FARM TO PROFIT
FARM BUSINESS UPDATE

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

Dubbo – Tuesday 12 February, 2019
Western Plains Zoo, Dubbo

Moree – Wednesday 13 February, 2019
AnyOccasion@TheMax, Moree

Toowoomba – Friday 15 February, 2019
City Golf Club, Toowoomba

#GRDCUpdates

GRDC Northern Region Farm Business Update
convened by ORM Pty Ltd.

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Welcome to the 2019 GRDC Farm Business Update program for the Northern Region

Managing farming businesses in a variable climate, along with mitigating risk, recruiting staff, and selecting the most viable grain storage options for different-size operations, are critical considerations when it comes to a profitable grain growing operation.

Providing growers, their advisers and other industry stakeholders with up-to-date information and the latest research on some of these key topics is the focus of the annual Grains Research and Development Corporation's (GRDC) annual Farm Business Updates.

This year's Updates have a 'Farm for Profit' theme and are designed to be practical and relevant to help inform participants about on-farm decision-making.

Growers are increasingly aware they need to work 'smarter' rather than harder in order to remain profitable and viable in environments with increasing climate variability. The challenges of farming in unpredictable seasons has been highlighted by severe drought conditions experienced across much of Queensland and New South Wales during the past 12 months.

In response, this year's GRDC Farm Business Updates have been developed to help growers identify and implement operational efficiencies on-farm, and to maximise stored grain quality and marketing opportunities to offset the challenges of rising production costs and unpredictable weather.

The GRDC's purpose is to invest in research, development, and extension (RD&E) to create enduring profitability for Australian grain growers. For more than 25 years the organisation has been driving grains research capability and capacity with the understanding that the continued viability of the industry hinges on rigorous, innovative research that delivers genuine profit gains.

The GRDC Farm Business Updates are part of an extensive collection of well-constructed, regionally relevant events developed to assist grain growers to grow profits in challenging times and environments.

I hope you enjoy the 2019 Updates and that they provide an invaluable opportunity for learning, knowledge sharing and networking.

SUSAN MCDONNELL,
Grower Relations Manager North

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NORTHERN REGION*

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Potential high-risk paddocks:

- Bare patches, uneven growth, white heads in previous crop
- Paddocks with unexplained poor yield from the previous year
- High frequency of root lesion nematode-susceptible crops, such as chickpeas
- Intolerant cereal varieties grown on stored moisture
- Newly purchased or leased land
- Cereals on cereals
- Cereal following grassy pastures
- Durum crops (crown rot)

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- Rhizoctonia root rot
- Root lesion nematodes
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- Common root rot
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- Charcoal rot
- Ascochyta blight of chickpea
- Sclerotinia stem rot
- Long fallow disorder
- Phytophthora root rot
- Fusarium stalk rot
- White grain disorder
- Sclerotinia stem rot

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Grains Research & Development Corporation

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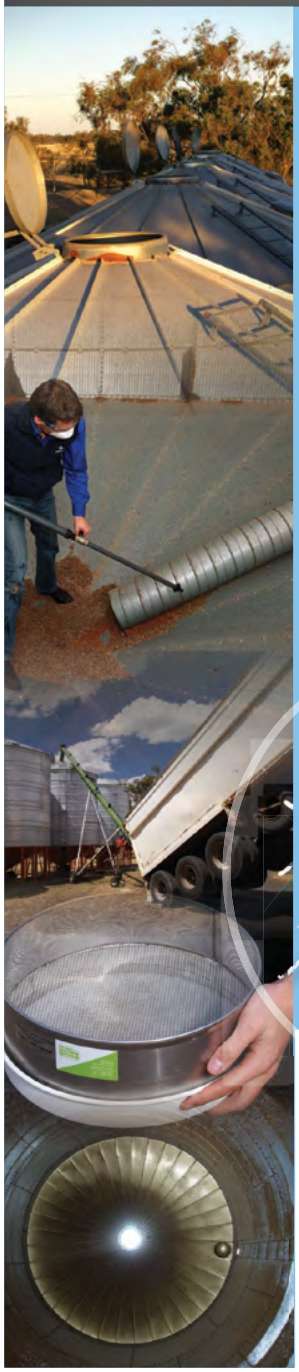

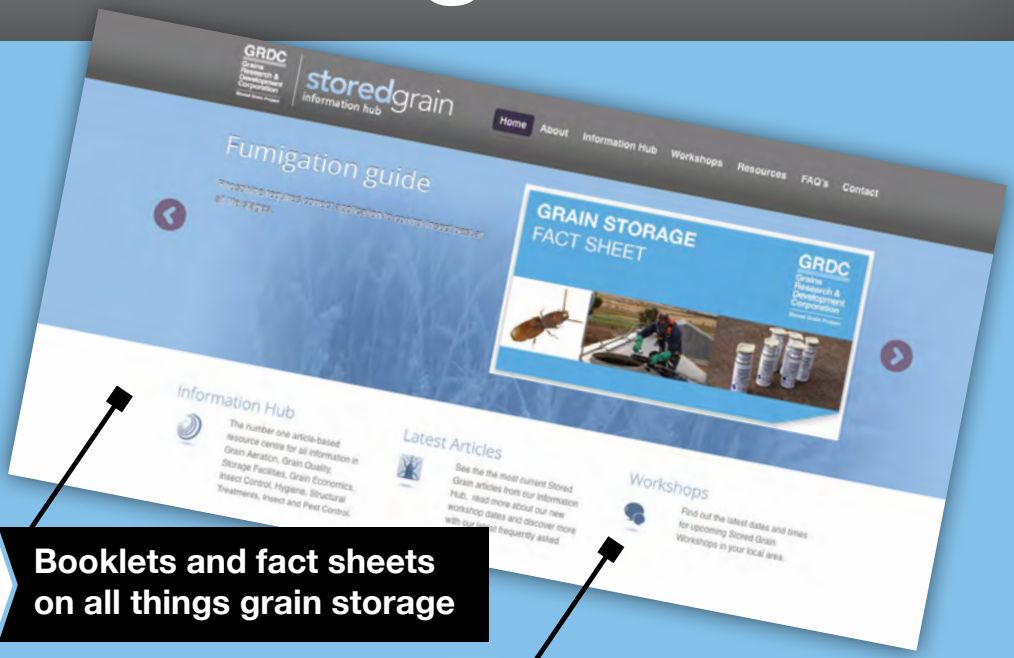

Booklets and fact sheets on all things grain storage

Workshops in all regions covering topics such as:

- Economics of on-farm storage
- Grain storage hygiene
- Aeration cooling or drying
- Managing high moisture
- Fumigation
- Insect pest management
- Managing different storages
- Storage facility design
- Storing pulses and oilseeds

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Download the new storedgrain app to get the latest information and storage recording tool on your iPhone or iPad

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Program

9.30 am	**Announcements**	***Jane Foster,*** *ORM*
9.35 am	**GRDC welcome**	***GRDC representative***
9.50 am	**On-farm storage investment and grain marketing**	***Stuart Clarke,*** *Robinson Grain*
10.10 am		***Philip Burrill,*** *Dept of Agriculture and Fisheries*
10.30 am		***Chris Warrick,*** *Primary Business*
10.55 am	**Facilitated Q&A session**	
11.15 am	***Morning tea***	
11.45 am	**How HR compliance and best practice can positively impact the recruitment, management and retention of skilled staff**	***Liz Jamieson,*** *Rimfire Resources*
12.30 pm	**Creating a prosperous farming future – building resilience**	***Ken Solly,*** *Solly Business Services*
1.15 pm	***Lunch***	
2.15 pm	**What climate variability means for farming systems**	***Lindsay Bell,*** *CSIRO*
2.40 pm		***Simon Fritsch,*** *Agripath*
3.00 pm		***Glenn Shepherd,*** *IMAG Consulting*
3.20 pm	**Facilitated Q & A session**	
3.40 pm	***Close***	

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3.40 pm	***Close***	

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On-farm storage investment and grain marketing

Stuart Clarke.

Robinson Grain.

GRDC project code: PRB00001

Keywords

- on-farm grain storage, consumers, price, segregations, quality, premium.

Take home messages

- To command more money from your on-farm grain you must provide more value.
- Identify who your customer is. It isn't necessarily the end user of the grain.
- Understand what your customer values – put yourself in their shoes.
- Market dictates what should be stored on farm at any point in time.

To command more money, you must provide more value

Value comes in many forms and each enterprise values their attributes differently. In most aspects of business, we exchange value in return for money. For example, selling or buying goods (value) in exchange for money, or as a service provider exchanging a service (value) for money. To command more money, we typically need to provide more value, for example; better goods or a higher quality service.

On-farm storage is no different. To extract more money from your grain stored on farm, we need to provide more non-monetary value to the buyer of that grain. For a buyer to pay you more money they in turn need to be getting more value for themselves from the sale of that grain to justify doing so, otherwise they will buy from another source. Maintaining or creating value doesn't have to involve significant outlay and often doesn't cost anything at all. This can be achieved by maximising the already inherent value in the grain you produce or simple operational methods that create value that the buyer of your grain values.

Some examples are:

- Maximise the value of the quality you produce:
  - Segregate based on grade and keep running samples and record stack averages.
- Know your competitive advantage:
  - Identify what your local competition lacks. Bulk handlers typically don't provide flexibility of operation or certainty of quality and service.
- Solve the customers' problems:
  - Wet weather access, weekend loading, short notice loading, known quality.
- If you do it, do it properly:
  - Create a reputation of meeting/exceeding customers' expectation. You will get first call when the customer values it.

Who is your customer?

When identifying who your customer is, it is important to consider all types of market participants as your customer; i.e. consumer, trader, packer and

stock feeder. Most of these types of participants will have similar drivers and will see value in similar ways. By considering all types of market participants, you aren't limiting your buyer base. Different participants will be active at different times and for differing reasons, so who is the most competitive buyer on the day for your 'value offering' may not be who you initially identified.

What does your customer want?

Each customer has different drivers based on their business's needs. Each business will place different values on the following four attributes; consistency, efficiency, certainty and price, based on whether they have the capability to compensate for the lack of that attribute. If you, as a supplier considers these when planning and operating on-farm storage, then you will maximise the potential value and appeal to more buyers of grain.

Consistency

Across all industries that handle or consume grain, the common challenge that everyone faces is the requirement to convert an inconsistent, natural, raw ingredient into a consistent homogenous finished product. The end consumer of the finished product is extremely discerning and expects the same consumer experience each time they purchase the product, whether it is a loaf of bread, beer, ethanol for fuel or packet of instant noodles. The sheer volume of raw inputs that grain processors manage also doesn't lend well to production of consistent end-product. With some facilities processing 1000MT-plus/day, it becomes difficult to adapt processing to manage individual parcels of varying quality.

Extracting value out of consistency - segregating by grade and recording running samples and stack averages

Grain buyers will value a parcel of grain based on the lowest quality they are guaranteed to receive. Any quality value above the minimum is being lost with no one able to capture that quality value unless it is segregated again (bulk handler). Storing by grade will mean that you minimise the range of quality in a parcel, and therefore, maximise the value you receive for the quality that you produce. On occasion, some buyers may value intra-grade quality (i.e. AUH 14 Pro) if it is known when contracting. This will depend on the buyer's capability to extract value from that quality and whether there are alternative suppliers at the time. This means that recording running samples and knowing the stack average of each segregation is worthwhile.

Efficiency

As with any mature industry, most grain processors are in a margin competitive trading environment. This means that to stay viable, efficiency of their facilities is paramount. This efficiency can come in the form of maximising output of a facility, minimising the amount of handling of raw ingredients, minimising wastage and/or minimising stock on hand (JIT).

Extracting value out of efficiency

Having the capability and willingness to sell 'buyers call' or to load nights/weekends or on short notice can assist a customer to gain efficiencies, and therefore, value. Along with being easy to deal with by providing correct information at delivery and providing weigh dockets on delivery completion, will improve the value you provide, and therefore, the price that you command.

Certainty

Certainty of quality and delivery is desired by the buyer, and therefore, the more certainty you can provide the more value you can extract. All contract terms are legally certain however, being able to narrow terms beyond standard terms gives the buyer something they can rely on to extract value from their efficiency or consistency.

Extracting value out of certainty

Creating a reputation for meeting commitments will give you an edge over other suppliers. Certainty of quality and delivery provides significant value to a customer as they can call in their exact requirements without requiring additional inventory on hand. Buyers also need contingency plans in case of unforeseen supply issues to ensure they can extract value from efficiency. Ensuring your facilities have all-weather access and on short notice, provides value to a buyer.

Price

A buyer isn't necessarily motivated to buy the cheapest grain available. A buyer is motivated to buy the best 'value for money' product for their operation at the time. As a supplier, the more value provided, the more money that buyer is willing to pay for that parcel over a competitor.

Extracting value out of price

It is important that the supplier clearly states the terms that he/she is willing to guarantee the buyer so that the buyer can understand the value that the supplier is providing. If the price quoted isn't desirable, provide an offer. An offer allows the buyer

to fully weigh up the value for money proposition of your parcel, and may help you in reaching your target.

