Queensland investment in fast-tracking the adoption of relevant R,D & E outcomes to increase grower productivity and profitability across central Queensland. Covering approximately 550,000 ha and representing 450 grain producing businesses, the central Queensland region includes areas from Taroom and Theodore in the south to Mt McLaren and Kilcummin in the north, all of which are serviced by the project staff, located in Biloela and Emerald. Team leader Rod Collins is an experienced facilitator and extension officer with an extensive background in the central Queensland grains industry. He was part of the initial farming systems project team in the region throughout the late 90's and early 2000's which led the successful adoption of ley legumes to limit nutrient decline and wide row configurations in sorghum to improve yield reliability across central Queensland. He has more recently led the development and delivery of the Grains Best Management Practices program.

COASTAL HINTERLAND QUEENSLAND AND NORTH COAST NEW SOUTH WALES GROWER SOLUTIONS GROUP

The Coastal Hinterland Queensland and North Coast New South Wales Grower Solutions project was established to address the development and extension needs of grains in coastal and hinterland farming systems. This project has nodes in the Burdekin managed by Dr Steven Yeates from CSIRO; Grafton managed by Dr Natalie Moore from NSW DPI; Kingaroy managed by Nick Christodolou (QDAF) and Bundaberg managed by Neil Halpin.

BUNDABERG QUEENSLAND:

NEIL HALPIN

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Neil Halpin is a principal farming systems agronomist with the Queensland Department of Agriculture and Fisheries. He has over 30 year's field trail experience in conservation cropping systems, particularly in the sugar-based farming systems of the coastal Burnett. His passion is for the integration of grain legume break crops, reduced tillage, controlled traffic and organic matter retention in coastal farming systems. Maximising the productivity and profitability of grain legumes (peanuts, soybeans and mung beans) is a common theme throughout the various production areas and systems covered by this project.

KINGAROY QUEENSLAND:

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Nick Christodoulou is a principal agronomist with the Department of Agriculture & Fisheries (QDAF) on Qld's Darling Downs and brings over 25 years of field experience in grains, pastures & soil research, with skills in extension application specifically in supporting and implementing practice change. Nick has led the highly successful sustainable western farming systems project in Queensland. Nick was also project leader for Grain & Graze 1 Maranoa-Balonne and DAF leader for Grain & Graze 1 Border Rivers project, project leader for Grain and Graze 2 and was also Project leader for the Western QLD Grower Solutions project. Currently he is the coordinator for the Grower Solutions Southern Burnett program.

BURDEKIN QUEENSLAND:

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The Burdekin & tropical regional node of the Coastal and Hinterland Growers Solution Project is led by CSIRO research agronomist Dr Stephen Yeates and technical officer Paul McLennan, who are based at the Australian Tropical Science and Innovation Precinct at James Cook University, Townsville. The Burdekin & tropical Grower Solutions node has a committed and expanding advisory group of farmers and agribusiness professionals. Due to the rapid increase in farmers producing mungbean in the region an open door policy has been adopted to advisory group membership to ensure a balance in priorities between experienced and new growers. The node is focused on integrating grain crops into sugar farming systems in the lower Burdekin irrigation area in NQ and more recently contributing to other regions in the semi-arid tropics that are expanding or diversifying into grain cropping. Information and training requests for information and training from the Ord River WA, Gilbert River NQ, Mackay and Ingham areas necessitated this expansion. Recent work has focussed on the introduction of mungbeans in the northern Queensland farming systems in collaboration with the GRDC supported entomologists Liz Williams and Hugh Brier, Col Douglas from the mungbean breeding team, the Australian Mungbean Association and Pulse Australia. Both Stephen and Paul have many decades of experience with crop research and development in tropical Australia.

GRAFTON NEW SOUTH WALES:

NATALIE MOORE

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The NSW North Coast regional node of the Coastal and Hinterland Grower Solutions Project is led by NSW DPI research agronomist Dr Natalie Moore and technical officer Mr Nathan Ensbey, who are based at the Grafton Primary Industries Institute. The NSW North Coast Grower Solutions node prioritises and addresses issues constraining grain production via an enthusiastic advisory group comprised of leading grain growers, commercial agronomists from across the region and NSW DPI technical staff. In this high rainfall production zone (800-1400mm pa), winter and summer grain production is an important component of farming systems that also includes sugar cane, beef and dairy grazing pastures, and rice. The region extends east of the Great Dividing Range from Taree in the south to the Tweed in the north. Both Natalie and Nathan have many years experience with research and development for coastal farming systems and are also currently involved with the Australian Soybean Breeding Program (GRDC/CSIRO/NSW DPI) and the Summer Pulse Agronomy Initiative (GRDC/NSW DPI).

REGIONAL CROPPING SYSTEMS NETWORK (RCSN) SOUTHERN NSW

CHRIS MINEHAN

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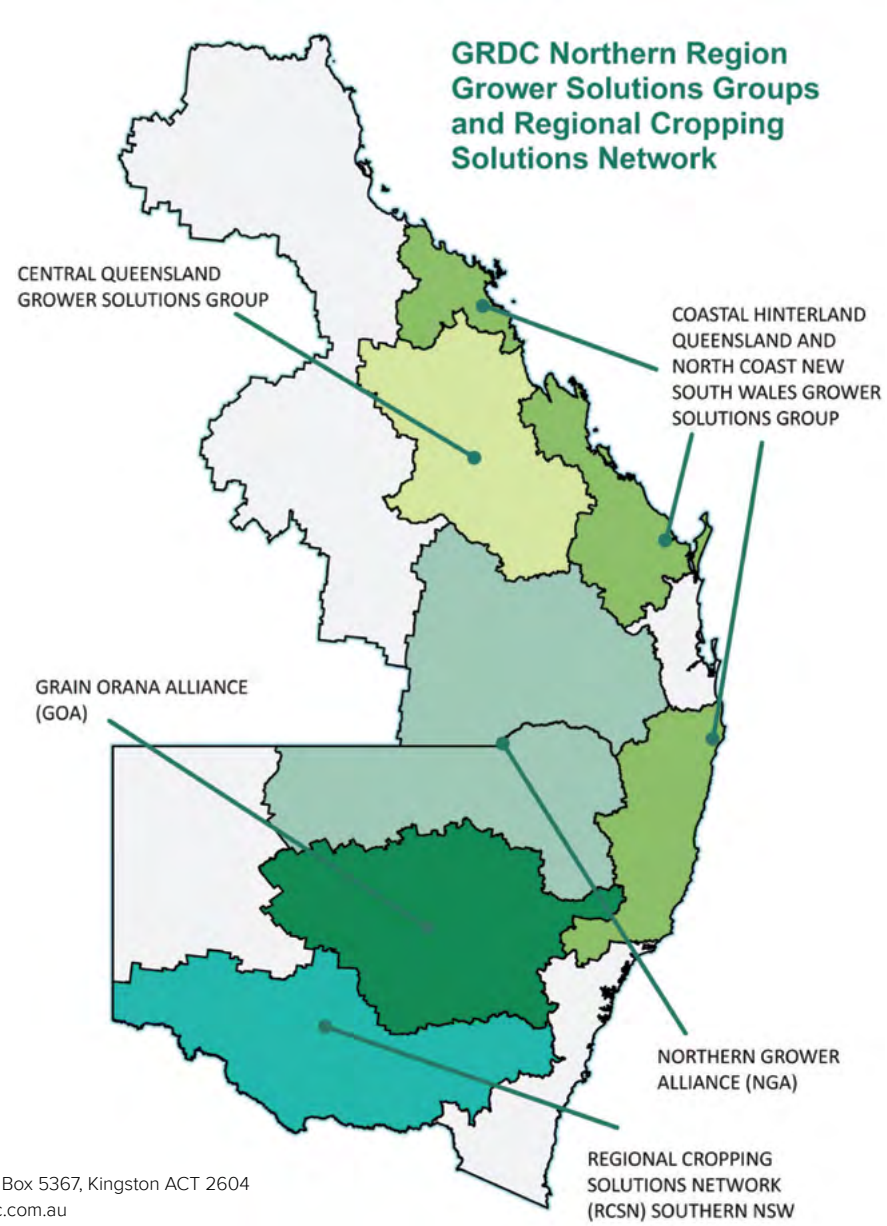
The Southern New South Wales Regional Cropping Solutions Network (RCSN) was established in 2017 to capture production ideas and opportunities identified by growers and advisers in the southern and western regions of New South Wales and ensure they translate into direct GRDC investments in local R, D & E priorities. The SNSW RCSN region covers a diverse area from the southern slopes and tablelands, through the Riverina and MIA, to the Mallee region of western NSW and the South Australian border. The region is diverse in terms of rainfall and climatic zones, encompassing rangelands, low, medium and high rainfall zones, plus irrigation. The SNSW RCSN is facilitated by Chris Minehan. Chris is an experienced farm business consultant and a director of Rural Management Strategies Pty Limited, based in Wagga Wagga, NSW. The process involves a series of Open Forum meetings which provide an opportunity for those involved in the grains industry to bring forward ideas, constraints and opportunities affecting grain grower profitability in their area. These ideas are reviewed by an RCSN committee comprises 12 members, including grain growers, advisers and researchers from across the region that meet twice per year to assist GRDC in understanding and prioritising issues relevant to southern NSW.