The grain market dictates what should be stored on farm

What grades and/or commodities that are best stored on-farm changes from year to year depending on the crop quality profile, export demand and consumer behaviour. To follow are some points to consider when planning your segregation plan:

- The market typically values what is least plentiful.
- In years of varied quality, certainty of quality is valuable.
- Central west NSW is becoming less bulk export centric:
  - Growth of 'upcountry' container packers.
  - Major local consumers continuing to grow.
  - Northern NSW and southern Queensland cattle on feed increases.
  - Newcastle/Tamworth poultry market continues to grow.
- Road freight costs versus rail freight costs are narrowing with limited export surplus; with corresponding reduced bulk handler competitive advantage.

Conclusion

Utilising on-farm storage often provides a compelling case, however all costs, risks and rewards need to be considered when comparing this option with alternative storage options.

The market will dictate what commodities and grades are best stored on-farm, however a general rule is the market will value what is most scarce.

Consider a wide range of buyers as your customer including consumers, traders, container packers and stock feeders.

If you are going to store on-farm, put thought into why you are storing grain and what your customer values. Value creation should be your motivator for establishing or utilising on-farm storage.

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On-farm storage practices and records – building grain market confidence

Philip Burrill.

DAF Qld., Warwick.

Keywords

- on-farm grain storage, grain supplier, reputation, communication, grain quality testing, grain quality segregations, farm records.

Take home messages

- Work towards building a reputation as a grower with on-farm storage, who can consistently supply pest-free grain that meets buyers' quality specifications.
- Talk with grain buyers regularly to keep up-to-date with grain market trends and to know what grain qualities are in demand. At harvest time segregate on grain quality into storages, in order to target specific markets.
- Aim to build your skills in using on-farm 'grain quality testing equipment'. Know the quality of your grain and what markets are looking for. This puts you in a stronger negotiation position.
- Keep up-to-date storage records of grain quality specifications and approximate tonnages held in each silo.
- Storage records also include monthly notes of insect pests detected in silos, along with any grain treatments applied – fumigations, grain protectant insecticides, plus required commodity vendor declaration (CVD) information.
- Remember to take care; grain in storage is 'food'. An ingredient for human food or livestock feed. The latter feeds animals that produce products we consume such as meat, eggs, milk, etc.

On-farm storage – build a positive reputation

There are medium and long-term profitable benefits and opportunities that a grower develops when they build a positive grain supply reputation with buyers. Such a reputation would involve consistently supplying a pest-free product from their on-farm storage that meets the buyer's quality specifications.

Put yourself in the shoes of the grain buyer or end-user. It is not hard to understand the problems and additional costs that can occur if a parcel of grain, on which the buyer has been depending, arrives at the delivery point and is well outside the required grain quality specifications; protein, screenings, noxious weed seeds, moisture content, pests, etc.

The export container trade is an example of where there is very little room for negotiation on grain quality problems at delivery. The buyer is put in the difficult position of trying to quickly find a replacement parcel of grain of the required quality, from a 'reliable supplier'.

The other area that all markets (both domestic and export) are particularly keen to avoid is 'chemical residues' on grain that should not be there. There is potential if product is unacceptable for expensive legal claims and long-term damage to the reputation of a business, or an industry. Grain buyers and end users place considerable value on an accurate CVD when grain is delivered.

Growers who, over time, build a reputation of careful grain storage management, are usually the growers who get the first phone calls from grain buyers. Buyers and end users are keen to develop a long-term relationship with reliable suppliers. It is sound commercial sense, where both parties benefit.

Managing pests and maintaining grain quality – key practices

Fumigations and use of grain protectant insecticides are only two of the five key tools used to maintain grain quality and achieve reliable insect pest control. Combining the five practices outlined in this paper forms the foundation for successful on-farm grain storage.

Top five practices for successful storage:

1. **Aeration:** Correctly designed and managed, aeration provides cool grain temperatures and uniform grain moisture conditions. Aeration cooling reduces storage problems such as moulds and insect pests, plus helps maintain grain quality attributes such as seed colour and germination. Aim for grain temperatures of less than 23°C in summer and below 15°C in winter
2. **Hygiene:** A good standard of storage hygiene is crucial in keeping storage pest numbers to a minimum. Good hygiene for silos, augers and trucks also reduces the risk of seed contamination. The use of diatomaceous earth (e.g. Dryacide™) in empty storage following the grain residues clean out helps to control any remaining insect pests.
3. **Monitoring:** To prevent serious damage, undertake monthly checking of grain in storage for insect pests (sieving / trapping) as well as checking grain quality and temperature. Keep monthly storage records, including any grain treatments applied.
4. **Fumigation:** In Australia, only fumigant gases (e.g. phosphine) are registered to deal with live insect pest infestations in stored grain. To achieve effective fumigations, the storage/silo must be sealable/gas-tight to hold the gas concentration for the required time. For example, a minimum phosphine gas concentration of 200ppm is required for 10 days to control all life stages (egg, larvae, pupae, adult) of storage pests. Check labels for details.
5. **Grain protectants:** Grain protectant insecticide sprays provide another line of defence against storage pests. Before use, always check with potential grain buyers as there are a growing number of markets where grain is required to be pesticide free. Treated planting seed retained on-farm is common. Treat at harvest time, while augering into storage. Always use a registered grain protectant according to label directions.

Warning: *Grain protectant notes do not apply to the grains industry in Western Australia where their use is restricted. In all cases, product labels are to be used to determine correct use patterns.*

Figure 1. Rust-red Flour Beetle Tribolium castaneum, a common pest of stored grain

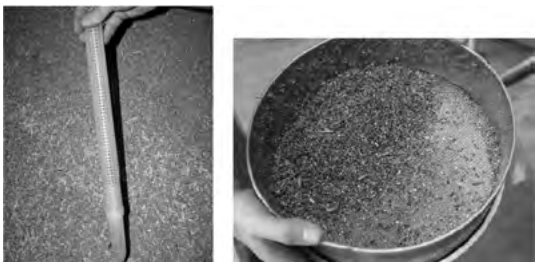

Figure 2. A probe trap and insect sieve used for regular grain inspections

Equipment - storage facilities and grain quality testing

Grain growers in eastern Australia are now storing a much larger proportion of their crop production on-farm and in many cases deliver grain directly off-farm to end-users or buyers. Therefore, for increasing volumes of production, the responsibility of grain quality testing and segregation into appropriate parcels or classifications has now moved from the traditional bulk handler back to the grower themselves at harvest time.

Managed well, growers can improve grain buyer confidence and see financial gains by using equipment that provides accurate grain quality specification. Carefully selected on-farm segregations during harvest provides confidence in the quality of grain available for sale.

Figure 3. An on-farm storage facility with a weighbridge, sample stand and grain testing room.

Equipment/resources - grain quality testing

- A truck weighbridge and sample stand, if economical, next to the on-farm storage facility.
- Air-conditioned room at the sample stand for housing grain testing equipment.
- Sample spear or vacuum probe for truck sampling at harvest time and checking grain quality during sales outturn.
- Each storage clearly identified or numbered, plus a visual storage plan board (white board) located in grain testing room.
- Primary level: moisture meter (portable), insect sieve, grain size / screening sieves, grain defect and contamination identification resources (e.g. photos of black point, weed seeds), current season's grain standards (GTA web site; https://www.graintrade.org.au/), numbered sealable 20 litre buckets for harvest time truck sample which represent each silo and a storage record system / spreadsheet.
- Second level: Near infrared (NIR) protein and moisture testing, test weight (kg/hl), auto screenings shaker, falling numbers testing and grain grinding and separate multi copy record book for each truck outturn load/sales from storage facility (signed by truck driver).

Figure 4. An on-farm grain testing room with equipment and individual silo sample buckets.

Conclusion

One of the potential advantages that well-managed on-farm storage may have to offer is the ability of individual growers to apply and hold a larger number of grain quality segregations in their storage facilities.

An individual grower typically has a limited number of varieties and grain quality segregations. Farm storage systems usually have multiple silos into which specific quality segregations can be made. This contrasts with bulk handler depots that receive a large range of grain varieties and classifications from multiple growers over a wide regional area. Bulk storage facilities also often include large bunker or pad storages which involve some level of strategic co-mingling of several grain classifications.

The tighter quality segregations that an individual grower or small group of growers can apply may suit the growing container export market, where 'smaller parcels' of specific quality specifications are required. It may also suit domestic markets, such as specialist product flour mills and barley malt growers who aim to segregate to a specific variety along with tight quality parameters.

On-farm storage may also offer improved levels of grain quality maintenance through well managed aeration cooling systems. These are helpful for maintaining seed colour in pulses and oil quality in oilseeds.

Growers who take time to learn more about their grain value chain and end uses stand to gain a much better understanding of quality segregations, as well as why increased value is assigned to grades.

Grain buyers also benefit from learning first-hand from growers the many agronomic decisions and risks that growers are required to make during the life of each crop. Seasonal conditions, crop nutrition, pests and diseases all have a major impact on the final grain quality.

At least with grain storage, we have the opportunity to maintain the grain quality we harvest. Peter Botta, a friend and colleague who sadly passed away recently, was often heard to say at his grower storage workshops that 'grain is food', and we should look after it in storage.

As a grower, if you understand your markets, classify and segregate appropriately, then you know the true value of the grain held in storage that year. You are now in an informed position to negotiate the sale of the grain, with an outcome which is mutually beneficial to both you and the buyer.

Useful resources

GRDC Fact Sheet – Grower storage and handling facilities – checklist: http://storedgrain.com.au/storage-checklist/

GRDC booklet – Aerating stored grain – Cooling or drying for quality control: http://storedgrain.com.au/wp-content/uploads/2016/10/GRDC-Aeration-Book-2016_R2.pdf

GRDC booklet - Fumigating with phosphine and other controlled atmospheres: http://storedgrain.com.au/fumigating-with-phosphine-and-ca/

GRDC booklet – Grain storage facilities – planning for efficiency & quality: http://storedgrain.com.au/grain-storage-facilities/

Grain Trade Australia – Grain quality standards: https://www.graintrade.org.au/

Grain quality testing equipment – Graintech Scientific - https://www.graintec.com.au/

Acknowledgements

The work undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the authors would like to thank them for their continued support. The author would also like to thank DAF's Postharvest research team members, GRDC's national grain storage extension team, along with valued support from growers and industry collaborators.

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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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Grain storage – the economic considerations

Chris Warrick.

Consultant and National Coordinator for the GRDC Grain Storage Extension Project.

GRDC project code: PRB00001

Keywords

- grain storage, economics, costs, benefits, comparison.

Take home messages

- In majority of cases, on-farm storage requires multiple financial benefits to cover the costs.
- The most economic form of storage will be the one that suits your system, the grain being stored and the length of time it's stored.
- Permanent on-farm storage is a 25+ year investment – it's worth taking the time to do the numbers, consider the options and make informed decisions.

Background

As growers continue to expand on-farm grain storage, the question of economic viability gains significance. There are many examples of growers investing in on-farm grain storage and paying for it in one or two years because they struck the market at the right time, but are these examples enough to justify greater expansion of on-farm grain storage?

The grain storage extension team conduct approximately 100 grower workshops every year Australia-wide and it's evident that no two growers use on-farm storage in the exact same way. Like many economic comparisons in farming, the viability of grain storage is different for each grower. Depending on the business's operating style, the location, the resources and the most limiting factor to increase profit – grain storage may or may not be the next best investment. For this reason, everyone needs to do a simple cost benefit analysis for their own operation.

Comparing on-farm grain storage

To make a sound financial decision, we need to compare the expected returns from grain storage versus expected returns from other farm business investments, such as more land, a chaser bin, a wider boomspray, a second truck or paying off debt. The other comparison is to determine if we can store grain on-farm cheaper than paying a bulk handler to store it for us.

Calculating the costs and benefits of on-farm storage will enable a return-on investment (ROI) figure, which can be compared with other investment choices and a total cost of storage to compare to the bulk handlers.

Most economic form of storage

The key to a useful cost–benefit analysis is identifying which financial benefits to plan for and costing an appropriate storage to suit that plan. People often ask, 'what's the cheapest form of storage?' The answer is the 'storage that suits the planned benefits.' Short term storage for harvest logistics or freight advantages can be suited to grain bags or bunkers. If flexibility is required for longer term storage, gas-tight, sealable silos with aeration cooling allow quality control and insect control.

Benefits

To compare the benefits and costs in the same form, work everything out on a basis of dollars per tonne. On the benefit side, majority of growers will require multiple financial gains for storing grain to make money out of it. These might include harvest logistics or timeliness, market premiums, freight savings or cleaning, blending, or drying grain to add value.

Costs

The costs of grain storage can be broken down into fixed and variable. The fixed costs are those that don't change from year to year and have to be covered over the life of the storage. Examples are depreciation and the opportunity or interest cost on the capital. The variable costs are all those that vary with the amount of grain stored and the length of time it's stored for. Interestingly, the costs of good hygiene, aeration cooling and monitoring are relatively low compared to the potential impact they can have on maintaining grain quality. One of the most significant variable costs, and one that is often overlooked is the opportunity cost of the stored grain. That is the cost of having grain in storage rather than having the money in the bank paying off an overdraft or term loan.