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GRDC™ GROWNOTES

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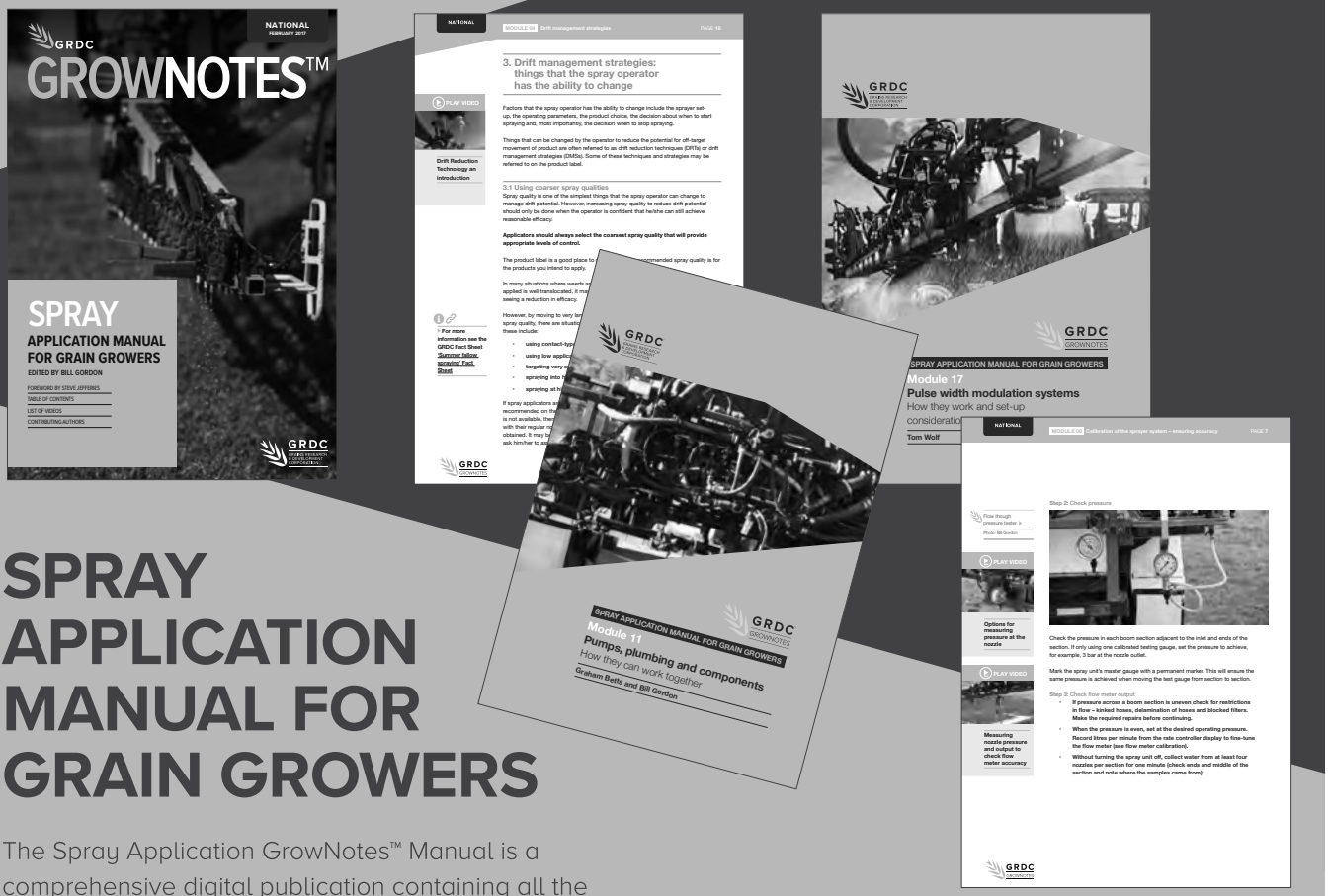
SPRAY APPLICATION GROWNOTES™ MANUAL



SPRAY APPLICATION MANUAL FOR GRAIN GROWERS

The Spray Application GrowNotes™ Manual is a comprehensive digital publication containing all the information a spray operator needs to know when it comes to using spray application technology.