The result

While it's difficult to put an exact dollar value on each of the potential benefits and costs, a calculated estimate will determine if it's worth more thorough investigation. If we compare the investment of on-farm grain storage to other investments and the result is similar, then we can revisit the numbers and work on increasing their accuracy and assessing the sensitivity. If the return is not even in the ball park, we've potentially avoided a costly mistake. On the contrary, if after checking our numbers the return is favourable, we can proceed with the investment confidently.

Summary

Unlike a machinery purchase, grain storage is a long-term investment that cannot be easily changed or sold. Based on what the grain storage extension team are seeing around Australia, the growers who are taking a planned approach to on-farm grain storage and doing it well are being rewarded for it. Grain buyers are seeking out growers who have a well-designed storage system that can deliver insect free, quality grain without delay.

For more information or advice on grain storage or to download a copy of the cost benefit analysis booklet and spreadsheet or contact the grain storage extension team via www.storedgrain.com.au

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How human resource compliance and best practice can positively impact the recruitment, management and retention of skilled staff

Liz Jamieson.

Rimfire Resources.

Keywords

- compliance, human resources, labour management, recruitment, retention, training, employee lifecycle.

Take home messages

- Know the law – review and implement employment documents and processes in line with Fair Work legislation.
- Keep updated – amend these documents and processes following business or legislative changes.
- Invest in training managers.
- Remunerate staff fairly.
- Embrace workforce planning.

Background

Good people are the heart of every successful agribusiness. Managing the components of human resources (attraction, retention, remuneration, safety, compliance and training) are therefore core functions of any business employing staff.

However, the reality of small to medium-sized businesses means that HR is often woven into standard business practices rather than being an explicit business function. Rimfire Resources' 2018 Agribusiness HR Review found that over 40% of Australian agribusinesses do not employ any dedicated HR staff.

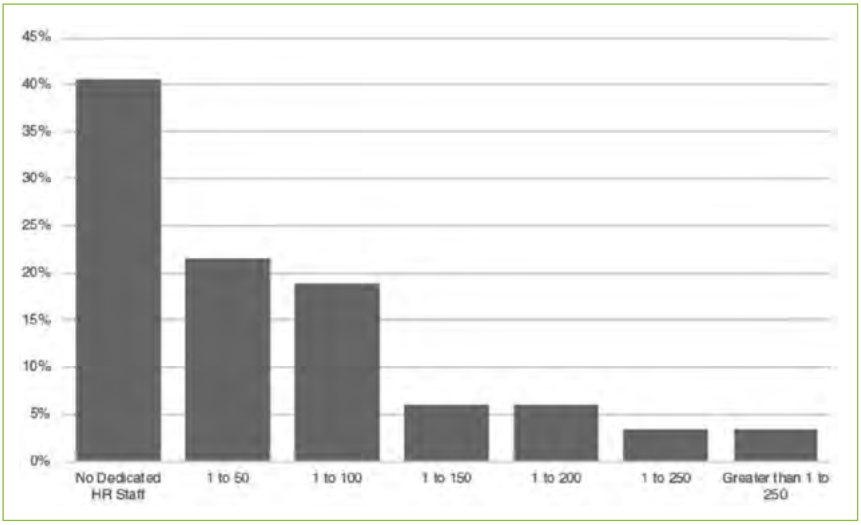

Figure 1. Ratio of HR professionals to staff members in Australian agribusinesses.

For these businesses, there are substantial opportunities to improve both compliance and profitability through good HR management – whether this is internally or through an outsourced HR provider.

What does poor HR management cost?

The estimated cost of replacing employees ranges from 20% of annual salary for low-wage, high-turnover roles to more than 200% of annual salary for highly-educated executive positions. We are now in a candidate-driven market with high labour mobility and skills transference, combined with nearly full employment and a worsening labour shortage. This combined with typical staff turnover rates in agribusiness of 4-10% in 2018 means our sector is losing millions of dollars per year on vacancies. Therefore, the recruitment, management and retention of staff is more important than ever.

Why is HR compliance important?

In simple terms, compliance is important because all organisations must comply with employment law, rules and regulations. Fair Work Inspectors have the right to enter a business at any time to spot-check HR practices – and this is neither an idle threat nor an isolated occurrence.

In an increasingly complex and regulated workplace, a lack of HR compliance exposes the business to risks of fines, hefty back-payment bills, adverse publicity, litigation in court, reduced staff performance and employee turnover.

How can HR compliance help attract and retain staff?

Small businesses can manage their HR duties without employing a dedicated HR resource, but they must dedicate time and resources to developing, executing and maintaining healthy HR practices. By doing so they will not only protect their single most important asset – people – but also increase profitability.

Each business needs to understand its own situation, but there are some common areas growers should understand their HR obligations in. These can be roughly grouped into stages of the employee lifecycle.

HR compliance throughout the employee lifecycle

- Hiring employees:
  - Recruitment – know what to do before you hire (i.e. create a position description, write a job advertisement, interview, reference checks, make an offer etc.) and after you hire (i.e. create an employment contract containing the 10 National Employment Standards, set up an induction, etc.).
- Paying employees:
  - Award compliance – know which award or agreement will apply to your workers, the minimum wage for the role and any penalty rates and allowances. The award also determines how often employees should get paid.

Figure 2. Factors that influence employees' retention rate.

- Be careful not to misclassify employees as independent contractors, casuals or seasonal workers if they have regular work – this could entitle them to employee benefits e.g. superannuation and leave.

- Keeping the right records:
  - Payslips, timesheets and rosters are mandatory parts of running a business and will help manage finances while avoiding risks of fines and penalties.
- Offering leave and other benefits:
  - Leave – know the leave entitlements of different employees under the law (e.g. annual, sick, parental, domestic violence, community, long service leave etc.) and whether employees are entitled to ask for flexible working arrangements.
- Dealing with a difficult or underperforming employee:
  - Discrimination, harassment and bullying – know the differences and courses of action.
  - Performance management – help employees work at their most productive level and address underperformance if it occurs. .
- Ending employment:
  - Appropriate workplace behaviours – have a code of conduct or policy in place that outlines what behaviours are appropriate in your workplace. This will also help with managing difficult or underperforming employees.
  - Termination – know your rights and obligations when it comes to dismissal, notice and final pay for employees, in order to avoid future unfair dismissal claims and penalties.

It is then important to stay up-to-date with legislative changes that effect HR practices to ensure you continuously meet your legal obligations.

Conclusion

The 2019 labour market outlook shows an increasing demand for skilled and motivated staff, who are more mobile between roles due to low unemployment. This means vacancies and non-compliant HR practices could cost growers more time and money than ever before. Focusing on HR compliance can foster a fair, safe, ethical, diverse, inclusive and profitable workplace which in turn will help attract and retain the right people.

Useful resources

Some useful online resources for managing your HR duties include:

- https://www.fairwork.gov.au/ (Fair Work Ombudsman)
- https://calculate.fairwork.gov.au/FindYourAward (Pay and Conditions Tool – PACT)
- http://awardviewer.fwo.gov.au/award/show/MA000035 (Pastoral Award 2010, which covers many employees working on broadacre field crops including grains)
- http://awardviewer.fwo.gov.au/award/show/MA000002 (Clerks Private Sector Award 2010, which covers many administrative employees working in sectors including grains)

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Creating a prosperous farming future

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Keywords

- farming future, profit drivers, people, resilience, emotional intelligence.

Take home messages

- People are the number one profit driver in any business. Ensure 2% to 3% of gross farm income is invested in professional development each year and make sure some of it is in the interpersonal skill area.
- A 'measure to manage' approach is a must in all farm businesses. Develop your key performance indicators then identify and improve the skills and strategies to enable continuous improvement.
- Most farmers live in a cage of their own making. It is knowing what is going on outside that cage and how you adopt and implement the new ideas that usually decides your future.

Introduction

Agriculture is one of the most challenging industries in the world, with the two most influential factors, climate and markets out of most farmers control. Prospering in farming requires five key attributes:

1. Mindset – attitude.
2. Structure – systems.
3. Plans – strategy and tactics.
4. Chemistry – how to gel/relationships.
5. Culture – values that guide decisions and behaviour.

A lack of profit most of the time is not a technical or production issue. More often, it is a people problem. Get the people right and the production and profit will follow. Profit is just as dependant on good communication, problem solving and negotiation as it is on using the right chemical and fertiliser. We must always be fertilising the top paddock; the one on top of your shoulders. A good starting point is to invest 2% to 3% of your gross income on professional development each year. As the leader of your farm business you need to ensure that you are staying abreast of the opportunities that are available to you. Change may not be compulsory but neither is survival.

Main characteristics of the key profit driver

The number one profit driver in your farm business is not price or yield. You are the number one profit driver. To become a better operator it may be useful for you to critically analyse some of the best farmers in the district. Good operators understand and have strong focus on the key performance indicators and what drives them. They have a measure to manage approach, have great discipline and never make excuses. Resource allocation is well managed and they have a good support team around them. Good planning, monitoring and analysis skills are supported by an ability to synthesise information well. Behaviours such as remaining abreast of new technology and conducting one's own on-farm research are a given on prosperous farms. Most importantly good farmers have an ability to milk all the learning from every mistake and their time management is spot on.

Management structures that matter

When you mention the words 'farm business structures', most farmers think of legal structures such as sole traders, partnerships, companies and trusts. Whilst it is very important to ensure you are using the right trading and ownership entity, there are many more structures that need to be put in place to ensure the smooth running of the farm

business. Management structures are also very important. Boards or advisory groups, support teams, regular meetings, job descriptions and dispute resolution processes are all part of good management structures.

Selecting the right business structures helps manage the expectation of the partners or investors in the business and reduces the risk exposure of the individuals within the entity. It should also bring about the most effective tax arrangements and keep the administration costs in line with the benefits derived. Selecting the right structures can also be a tremendous aid to succession planning. A failure in any one of these can be traced back to a lack of good processes, systems and discipline. It is like cooking a special cake, as you need a good recipe where ingredients are contributed in the right proportion. It always pays to work on the weakest link, and if you do this with the five core business ingredients then there is every chance you will be profitable and gaining job satisfaction.

When we analyse the very successful franchise businesses, the core of their success is built around, structures, systems and processes. Having good systems and structures in place ensures that the members of the business are playing "the ball not the man". This should reduce disputation, ensure better and more timely decisions and make the job of farming a more profitable and pleasurable one.

I have long held the belief that you should never go into business with family or friends. With family farming being the predominant operational structure in Australian agriculture, it is critical to have good systems and structures in place, not only to make the best decisions but also to preserve the family relationships.

Every year I see farmers having a strong desire to improve production. They attend field days and seminars, invest in equipment and machinery, read farming magazines and pester their neighbours for knowledge yet they do not invest a cent in the development of their core interpersonal skills. In this fast-changing world communication, problem solving, negotiation, stress management, time management and leadership are the mortar between the bricks when it comes to running a successful business and ensuring that progression is made. Each year most farmers should be undertaking professional development in one or two of these areas. After all, you do not want to become the weak link in the business. Structuring a three-year professional development program for yourself is well worth the effort.

How do you develop the best strategy?

Develop the Key Performance Indicators and the strategies that drive them. Strategy is the art of planning and directing the larger decisions in the business. Good strategy is everything when it comes to running a prosperous business and starts with having good data or facts on which to base your decision. It is like the foundations of a building; the rest of the structure depends on it. In making better decisions further information and research is usually required. Combine all that with your own experience and you are getting to a point of being wise enough to make a good decision. Wisdom can only be created by combining all these factors; it cannot sit on its own. Farmers must always remember that it is not how high you fly but how well you bounce. It is the decision's that you make in the good times that get you through the bad. If you are going to cope with drought, for instance, it is the good decisions that you make in good seasons that will get you through the drought.

Developing your personal priority list

Your priorities in life and their order of importance should rarely change and are as follows:

- Your physical and mental health – determines how you perform
- Your family – you need them for love, support and responsibility
- Your business/occupation – for self-worth and livelihood
- Your personal priorities – relief valves
- Your friends – for fun
- Your community – takes the focus away from yourself

Many farmers place their business first and wonder why their physical and mental health is not what it should be. Good mental health is enhanced by a good annual holiday and, where possible, a few short breaks in-between. Some farmers doing it tough say they cannot afford a holiday, but I am convinced that the benefits outweigh the costs manyfold. Without your health the rest of your life (and the people around you) can suffer.

What must be your non-negotiables

Every farming family should have a set of 'non-negotiables'. This is an agreed list of 'must-dos' and things that you will not do. This sets a good environment in which the team can do things

confidently and well. If after a good apprenticeship you decide to return to the family farm for the long term it is critical that you develop some 20-year goals. For parents, it is critical that by the time they have reached 50 years of age they have well defined retirement, succession and estate plans. Most leave it far too late and the decisions made usually impacts significantly on the next generation. The younger generation need to have share farming, leasing and contracting as considerations for their individual growth strategies. A goal to own 1000 hectares at 40 years of age cannot happen overnight. Equity needs to be accumulated over time to enable this to happen. Timing and good advice in agriculture is not something; it is everything. The difference between good and average farmers is not in the amount of work done, but in the quality, timing and implementation of the decisions. Young farmers need to accept responsibility, take calculated risks and learn everything possible from their mistakes.

To be able to achieve 20-year business goals it is essential that farmers understand the relationship between cash, profit and wealth. Many farmers generate a lot of cash, but the level of profit is not as one would expect, thus limiting wealth creation. To create wealth, we need profit so that cash management is the key. It is investing in appreciating assets rather than depreciating assets that makes this journey more achievable. Every individual piece of machinery and or equipment on a farm must be a cost and profit centre in itself, so that wise decisions can be made when it comes to its replacement.

How you build your personal resilience

Resilience is our ability to withstand or overcome adversity or unpleasant events and successfully adapt to change and adversity. Farmers that experience drought, floods and fire are always challenging their own resilience. It is commonly said that what matters most is not what happens to us, but how we deal with the adversity. Resilience is built around having strong purpose, mental toughness, physical endurance and emotional balance. Staying in control of one's thoughts is so important. Making sure that you are always dealing with reality and basing decisions on high probability rather than hope remains critically important.

Having a couple of personal and/or business mentors can help. Having someone with whom you can share your inner thoughts is invaluable, particularly in tough times. Asking your mentor 'how do you think I am going?', whilst knowing that the reply will be honest and valued, is critical.

Physical and mental fitness are strongly linked. Many farmers whilst doing some physical work remain physically unfit and this eventually impacts on mental well-being.

Emotional intelligence is more important than you think

Emotional intelligence is about using your emotions to inform your thinking and then using your thinking to manage your emotions. Whether we like it or not, we experience an emotion every minute of the day. Right now, you are experiencing an emotion and when asked what it is, most people struggle to describe or identify it. Emotions are feelings you have about a situation and, believe it or not, they strongly influence the way you act and interact. Most of our relationships are built around emotional intelligence. The six basic emotions of joy, surprise, fear, disgust, anger and sadness can be expanded to hundreds of words that describe how we feel about a person or situation. A good starting point is to identify when you behave badly, and then work on improving your reaction to this situation when it happens again. If it involves another person, a good starting point is to make sure you frame your comments with the word 'I' rather than 'you', as this takes the blame out of the conversation. To use the 'I feel ___ because ___ and I would like ___' process has a high success rate in meeting the needs of both parties and rarely burns any bridges.

Managing generational differences

When a young farmer is showing excellent signs, it is important that Mum, Dad or the boss harnesses this enthusiasm and ability. I see far too many farmers who become control freaks and remain so until they retire. The issues that need to be addressed in this process can be difficult and complex and a third-party consultant can be a good foil in making the decisions that accommodate for all parties. Whilst there is a huge knowledge, wealth and experience gap when the young farmer starts out, I still believe you need to develop a team approach from day one. There should be no power plays.

Regardless of whether it is your son or daughter that has joined the workforce, they should be treated as a professional employee from the beginning. This means sitting down and writing a job and person description, so that the new employee has a clear understanding of what their role and responsibilities are, as well as what expectations need to be developed and met. This should be supported by a well-documented

salary package. If a full salary is not to be paid the difference between what the young employee is worth and what they get paid should be shown as a trade creditor on the balance sheet at the end of each year. Giving sole responsibilities from the commencement of employment is essential, even if it is initially just caring for the dogs or tidying the workshop. Transferring responsibility from the older to the younger generation should be pursued at appropriate times from there on.

If the young family member continues to live in the family home, commercial rates of board should be paid. As an employer you become a very important teacher particularly in the earlier years. Learning the true cost of living is very important and therefore, if a parent is continuing to do the clothes washing, this should be valued. When an appropriate opportunity presents itself for the younger generation to live separately, this should be considered. Living and breathing the same air day after day can spell problems for many.

If, however, you continue to live under the same roof, an important consideration is to avoid giving the son or daughter a wakeup call each morning - that is what alarm clocks are for. If they don't present for work, drive away and leave them behind. In this instance, guilt should be the greatest teacher, but if you have to drive off to work without your employee repeatedly, then maybe it is time for them to find another job. Every job should provide the necessary motivation to get out of bed. However, we must remember that we have all been guilty of a sleep in.

The old saying is that if you have a problem at work then you will be a problem at home, and therefore it is critical to preserve family relationships. Setting good ground rules and processes at the start are the secret to maintaining a good relationship. If a problem has surfaced, don't sit on it, but get it out in the open, have a discussion, come up with a resolution and move on. In these situations, some give and take is usually required, and sometimes we need to agree to disagree. The requirement for regular formal business meetings goes without saying.

Conclusion

People are the number one profit driver in any business. Ensure that 2% to 3% of gross farm income is invested in professional development each year and make sure that some of it is in the interpersonal skill area.

Develop your business's key performance indicators, then identify and improve the skills and strategies of your employees to enable continuous improvement.

Most farmers live in a cage of their own making, therefore it is knowing what is going on outside that cage, as well as how you adopt and implement new ideas, that usually decides your future.

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Building climate resilience in farming systems

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GRDC project code: CSA0050

Keywords

- modelling, risk, gross margin, climate variability.

Take home messages

- The profitability of a farming system should be quantified over the whole crop sequence accounting for fallow costs and the length of the crop sequence/rotation.
- Cropping intensity is a key driver of system profitability and risk, more so than the mix of crops used. Crop systems with higher intensities (i.e. less time in fallow) have higher average profitability, but also higher risk — vice versa, crop systems with longer fallows have lower risk, but there are trade-offs of lower long-term gross margins (GMs).
- It is critical to match cropping intensity to environment to optimise the risk-return trade-offs. Lower crop intensities (0.5-0.75) are optimal in harsher environments (e.g. western districts), moderate crop intensities (0.75-1.0) in the moderate environments, but crop systems with higher crop intensities (1.0-1.3 crops/yr) are optimal in higher rainfall environments.
- Mixing summer and winter crops in the sequence also mitigates seasonal variability and helps stabilise gross margins and risk for key crops following transitional long-fallows.
- Crop sequences with lower crop intensities and involving summer crop in rotations have been increasingly attractive (in terms of risk-returns) over the past 10-20 years.

Background

Farming in Australia's subtropics is a risky pursuit. We experience one of the most variable climates in the world in a market environment exposed to significant fluctuations in prices for commodities and inputs. Hence, designing a cropping system that helps to mitigate these risks is central to long term viability of a farming enterprise. While there are several mechanisms that can be used to mitigate price risks, managing climate risks on production is critical. Central to this is the capacity of the farming system to capture and utilise rainfall to convert this into profit.

However, there is often a trade-off between optimising water use efficiency (i.e. $ return per mm) and riskiness of the farming system. For example, cropping systems can reduce risk by employing longer fallows and waiting until soil water in the profile has been built and thereby minimising risks of crop failures or lower crop margins. However, longer fallows clearly mean fewer crops are grown and these returns must be adjusted for the duration of the fallow prior. Systems with longer fallows typically have lower fallow efficiencies and less rainfall is used by the crops. Conversely, cropping systems with higher intensity (i.e. more crops per year) have shorter fallows, lower soil water at sowing, lower average margin for each crop, but more of them and higher risks. Hence, finding the right spot where returns per unit of risk are achieved is a significant challenge.

The analysis reported in this paper uses simulation models to compare the long-term performance of crop sequences in terms of their relative profitability, riskiness and their resilience to a changing climate. It is important to capture the dynamics over the whole crop sequence as there are benefits and costs transferred from one crop to another that influence the efficiency of the system as a whole (e.g. nitrogen (N) supply, residual soil water, ground cover influencing fallow water accumulation). These models can be used to predict the potential yield outcomes for different farming systems, but in reality, it is often difficult for growers to maximise this — maximising yields may not be economically optimal, higher inputs are often needed and crop management is also assumed to be optimal. For this reason, the relative performance of different crop sequences when yields are adjusted to 80% of water-limited potential is also explored – this level is regarded as an achievable level on-farm.

Method

Simulations

This study is a simulation analysis that uses the rotation features of the Agricultural Production Systems sIMulator (APSIM) framework (Holzworth et al. 2015) to simulate crop rotations from historic climate records (1900-2012). APSIM has a long history of simulating northern farming systems (Carberry et al. 2009; Whish et al. 2007) and uses environmental signals to trigger appropriate management decisions. However, these simulations only considered the dynamics of water and nutrients. Losses due to waterlogging, heat or frost shock events, disease, pests, weeds or crop nutrition other than N were not considered by these simulations.

The simulation of all crop sequences was phased, so that each crop in the sequence was sown in every simulated year — a rotation of three crops in four years would be phased four times with each crop and one fallow starting the rotation. This was done to avoid any bias associated with starting particular sequences in any particular year and to ensure data on every crop or fallow was available in every year.

Rotations

The rotations presented were identified through consultations with a wide diversity of growers and advisers across the northern region (Dubbo to Emerald). The rotations analysed cover a range of intensities (0.5 to 1.3 crops per year), but have been restricted to only include the region's most commonly grown crops (Table 1). All crop rotations simulated here are set rotations, with a crop sown each year at the end of the sowing window irrespective of soil water conditions — hence, the capacity to mitigate risk through tactically avoiding crops sown on marginal soil water is not considered. Cotton was excluded from the simulations due to inadequacies of the Cotton model to simulate dryland cotton in a cropping system (particularly soil water extraction). However, crop sequences where sorghum is used could equally represent crop sequences involving cotton. However, there are likely to be higher investment risks and negative impacts on subsequent crops (e.g. lower fallow water accumulation and less soil water available at sowing) compared to sorghum.

All rotations were simulated with traditional sowing windows for each crop, and fertiliser needs were simulated to ensure each cereal crop had sufficient N supplied at sowing to maximise crop yield potential. The frequency of fallow sprays was also flexibly predicted, based on occurrences of events with 25mm or more of rain over three days and repeats were only included where these occurred more than 10 days apart.

Financial calculations

Average annual GM analysis was conducted for each phased crop sequence using the equation below. Long term average grain prices (2008-2017) and current variable input prices were used and these were held constant across all locations (Table 1). Insurance and levy costs together were 2% of the grain income value and were deducted from grain prices. Simulated yields were also adjusted to 80% of water-limited yields to approximate grower achievable yields. The price for N fertiliser applied was set at $1.30/kg N and each fallow spray was set at $17/ha. The simulations did not account for application losses of N fertilisers, therefore, an additional 30% of applied N was used to ensure fertiliser N reached the soil mineral N pool. The baseline 'variable cost' for each crop included planting, non-N nutrients and in-crop pesticide applications. Harvesting costs, N fertiliser and fallow spray frequency were included separately as these varied between the crop sequences or if crops failed. Crops were not harvested if yields did not exceed the costs of harvesting. Machinery costs were based on an owner-operated production system, therefore, fuel, oil, repairs and maintenance (FORM) costs where included in the variable costs.

$$GM_{seq}\ (\$/ha/yr) = \frac{(\sum\{(\text{Grain yield} \times \text{price}) - (\text{kg N} \times 1.3) - (\text{sprays} \times 17) - \text{variable costs} - \text{harvest costs}\})}{(\text{no.of years})}$$

Table 1: Assumptions of crop prices and variable costs used in GM calculations for crop sequences.

Crop	Average Price ($/t)#	Harvest cost ($/ha)	Variable costs ($/ha)
Wheat	264	40	175
Sorghum	225	55	218
Chickpea	569	45	284
Mungbean	710	55	276

 # farm gate price with grading and additional harvesting costs already deducted

Results and discussion

Calculating crop sequence returns

Comparing the GM of different crops is commonly used by growers and their advisers to make tactical choices about which crops to choose for a particular season or set of conditions. However, only considering crops individually and on an annual basis fails to consider the implications on subsequent crops or the fallow leading up to that crop. It is important to consider and analyse the cropping system as a whole over the whole sequence. To highlight this, the following example compares two crop rotations involving the same crops, but where the intensity of the cropping system (i.e. number of crops per year) is altered.

The two similar crop rotations used the same crops (S – Sorghum, Ch – Chickpea, W – Wheat, x – Fallow) — one where a chickpea crop is double cropped (SChxWxx) following sorghum while the other chickpea is long-fallowed from sorghum (SxxChxWxx). The SxxChxWxx sequence achieves higher margins on each crop in the system (owing to higher soil water at sowing of each crop), and particularly the chickpea crop which was preceded by a long-fallow which yielded 0.7t/ha higher than a double crop. However, the aggregate return of the crop sequence as a whole must account for the additional fallow costs ($100) and must be averaged over the four-year sequence length compared to the three year sequence. Overall, there is only a little difference in sequence GM, with the higher intensity crop sequence (three crops in three years) achieving $15/ha/yr higher GM than the lower intensity crop sequence (three crops in four years).

Risk-return relationships in farming systems

Crop intensity (% of time in crop) was found to be a major driver of GMs of the crop sequence, irrespective of the mix of crops used (Figure 1). Figure 1 plots the relationship between period of time in fallow (i.e. no crop actively growing) and the average GM across the 22 crop sequences, varying in their mix of crops and intensity of crops in the sequence. This shows that environment has a large influence on these relationships. Mungindi has a very flat relationship indicating that crops across a wide range of intensities (from 55%-80% time in fallow) generate very similar average GMs. Meanwhile, at Trangie and Narrabri there is

Table 2: Computing System annual GM between different crop sequences (S – Sorghum, Ch – Chickpea, W – Wheat, x – Fallow). Example is based on simulated long term average yields for each crop at Narrabri.