It explains how various spraying systems and components work, along with those factors that the operator should consider to ensure the sprayer is operating to its full potential.

This new manual focuses on issues that will assist in maintaining the accuracy of the sprayer output while improving the efficiency and safety of spraying operations. It contains many useful tips for growers and spray operators and includes practical information – backed by science – on sprayer set-up, including self-propelled sprayers, new tools for determining sprayer outputs, advice for assessing spray coverage in the field, improving droplet capture by the target, drift-reducing equipment and techniques, the effects of adjuvant and nozzle type on drift potential, and surface temperature inversion research.

It comprises 23 modules accompanied by a series of videos which deliver 'how-to' advice to growers and spray operators in a visual easy-to-digest manner. Lead author and editor is Bill Gordon and other contributors include key industry players from Australia and overseas.

Spray Application GrowNotes™ Manual – go to: https://grdc.com.au/Resources/GrowNotes-technical Also go to https://grdc.com.au/Resources/GrowNotes and check out the latest versions of the Regional Agronomy Crop GrowNotes™ titles.

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GRAINS RESEARCH & DEVELOPMENT CORPORATION

Acknowledgements

The ORM team would like to thank those who have contributed to the successful staging of the Mulwala GRDC Farm Business Update:

- The local GRDC Farm Business Update planning committee that includes both government and private consultants and GRDC representatives

- Partnering organisation: Riverine Plains

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You can now provide feedback electronically ‘as you go’. An electronic evaluation form can be accessed by typing the URL address below into your internet browser.

To make the process as easy as possible, please follow these points:

- Complete the survey on one device (i.e. don’t swap between your iPad and Smartphone devices. Information will be lost).
- One person per device (Once you start the survey, someone else cannot use your device to complete their survey).
- You can start and stop the survey whenever you choose, **just click ‘Next’ to save responses before exiting the survey**. For example, after a session you can complete the relevant questions and then re-access the survey following other sessions.

www.surveymonkey.com/r/Mulwala-FBU

2018 Mulwala GRDC Farm Business Update Evaluation

1. Name

ORM has permisssion to follow me up in regards to post event outcomes.

2. How would you describe your <u>main</u> role? *(choose one only)*

- ❑ Grower
- ❑ Agronomic adviser
- ❑ Farm business adviser
- ❑ Financial adviser
- ❑ Communications/extension
- ❑ Grain marketing
- ❑ Farm input/service provider
- ❑ Banking
- ❑ Accountant
- ❑ Researcher
- ❑ Student
- ❑ Other* (please specify)

Your feedback on the presentations

For each presentation you attended, please rate the content relevance and presentation quality on a scale of 0 to 10 by placing a number in the box (**10 = totally satisfactory, 0 = totally unsatisfactory**).

3. Marketing grain – what, where, how & who of maximising profit: *Brad Knight*

Content relevance /10 Presentation quality /10

Have you got any comments on the content or quality of the presentation?

4. Identifying high costs paddocks & how they impact on your farm profit: *Phil O'Callaghan*

Content relevance /10 Presentation quality /10

Have you got any comments on the content or quality of the presentation?

5. Making it work across generations. A family farm case study: *Leo Delahunty*

Content relevance /10 Presentation quality /10

Have you got any comments on the content or quality of the presentation?

6. How to think about emerging technologies: *Paul Higgins*

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

Your next steps

7. Please describe at least one new strategy you will undertake as a result of attending this Update event

8. What are the first steps you will take?
e.g. seek further information from a presenter, consider a new resource, talk to my network, start a trial in my business

Your feedback on the Update

9. This Update has increased my awareness and knowledge of farm business decision-making

Strongly agree	Agree	Neither agree nor Disagree	Disagree	Strongly disagree
❑	❑	❑	❑	❑

10. Overall, how did the Update event meet your expectations?

Very much exceeded	Exceeded	Met	Partially met	Did not meet
❑	❑	❑	❑	❑

Comments

11. Do you have any comments or suggestions to improve the GRDC Update events?

12. Are there any subjects you would like covered in the next Update?

Thank you for your feedback.