Crop sequence	SChxWxx			SxxChxWxx		
	Sorghum*	Chickpea	Wheat	Sorghum*	Chickpea	Wheat
Yield (t/ha)	3.2	1.6	2.8	3.2	2.3	2.9
Costs ($/ha)	273	329	215	273	329	215
Crop GM($/ha)	447	581	524	514	980	551
Fallow costs ($/ha)	98	28	65	98	125	65
Total GM over sequence ($)	**1362**			**1756**		
Rotation years	3			4		
GM per year ($/yr)	**454**			**439**		

**Equivalent dryland cotton yields to achieve similar GM is 2.1 bales per ha (assuming double input costs and $480/bale).*

a reduction in average sequence yield as time in fallow increases (i.e. crop intensity declines). This relationship is even steeper at the higher rainfall and more favourable location of Cecil Plains.

While it is important to consider the average annual returns of the crop sequence as a whole, it is also important to quantify the risk associated with the crop sequence. While there are a range of ways 'risk' can be quantified, here the average GM is calculated in the worst 20% of years. Hence, systems with a higher return in these poor years are those that are less prone to negative or very poor GMs and are less 'risky'.

Figure 1 shows that all site rotations with more time in fallow were those with lower risks (due to higher soil water available at sowing) while higher

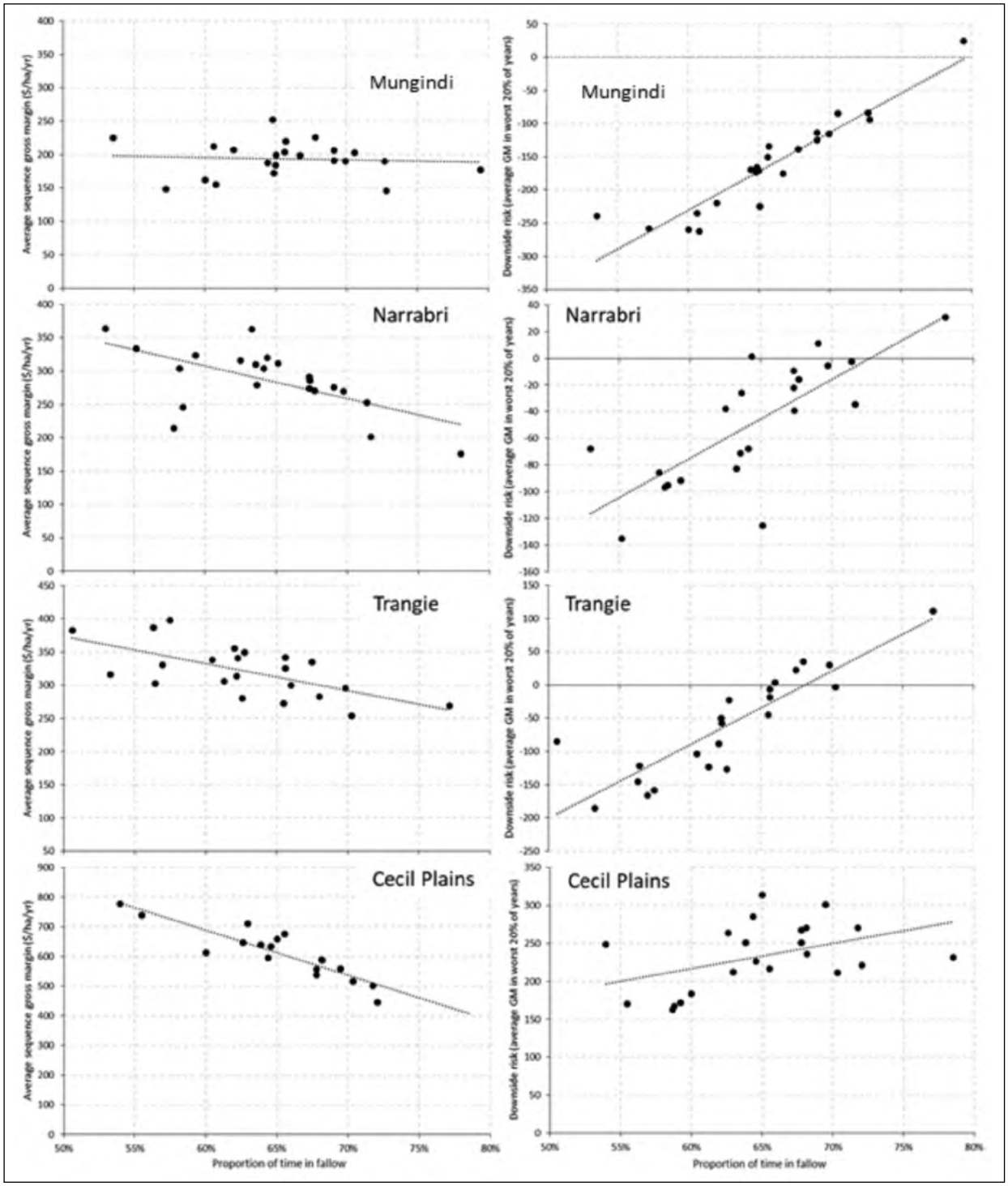

Figure 1. Relationship between proportion of time in fallow and average crop sequence GM (left) and downside risk (i.e. average GM in the worst 20% of years) (right) for 22 crop sequences across four differing locations in the northern grains zone.

crop intensities (i.e. less fallow time) increased the risk of low returns in poor seasons (due to more marginal soil water sowing conditions). Again this relationship was more associated with crop intensity than it was with the mix of crops grown. This relationship between higher risk with increasing crop intensity was most severe in lower rainfall or more marginal environments (e.g. Mungindi), but Narrabri and Trangie also demonstrated a strong negative relationship. At Cecil Plains, cropping intensity (i.e. time in fallow) was less strongly related to risk, meaning that the downside of higher crop intensities was lower.

To illustrate this further, Table 3 compares five selected crop sequences that differ in crop intensity from 0.5 to 1.3 crops per year. For each location, the % of times that crops are sown with plant available water below 100mm and the % of crops that do not break even (i.e. returns do not exceed variable and fallow costs) are shown. This clearly shows that as crop intensity increases, the % of crops that are sown when soil moisture levels are marginal (defined here as < 100mm plant-available water) increases significantly. This is because there is less time for fallows to accumulate moisture and crops become more reliant on in-crop rain. Hence, as crops are grown on marginal soil water, the risk that any particular crop may not break even is increased. This may be managed in a cropping system through tactical decisions to avoid an 'at risk' crop in the sequence, but this is not considered in the current analysis.

These analyses clearly show that in most grain production environments, there is a significant trade-off between higher potential average GMs per year with increasing risk, and this is closely associated with cropping intensity. So, for a particular environment, it is important to know which crop systems maximise the returns per unit of risk. In Figure 2, the average long-term returns are plotted against the downside risk for the full range of 22 crop sequences to see which crop sequences and their associated cropping intensities are optimal against these two competing factors. Sequences located further to the top right are found to be more optimal in terms of maximising the return-risk trade-off for each location (i.e. higher return with lower downside risk or higher returns in the worst years). If a crop sequence achieves a lower GM for a given unit of risk, then it is sub-optimal in terms of risk-return. The crop sequences at the frontier of this trade-off have been highlighted for each location. This figure shows that at Mungindi low intensity crop sequences (0.5-0.75 crops/yr -SxxWxChxWxx, WxxxChxxx) were optimal, while at Cecil Plains higher intensity crop sequences (1.0-1.3 crops/yr) were optimal. Narrabri and Trangie were intermediate with varying crop sequences ranging from 0.5-1.0 crops/yr presenting different risk-return propositions that may be tailored to the particular grower's risk appetite or financial position.

It is also worth noting that in these locations, mixtures of summer and winter crops offer lower risks than systems dominated by summer or winter crops only. This is associated with mixing the range of crops up to utilise good or poor summer or winter seasons to help buffer the system against climate variability. Such systems where summer and winter crops are used in the crop sequence also allow for mitigating risk though employing some long-fallows leading into key crops (e.g. long-fallow from winter to a summer crop (e.g. sorghum here, but alternatively

Table 3: Frequency of crops being sown on marginal soil water (i.e. < 100mm plant-available water (PAW)) and % of all crops with a negative GM across crop sequences varying in intensity and environments.

	Crops/yr	Mungindi	Narrabri	Trangie	Cecil Plains
% of crops sown with < 100mm PAW					
WxxxChxxx	0.5	4	0	4	0
SxxChxWxx	0.66	25	14	25	4
SxxWxChxWxx	0.8	26	16	26	3
SChxWxx	1.0	44	36	50	13
SChxWMgx	1.3	66	54	66	37
% of crops with GM < $0/ha					
WxxxChxxx	0.5	8	7	1	0
SxxChxWxx	0.66	30	9	16	6
SxxWxChxWxx	0.8	28	18	12	4
SChxWxx	1.0	49	21	32	10
SChxWMgx	1.3	55	44	45	14

cotton) or stabilising the yield of the first winter crop after a long-fallow). Further risk mitigation would also be provided through buffering against price variability by using a variety of crops where prices are not linked. There are also likely to be a range of agronomic benefits from using summer crops regularly in the crop rotation.

Long term changes in relative risk-returns of crop systems

The above analyses have taken a long-term view considering a very long climate record at each of the focus locations. However, indications of changing climatic conditions and increasing variability may mean that the relative performances of different cropping systems may be changing. How relative GMs and risk have changed over the past 50 years was examined, looking at 10-year long periods from 2012 back to 1971. Overall, this shows that the average GM of all cropping sequences at all of the study locations has declined over this time, but particularly since 1996. The relative profitability of different crop sequences has also shifted significantly over this time. For example, at Narrabri, the most profitable crop sequence over a 10-year period has changed between several crop sequences over the past 50 years — showing that flexible and adaptable farming systems are critical. However, there appear to be some more fundamental shifts in the relative profitability of crop sequences across the sites. At Trangie, the Wheat-Wheat-Chickpea rotation was superior to other cropping sequences throughout the period up until the decade ending in 2008. Since that time, other lower intensity crop sequences involving summer crops of sorghum (e.g. SxxChxWxx and SxxWxChxWxx) have achieved similar average sequence GM with lower levels of risk. A similar trend is also evident at Narrabri. At Cecil Plains, while the higher intensity system (SChxWMgx) has maintained the highest GM over the whole period, the difference to other lower intensity systems has decreased at the same time as its riskiness has increased significantly. Finally, the analysis at Mungindi clearly shows that low intensity crop sequences (e.g. WxxxChxxx) have become equally

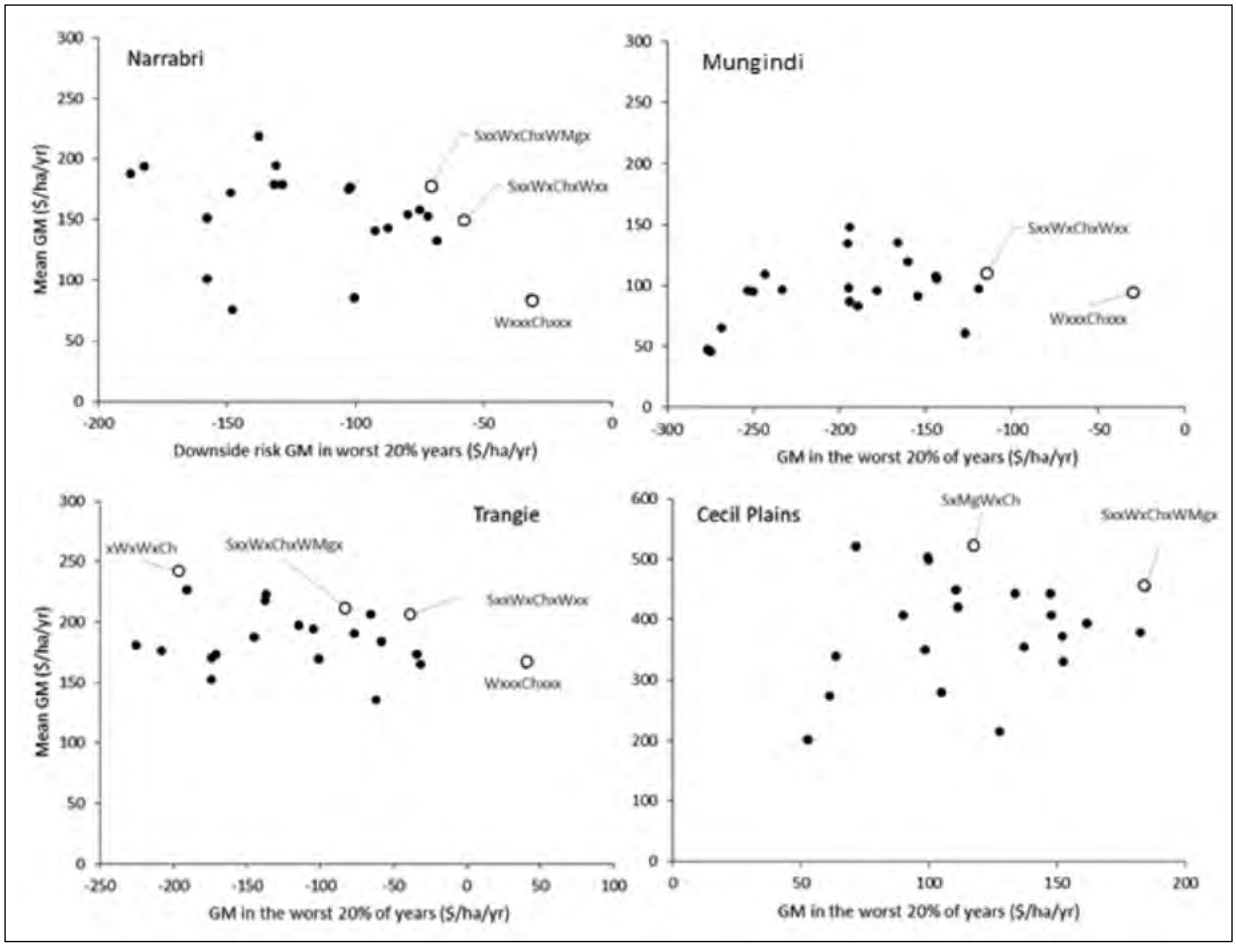

Figure 2. Relationship between long term average annual GM and downside risk (i.e. GM in the worst 20% of years) amongst 22 crop sequences at four locations across the northern grains zone. Crop sequences with the highest return per unit of risk are highlighted (O) and labelled.

Figure 3. For the preceding decade finishing in 2012 to 1971, changes in 10-year moving average (left) and coefficient of variation (right) in GM of six crop sequences varying in crop intensity across four locations in the northern grains region.

profitable to other crop sequences with significantly lower levels of risk in the past 15-20 years. Overall, these trends show that over the past 10-15 years, lowering the intensity of the cropping system has had advantages of lower risk, but the opportunity cost of the lower intensity system compared to the higher intensity system has declined.

Conclusion

Simulation analysis has allowed a long-term view of the relative profitability and risk-return relationships for cropping systems commonly deployed across the northern grains zone. This has shown that cropping intensity is a key driver of system profitability and risk, but this relationship varies significantly with cropping environment. Tailoring the cropping intensity suitable for your environment is a critical factor to balance the trade-off between risk and return across the crop system. There are many crop sequences that are suboptimal in a particular environment, and the gaps can be significant, hence, there is significant opportunity to alter the farming system to fit the risk appetite of the grower and their enterprise. Finally, this analysis shows that across the study environments, the relative attractiveness of summer crops and lower intensity farming systems has grown over the past 10-20 years, indicating that growers need to continually re-evaluate their farming system as a whole.

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Climate variability – how to build resilience through financial management

Kim Bowman and Simon Fritsch.

Agripath.

Keywords

- crop choice, crop sequence, crop frequency, high gross margin crops, resilient farming systems, low cost business, environment, risk management.

Take home messages

- Get to know the production and financial targets for your business.
- High gross margin crops – are a factor of crop choice and frequency in your environment.
- Operate a low-cost business – do you know what it costs to run your business?
- Grain storage - reduced harvest risk, value add from blending and managing cashflow.
- Managing debt – strong businesses utilise debt to grow their business.

Background

Each year there is a large variation in farmer returns in any given region (ie where soil types and climatic conditions are similar). Why is this so?

The average cropping farmer, according to ABARE figures shows a profit of approximately 3% of assets managed. Agripath benchmarking dataset includes farmers that average approximately 6% of assets managed, while the top 20% of farms achieved more than 10%.

This means there is **potential** to lift annual profit from around $300,000 to $1,000,000 on a typical farm where the value of land and machinery is around $10 million.

Financial management strategies to combat climate variability

Agripath has identified a number of key financial management strategies to focus on for building financial resilience in the Northern Grains region:

- Know the production and financial targets for your business.
- Optimise crop choice, sequence and frequency of your high gross margin crops.
- Run a low-cost business.
- Manage debt.

Agripath in conjunction with a GRDC project (RDP00013) titled 'The integration of technical data and profit drivers for more informed decisions' have determined a series of key financial targets for farmers to achieve the 'magical' 8% Return On Assets Managed (ROAM).

- Asset Turnover (Income/Asset Value) – aim for gross income to be >20% of the asset value.
- Direct Costs – aim to keep the direct costs <50% of gross income.
- Gross Margin (Income – Direct Costs) - aim for the gross margin to be >10% of asset value.
- Overhead costs – aim to keep overhead costs at <10% of gross income.
- Operating Profit (Profit/Asset Value) – gross margin less overhead costs equals operating profit, aim for a target of 8%.

Table 1: Financial targets for an example set of dryland grain growers in the Northern Grains region.

	High Rainfall Dalby, Spring Ridge		Medium Rainfall Moree, Gunnedah		Lower Rainfall Miles, Springsure	
	Target	$/ha	Target	$/ha	Target	$/ha
Average Dryland Asset (Land plus machinery)		8,000		5,000		3,500
Asset Turnover (Income/Asset)	18%	1,440	20%	1,000	20%	700
Direct Costs (Direct costs/income)	50%	720	50%	500	50%	350
Gross Margin (GM/Asset)	9%	720	10%	500	10%	350
Overhead (Overhead/Income)	<10%	144	<10%	100	<10%	70
Operating profit (Profit/Asset)	7.2%	576	8.0%	400	8.0%	280

The aspirational financial targets for various dryland grain growers in the Northern Grains region are represented in Table 1.

Crop choice, crop sequence and crop frequency

Farmers that understand their production system of soil constraints and climate variability, are more able to develop resilient farming systems that are profitable in their environment.

The key component of a profitable farming system is having a crop rotation plan that has a sequence and frequency of crops that have the potential to achieve above their targets. The crop sequence needs to be achievable and sustainable, in other words, the crop sequence utilise must best complement the environment it is grown in.

In most farming systems a percentage of fallow will be required as part of the cropping sequence. Fallow provides flexibility with crop choice and can add to the gross margin of subsequent crops. In general, the lower the rainfall the higher the average fallow percentage and in the higher rainfall areas potentially less fallow percentage.

Crop sequence is often strategically planned around a 'pillar crop'. A '**pillar crop'** refers to the main high gross margin crop suited to your environment. The management of this 'pillar crop' involves a carefully planned sequence of crops and farming activities that will maximise the opportunity for the 'pillar crop' to achieve its potential. The 'pillar crop' will vary from farm to farm and region to region based on soil type, location, climate and the farmers passion for that crop to succeed.

High crop gross margins

In general, top performing farms grow high gross margin crops, due to a combination of crop selection, high crop yields and low farm costs. Top performers understand the relationship between yield, price and plant available water and its ability to produce margin in their environment.

The Agripath data collected from up to 300 farms over a 5–10 year period clearly indicates that high yield correlates strongly with high margin and high margin correlates strongly with high ROAM.

In Figure 1 the results from the Agripath 17/18 Profit Focus program conducted on the Darling Downs shows a clear correlation between gross margin and ROAM.

High margin is determined by high yield

Figure 2 demonstrates the correlation between yield and gross margin for breadwheat in the North West NSW region in the 2017/18 year. This figure is indicative of the results produced by breadwheat but also by most other crops across 10 years of data. Collection. This is not to say that price and marketing are not important, but it does emphasise that growing the crop is critical.

Business profit is helped by a low-cost business

Table 2 summarises the major cropping costs in two of the major cropping areas in the northern cropping region.

Input/area costs

Chemical costs are one of the single major costs for most farms in this modern era of conservation farming. Efficiencies in this area when planning your cropping rotations are:

- The tactical use of residual chemicals,
- the use of camera active spray rigs in the fallow, and
- timeliness of operation.

In cases where a crop is failing sometimes the early decision to spray out may be the best option.

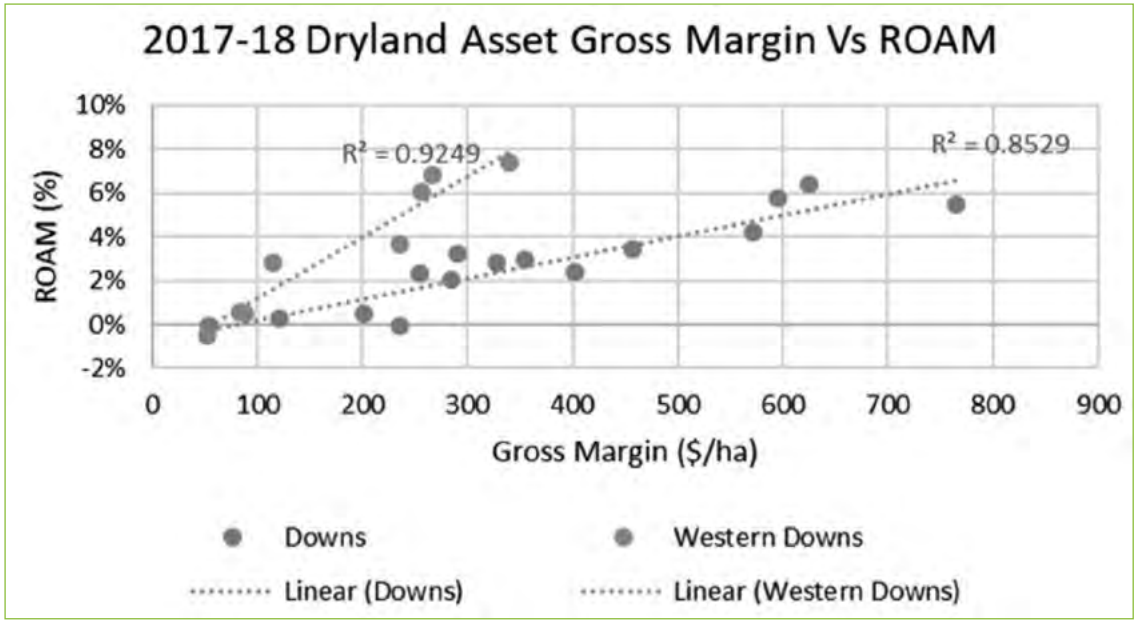

Figure 1. Darling Downs Average Gross Margin V ROAM% by Region 2017-18 (*Source: Agripath).*

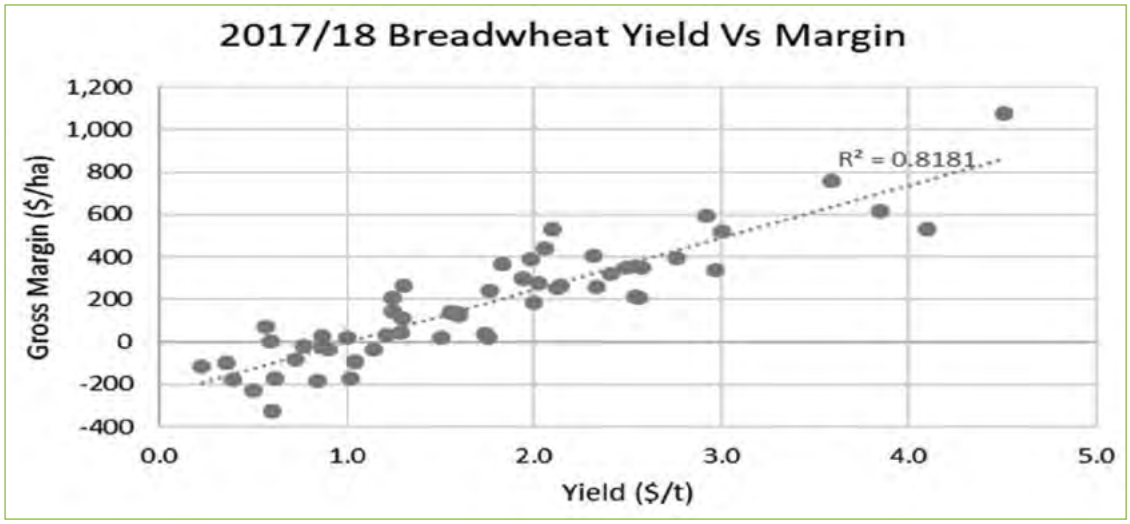

Figure 2. North-West NSW region average yield and gross margin for breadwheat for the 2017/18 season *(Source: Agripath).*

Table 2: Three-year summarised costs for NW NSW and the Darling Downs (14/15 – 16/17) *(Source: Agripath database).*

Costs ($/ha)	NW NSW West	NW NSW East	Downs West	Downs East
Area (ha)	9101	5842	4702	1523
Inputs/Area Costs	149	222	181	303
TPML	164	168	189	300
Yield	44	53	38	80
Overheads	47	82	55	73

Total plant machinery and labour (TPML)

TPML is often one of the highest costs areas of a business. In the figures shown in Table 2 there is an allowance for depreciation of 15% per annum on farm machinery and plant and an allowance for any unpaid family labour. These two key components are not often fully accounted for in many gross margin analysis.

Yield costs

On-farm storage is providing opportunity for farmers to be astute about managing risk by storing grain when it is at low prices and holding it until prices rise, with corresponding increase in gross margin. However, this needs to be balanced with the cashflow demands of the business.

Overhead costs

The main management consideration with overhead costs is to ensure that on average they are at or below 10% of crop income. If they are rising above this level then you may need to have a closer look at your overhead costs and look at areas where you can cut back.

All of the pre-mentioned costs need to be reviewed in relation to the gross margins you can achieve from the crops you chose to grow and your cropping frequency.

Grain storage

Early harvest with in-silo drying can save grain quantity and quality and/or extend the harvest period or usefulness of a grain harvester. In-silo drying uses large air flows, and therefore, takes longer than continuous flow drying, but it is much cheaper. Other benefits from on-farm storage, include savings in freight costs and marketing price advantages. The possible costs and benefits of storage are summarised in Table 3.

Farm storage offers a natural hedge and the potential to manage cashflow with carryover grain in poor seasons where prices naturally rise on the eastern seaboard due to low supply. High profit growers produce the grain to attain high gross margin and then can manage its marketing with storage as they do not have the cashflow constraints of average farms which are forced to sell to meet cash flow commitments. Most farms don't have a marketing problem, it is instead a failure to produce enough grain to meet the financial commitments of the business, that dictates the marketing triggers (i.e. cashflow requirements trigger grain sales rather than other factors).

Table 3: Costs and benefits of storage, with in-silo drying.

Costs of storage ($/t)		Benefits of storage ($/t)	
Capital cost	$160	Harvest logistics – reduced shattering, weather damage $250/t x 15% loss x 33% of years	$12.00
Depreciation over 30 years = 3.4% p.a. of cost	$5.40	Marketing price advantage: $250/t x 10% extra, 30% of years	$7.50
Opportunity cost: half of interest cost of 6%	$4.80	Savings on freight and/or central storage costs	$6.00
Operating cost – aeration, hygiene, repairs	$5.80	Extra value from blending moisture and quality grades	$2.50
Total costs of storage	$16.00	Total benefits of storage	$28.00

Table 4: Difference in debt servicing between a top and an average performing business.

	Top Performing business	Average Performing business
Asset Value	$6000/ha	$6000/Ha
Income $/Ha	$1200	$900
Direct Cost $/ha	$600	$600
Gross Margin $/ha	$600	$300
Overhead $/ha	$120	$120
Operating Profit $/ha	$480 (8%)	$180 (3%)
Interest @ 30% debt 5% interest	$90	$90
Profit after interest	$390	$90

Debt management

Debt is something that most businesses must live with. High profit businesses utilise debt to grow their businesses, whereas average performing businesses struggle to service debt. Table 4 demonstrates the potential of a high margin business to manage debt in comparison to an average performing business.

Conclusion

- Get to know the production and financial targets for your business.
- High gross margin crops – are a factor of crop choice and frequency in your environment.
- Operate a low-cost business – do you know what it costs to run your business?
- Manage debt – build a high margin business and utilise debt to grow the business

References

GRDC Project 'The integration of technical data and profit drivers for more informed decisions'

Agripath Profit Focus database (www.agripath.com.au)

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Agronomy in a variable farming system

Glenn Shepherd.

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Keywords

- farming systems, climatic variation, production variability.

Take home messages

- Farming systems that can rapidly adapt have the greatest ability to manage climatic variation.
- Growers need to match all elements in their system to improve flexibility – equipment, labour, soil type and stubble management.
- Growers must have flexibility in their system and have a number of levers ready to pull when circumstances change – e.g. changing crop type/variety, sowing timing and tactical fertiliser usage to match yield forecasts.
- Perennial pastures and a proportion of trading stock are essential components in managing production variability in a grazing system.

Introduction

Growers have been managing a variable climate since agriculture was first practised in Australia. Their adaptability has allowed agriculture to flourish in an environment very different from their European forebears. A legitimate and challenging question to begin with is, "what is our 'normal' climate like"?

Figure 1 highlights the variability in averages over seven-year periods for recorded history in Dubbo. A grower who worked in the 1950-1980 period would have a very different opinion on average rainfall to his/her predecessors, whilst the past 40 years is closer to the long-term average.

However, while this highlights changes over longer time frames, it does not indicate variability in a shorter period. It is this shorter-term variability that has a large impact on decision making at the paddock level. For example, will there be sufficient moisture to plant the crop in the desired window, or grow pasture before cold winter temperatures limit growth? Will there be enough rainfall to incorporate applied nitrogen (N) at the desired topdressing stage?

Figure 2 highlights the variability and challenges growers face in Central West NSW when it comes to planting a crop on time. We know that wheat yield declines by 4%-7% for every week a variety is planted outside its window (Matthews et al. 2018), so making the most of limited sowing opportunities is critical. There are a number of areas that farm businesses need to critically analyse to determine if they can minimise yield loss due to climate variability.

Factors that farm businesses need to analyse to minimise yield loss due to climate variability

Plant, equipment and labour

Given the opportunities to plant based on sufficient soil moisture appear to be decreasing (Figure 2), it is critical a business has sufficient scale in its planting equipment to sow the desired crop area when conditions are suitable. For example, a 10m machine that can operate at 8km/hr, a 16-hour day (after allowing for two hours of maintenance, refilling, etc) could plant 10m x 8,000m/hr ÷10,000m^2/ha x 14hrs = 112ha per day. If the cropping program is 2,000ha, this will require 18 days of planting to sow the entire crop. This does not include extra delays due to weather, moving farms, unexpected breakdowns, etc.

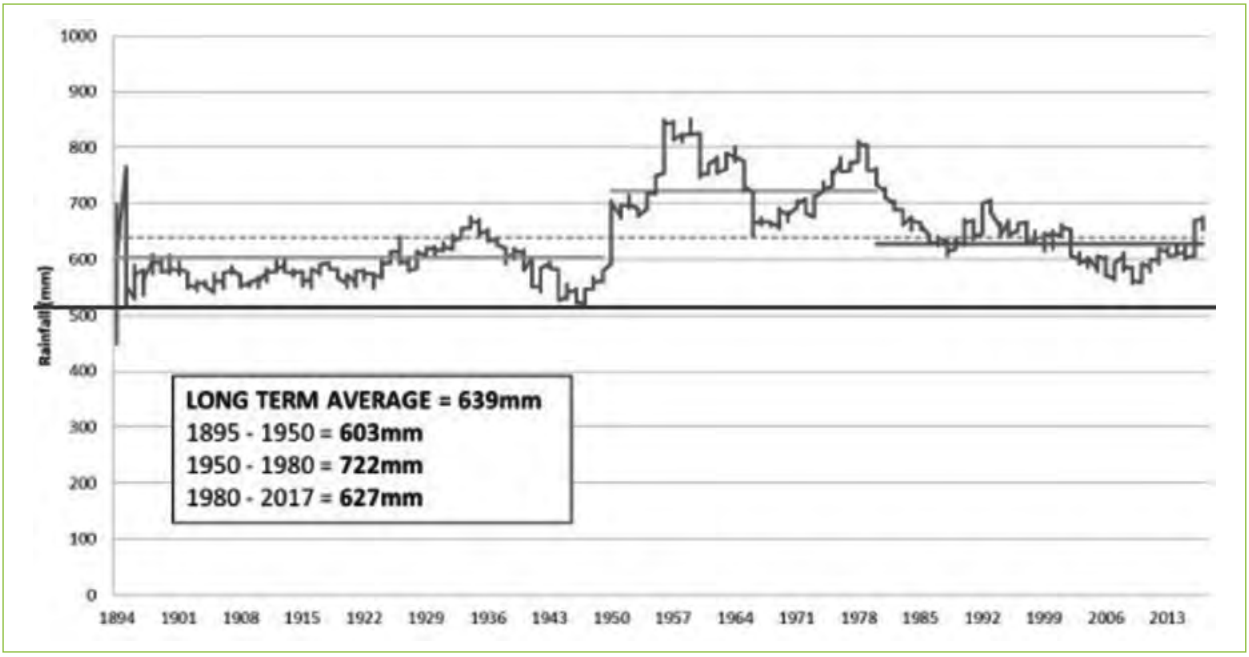

Figure 1. Seven-year rolling average rainfall for Dubbo (period from 1894 – 2013).

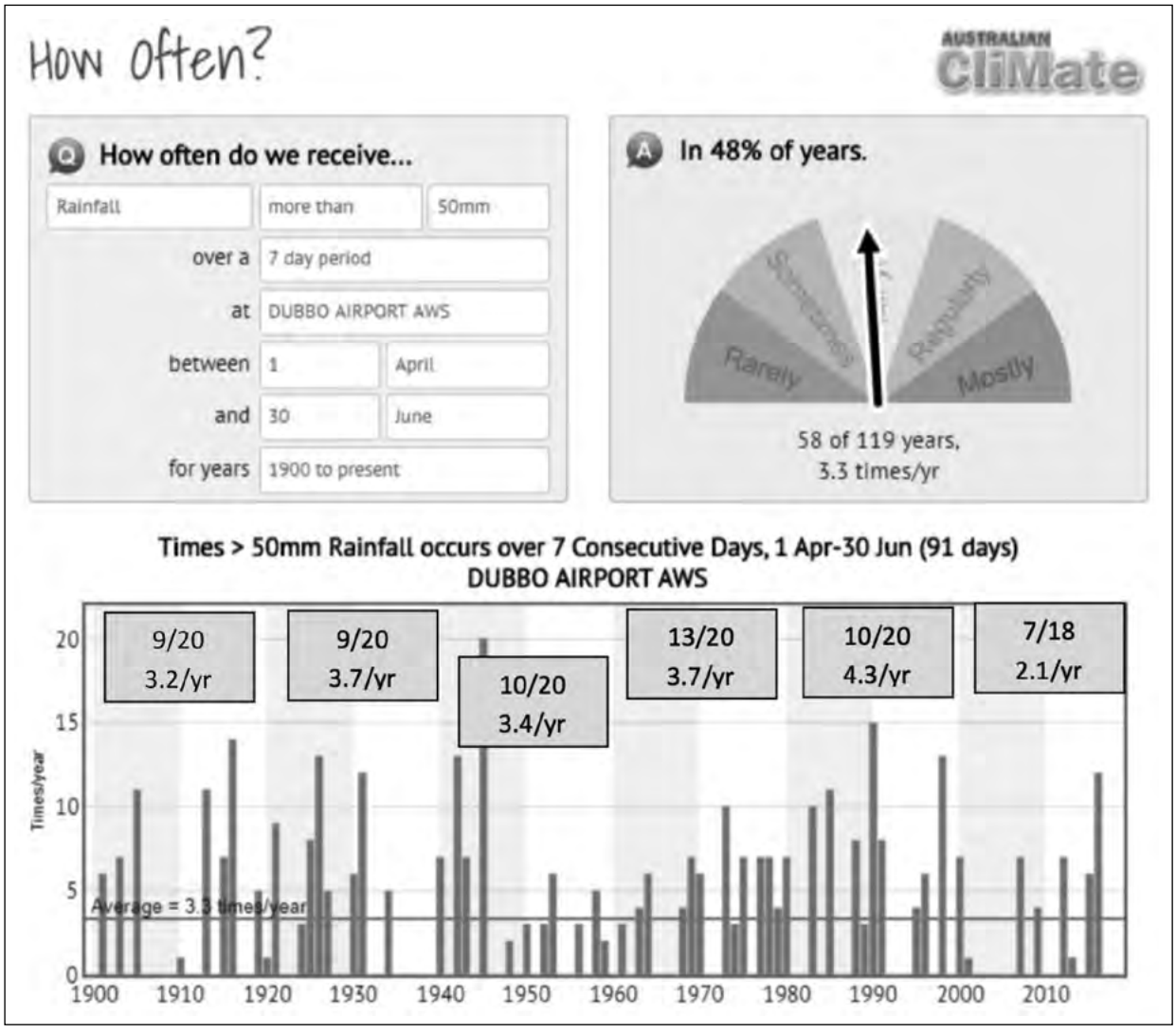

Figure 2. Chance of receiving a planting rainfall at Dubbo *(Source: CliMate app).*

The above calculation requires that sufficient labour be available to operate for a 16-hour day. The business may be able to employ extra seasonal labour to operate a longer day but needs to weigh up the costs of potential losses/mistakes if operators are inexperienced. Another alternative is to consider larger equipment, but the extra capital cost of this must be weighed against the decrease in labour demand. Or would the same sized equipment utilising better ground-engaging technology (seed/soil contact, consistent depth, etc) get more crop up on limited moisture?

Any decisions involving plant/equipment and labour must be considered in conjunction with each other. The judicious use of contractors to fill peak demands may be the most efficient and cost-effective means of completing time critical tasks. Contract chemical/fertiliser application is a good example where the opportunity to cover the entire crop area may be limited (too wet, too dry, too hot, too cold, too windy,) and contracting can ensure application occurs in a timely fashion. Timely control of fallow weeds has been shown to significantly increase plant available water at sowing (often 30mm-50mm) and mineralised fallow N (often 30-60kg/ha), usually representing returns on every dollar invested of $3-$8, but sometimes in excess of these figures. In some soils, water use efficiency of moisture stored deep in the profile can be as high as 60kg grain/mm (Cameron and Storrie, 2014). Such returns are more consistent in highly variable environments.

The type of equipment then becomes a serious consideration. For example, disc machines can generally get across the country faster than tines, but often have to wait an extra day or two before they can start planting after rain. Disc machines have limitations when seeking moisture but can operate under heavy stubble loads with precise placement, where more moisture is often conserved, than many tine machines. Investment in effective choppers/spreaders on harvesters can keep the topsoil wetter for longer, but the planter must be able to handle the residue. Thus growers need to consider how soil type, row configuration and stubble management will affect what equipment they will choose to enable them to plant crops as efficiently as possible

Dry sowing is one means of managing variable sowing rain by having a proportion of crop in the ground prior to rain arriving. All captured rain is then available for germination and none will be lost due to a disc or tine opening the soil. Such a system is dependent on good agronomic practice to have minimal weeds present (particularly annual grasses) and be able to effectively utilise pre-emergent chemistry (most pre-emergents do not perform very well under dry conditions and can cause crop damage when rain is received).

Stubble retention and management

Stubble retention has been one of the cornerstones of zero tillage farming systems, with the key benefit being an increased ability to capture and retain fallow rainfall. Maintaining high levels of ground cover (>65%) and practising zero till has shown to improve fallow efficiency from as low as 10% to as high as 30% (Freebairn 2016).

Retaining heavy stubbles whilst maintaining the flexibility to manage climate variability requires a high degree of management and technology. This may include control traffic and high accuracy guidance for inter-row sowing and/or disc machines or coulters to improve trash handling. Emergence of small seeded crops such as canola may necessitate strategic stubble removal after it has provided its fallow benefits.

Crop and variety choice

Growers can use stored moisture knowledge to select the crop and variety types best suited to a particular field. For example, a field may be switched to chickpeas instead of canola if insufficient moisture is present during the sowing window for canola. Not only does this decision allow for more time to replenish the profile, it utilises a crop that has a lower total water demand.

Within a crop, options are also available to manage variable starting soil moisture. For example, if growing wheat and available moisture is low, a field may be better suited to a low biomass variety than a bulkier one, e.g. Lancer$^{\Phi}$ compared with EGA Gregory$^{\Phi}$. The variable nature of autumn breaks (Figure 2) means that growers need to take advantage of sowing opportunities. Research has shown that it is beneficial to plant longer season wheats (e.g. EGA Wedgetail$^{\Phi}$) earlier in order to take advantage of early sowing rains, rather than waiting to plant shorter season varieties (Fettell et al. 2016).

Long season canola is another option available for growers with stock. Planting can occur in the previous spring-summer or early autumn, with grazing able to occur strategically depending on summer/autumn rainfall. The crop is then well established at the time of the traditional canola sowing window. The main challenge to this system in the local area is depletion of the moisture profile that is generally required for spring growth and grain fill. Conversely, if the profile is full at sowing, it gives

the opportunity to capture subsequent rainfall and reduce runoff throughout the growing season.

In seasons with delayed breaks, growers could plant short season winter crops such as safflower and linseed. However, these crops have niche markets and variable commodity prices to consider as well.

Central West NSW is challenging for summer cropping due to its limited suitable soil types, unreliable summer rainfall and high evapotranspiration losses. Short season crops such as mungbeans use less water and can be sown to avoid the worst of the hot conditions. The red loam soils of the area have inherently lower water holding capacity, so growers need to carefully evaluate their risk profile when considering such crops. On soils that can hold larger quantities of stored moisture, crops such as cotton and sorghum could be considered.

A lack of understanding how residual chemicals break down is an area for potentially large losses in cropping systems. Many chemicals rely on microbial degradation, which happens most readily under mild, moist conditions. Isolated heavy falls interspersed with hot, dry conditions can easily result in slower breakdown of residues than rainfall totals alone suggest. The summers of 2017/2018 and 2018/2019 are excellent examples of this.

Fertiliser usage

Nutrition is one of the single largest expenses in many dryland crops, so matching requirements to usage is critical. The Central West of NSW is home to a wide variety of soil types, with moisture holding capacities ranging from 50-200mm (sands to heavy vertisols) (Ladson et al. 2004) and soil depth from as little as a few centimetres to tens of metres. An increase in climatic variability means a greater reliance on stored moisture to maximise crop yields. Optimising fertiliser use depends on setting realistic target yields. Assuming a water use efficiency of 20kg/mm moisture, soils holding 200mm could conceivably yield 3t/ha more wheat than a soil that can hold no more than 50mm. Base nutrition would be very different between these two soil types.

The risk of too much N resulting in small grain and 'haying off' in cereals has long been known. Recent research suggests growers can minimise their N risks in some crops more than others. Application of excess N in canola has consistently shown no negative yield impacts (O'Brien and Street, 2017). Other research has suggested that applying N to wheat any time up until the end of tillering is often equally efficient than earlier applications (Daniel et al. 2017). This allows growers to spread their risk by applying all canola N at (or close to) sowing, whilst being more strategic with their cereals, assisting with both cash flow exposure and logistics.

The ability to apply N in a timely fashion is critical as there may only be one opportunity in front of a rain event. Therefore, the issue of plant and labour affects this decision as well, in other words; the ability to spread urea or spray out liquid fertiliser quickly enough to cover all the required area.

Pastures

For mixed growers, perennial pastures should provide a significant portion of the feed supply system. They are ideally suited to variable climatic conditions for a number of reasons. They do not need to be established every year, therefore respond immediately to available moisture. After prolonged dry spells, species such as lucerne, digit grass and phalaris rapidly produce feed due to their extensive root systems. Annual pastures and fodder crops need to be sown and established before they can provide value to the stock enterprise, therefore are less flexible in the system.

Due to their perennial nature, such pastures only have one establishment cost. This can be significant when averaged over the lifespan of a well-managed pasture. Being neither Mediterranean-style winter dominant rainfall, nor equatorially affected summer rainfall, the Central West does not have a wide range of suitable species of high persistence. Lucerne is by far the most widely adapted but is very much a 'feast or famine' species. Digit and some other grasses are quite productive if they can be established, but their feed quality is limited. Perennial winter grasses can find it difficult to persist under hot, dry summer conditions. There is room for improvement in our range of perennial species suited to the local area.

(On a side note, there has been some progress in the development of perennial wheat, which would provide many of the advantages of a perennial pasture into a cropping system, but this is some time away from being commercially available.)

Growers need to scrutinise their flock/herd composition in a variable environment. The ability to match feed supply and demand (whilst considering other management issues such as husbandry and markets) greatly influences profitability and reduces exposure to feed shortages. Maintaining a significant proportion of trading stock (whether bred, purchased or both) in the mix allows for strategic reduction in numbers if feed production declines. This not only avoids having to feed all stock, it can

delay the start of supplementary feeding for the core stock that remain.

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THE 2017-2019 GRDC NORTHERN REGIONAL PANEL

JANUARY 2019

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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DR NICOLE JENSEN

Nicole Jensen is GRDC General Manager for the newly created Genetics and Enabling Technologies business group. Nicole brings a wealth of experience in plant breeding and related activities arising from several roles she has held in Australia and internationally in the seed industry including positions as Supply Innovation Lead with the Climate Corporation - Monsanto's digital agricultural flagship, Global Trait Integration Breeding Lead for Monsanto.

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NORTHERN REGION GROWER SOLUTIONS GROUP AND REGIONAL CROPPING SOLUTIONS NETWORK

JANUARY 2019

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:

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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:

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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

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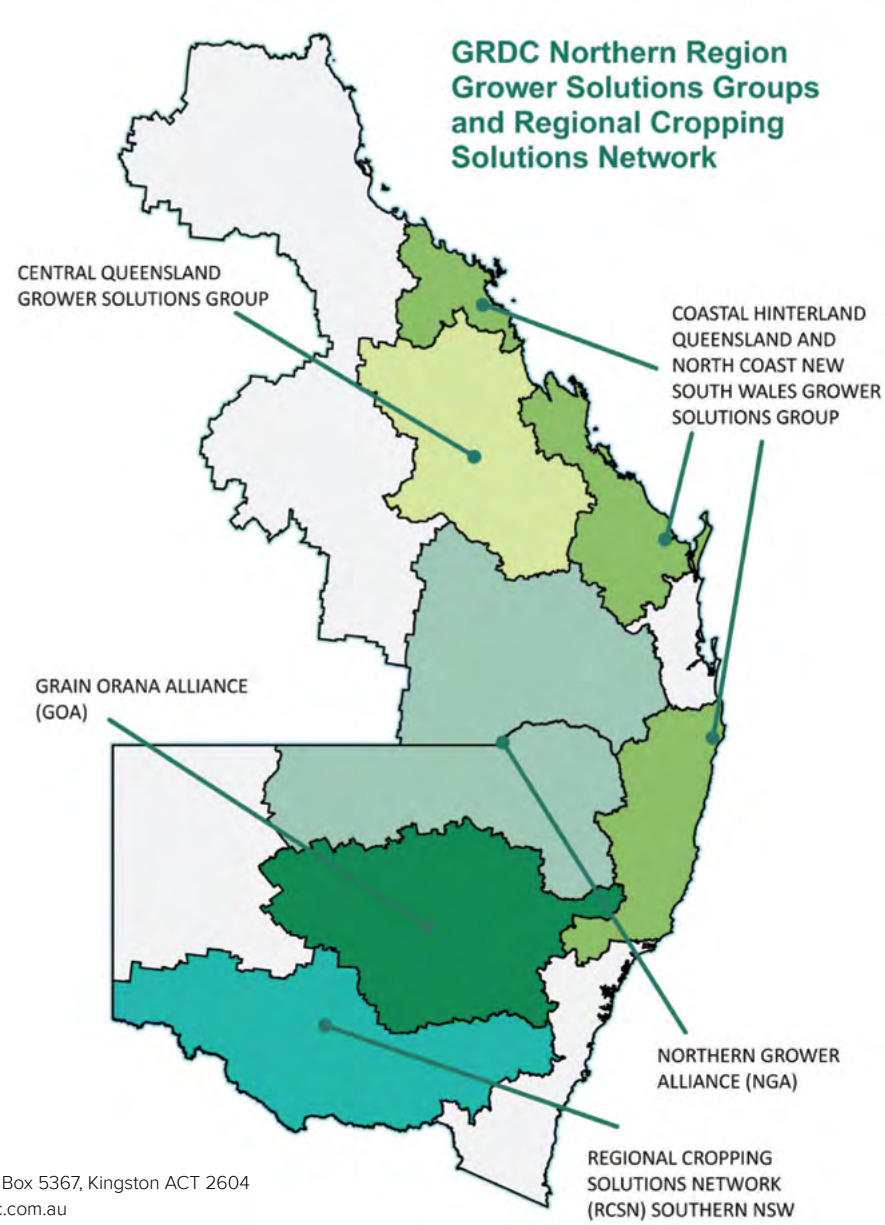
The Southern New South Wales Regional Cropping Solutions Network (RCSN) was established in 2017 to capture production ideas and opportunities identified by growers and advisers in the southern and western regions of New South Wales and ensure they translate into direct GRDC investments in local R, D & 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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The ORM team would like to thank those who have contributed to the successful staging of the 2019 GRDC Northern Region Farm Business Updates:

- The local GRDC Farm Business Update planning committee that includes both government and private consultants, and GRDC Northern Regional panel members and staff.

GRDC
GRAINS RESEARCH
& DEVELOPMENT
CORPORATION

Prefer to provide your feedback electronically or 'as you go'? The electronic evaluation form can be accessed by typing the URL address below into your internet browsers:

www.surveymonkey.com/r/North-FBU

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

- Complete the survey on one device
- One person per device
- 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.

2019 Northern GRDC Farm Business Updates Evaluation

1. Name

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

2. Location of Update

❑ Dubbo ❑ Moree ❑ Toowoomba

3. 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

4. How would you rate your understanding of on-farm grain storage before and after the review?

	Before		After	
technical understanding		/10		/10
economic considerations		/10		/10
practical application		/10		/10

5. Thinking about the on-farm grainstorage review, please rate the content relevance and presentation quality (10 = totally satisfactory, 0 = unstatisfactory)

	Content relevance		Presentation quality	
Marketing strategies: Stuart Clarke (Dubbo), Pete Johnson (Moree), Peter Brodie (Toowoomba)		/10		/10
Quality assurance: Philip Burrill		/10		/10
Economics of investing: Chris Warrick		/10		/10

Have you got any comments on the review?

6. Recruitment, retention, training: *Liz Jamieson*

Content relevance /10 Presentation quality /10

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

7. Creating a prosperous farming future: *Ken Solly*

Content relevance /10 Presentation quality /10

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

8. How would you rate your understanding of climate variability impacts before and after the review?

	Before		After	
technical understanding		/10		/10
economic considerations		/10		/10
practical application		/10		/10

9. Thinking about the climate variability impacts review, please rate the content relevance and presentation quality

	Content relevance		Presentation quality	
Crop rotation: Lindsay Bell		/10		/10
Financial management: Simon Fritsch		/10		/10
Agronomic practices: Glenn Shepherd (Dubbo), Tim Poole (Moree), David Hall (Toowoomba)		/10		/10

Have you got any comments on the review?

Your next steps

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

11. 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

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

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

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

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

Comments

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

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

Thank you for your feedback.