FACT SHEET

ADVISERS - HELPING CLIENTS MAKE MONEY FROM PRECISION AG

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

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Agronomic advisers can improve the economic value of precision agriculture for their clients

This fact sheet is a Profit First PA communication product derived from 'Assessing the economic value of precision agriculture (PA) tools for grain farming businesses in the Southern Region' funded by GRDC. Other project outputs include:

- a management guideline to aid growers and advisers decision making in adoption of PA
- a series of short videos, podcasts and fact sheets to further highlight the economics of PA when done well
- a review of existing information on the economics of PA.

These other resources are available at https://grdc.com.au/resources-and-publications/all-publications/publications/2020/profit-for-precision-agriculture/

This fact sheet aims to assist agronomic advisers to help their growers profit from PA. For more detail please refer to the management guideline.

PA is most profitable when:

- it focusses on unlocking yield and profit potential ahead of technology adoption
- it focusses firstly on the profit gain opportunities most likely to achieve a return on the investment and these are often regionally specific (see tables 4, 5, 6, 7, 8 and 9)
- it enables site specific best practice agronomy in the paddock.

The five critical questions that steer PA adoption towards profitability are listed in Table 1. The intimate insight advisers have of their clients people and property means they are well placed to assist growers to answer these questions without bias.

TABLE 1. FIVE PROFIT FIRST PA QUESTIONS
1. What are the profit gain opportunities for the farm business?
2. Does PA have a role in addressing those constraints/opportunities?
3. What is the cost and benefit of implementing the PA practice as determined using a partial budget approach?
4. Are there other benefits or barriers to consider?
5. Does the business have the capacity to usefully implement the technology?

Key points

Profitable adoption of PA is more likely when advisers have an active role

- Focus on firstly identifying the profit limiting agronomic issues with the grower before turning attention to the PA application itself
- The benefits of PA are highly situational, and care should be taken not to extrapolate results seen on one farm to another
- Provide a sounding board and agronomic rigour during the decision making process
- Collaborate with other providers as needed to get the best outcome for the grower

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Profitable adoption of PA relies on identifying the right opportunity or constraint within the business. Previous work has identified that there are 4 primary profit drivers to focus on (GRDC RDP00013 2016).

TABLE 2. FOUR KEY PROFIT DRIVERS AND MANAGEMENT CONSIDERATIONS

PROFIT OPPORTUNITY	KEY MANAGEMENT CONSIDERATIONS
Optimise the farm gross margin	Enterprise choice Crop rotation Timeliness of operations Sound agronomy driving high water use efficiency and yield Variable cost control Maximising quality
Understand and manage fixed costs	Overhead cost control Labour efficiency Machinery investment matched to business size Actively manage finance costs
Manage risks proactively	Strategies to withstand seasonal or other business shocks
Highly capable people	Getting things done in a timely manner and to a high standard Clear and balanced decision making Systems and processes to support work flow

To find the ways to profit from PA in relation to these profit drivers, we have looked at three pathways:

TABLE 3. PA PROFIT PATHWAYS		
STRATEGIC	EXAMPLES	PROFIT IMPACT POTENTIAL
Unlocking yield potential by cost effectively managing site specific soil constraints and/or enabling cost effective farming systems changes.	Sodicity Salinity Acidity Non-wetting sand Compaction Soil density Soil texture Waterlogging	This is usually where highest gain can be made. Yield potential is unlocked more quickly by using capital efficiently by targeting the areas that will have the highest response. Amelioration costs can also be saved by targeting to responsive areas.
TACTICAL		
Achieving water limited yield potential in a cost-effective manner while managing production risk.	Soil nutrition Matching yield potential to plant available water Crop monitoring Root disease management Fallow management of weeds In crop weed management	Can be high impact individually or incrementally. This relates directly to optimising your gross margin capturing the yield potential on offer as cost effectively as possible.
FLEXIBLE		
Optimising quality and price and therefore increasing revenue.	Frost Heat stress Harvest management Patchy weed infestations On farm trials	High impact but less frequently. This relates directly to proactive management of risk and making the most of every income opportunity.

The profit opportunities vary greatly between regions, districts and farms. The following tables highlight likelihood of opportunities for different areas in the southern region. They are a starting point to assess opportunities, rather than a definitive guide.

Low rainfall zone

Are you aware of which factors are *most likely* to influence grain yield in your region and on your farm?

TABLE 4. FACTORS THAT ARE LIKELY TO INFLUENCE GRAIN YIELD IN EACH LOW RAINFALL ZONE												
LOW RAINFALL ZONE	PLANT AVAILABLE WATER	SANDY SOILS	ACID SOIL	SALINITY	SODICITY	WATER LOGGING	COMPACTION	NPKS NUTRITION	FALLOW MANAGEMENT	HERBICIDE RESISTANCE	FROST	HEAT STRESS
Upper EP	√	√			√		√	√	√	√	√	√
Western EP	√	√			√		√	√	√	√		√
Upper North	√	√	√	√	√		√	√	√	√	√	√
SAVIC N Mallee	√	√		√	√		√	√	√	√	√	√
SAVic S Mallee	√	√		√	√		√	√	√	√	√	√
Vic C Mallee	√	√		√	√		√	√	√	√	√	√

TABLE 5. THE LIKELY CONTRIBUTION OF VARIOUS PA APPLICATIONS TO PROFIT ACROSS THE LOW RAINFALL REGIONS BASED ON SUITABILITY AND AREA AFFECTED WITH GREEN BEING HIGHLY LIKELY, YELLOW SOMETIMES LIKELY AND ORANGE LESS LIKELY															
LOW RAINFALL ZONE	STRATEGIC			TACTICAL								FLEXIBLE			
	Drainage mapping	Zoned claying/ delving	Zoned ripping/ spading	Zone management through variable rate application of:				Vehicle autosteer	Implement steering (Protrakker)	Compaction management with CTF	Inter-row or on-row sowing	Site specific weed detection and control	Decision support for soil & crop monitoring	Mapping weeds	Protein Mapping	On farm trials
				Lime	Gypsum	Seed	N, P, K, S									
Upper EP																
Western EP																
Upper North																
SAVIC N Mallee																
SAVic S Mallee																
Vic C Mallee																

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Medium rainfall zone

Are you aware of which factors are *most likely* to influence grain yield in your region and on your farm?

TABLE 6. FACTORS THAT ARE LIKELY TO INFLUENCE GRAIN YIELD IN EACH MEDIUM RAINFALL ZONE

MEDIUM RAINFALL ZONE	PLANT AVAILABLE WATER	SANDY SOILS	ACID SOIL	SALINITY	SODICITY	WATER LOGGING	COMPACTION	NPKS NUTRITION	FALLOW MANAGEMENT	HERBICIDE RESISTANCE	FROST	HEAT STRESS
Lower EP	√	√	√	√	√	√	√	√	√	√	√	
Central YP	√	√					√	√	√	√		
Lower YP	√	√		√			√	√	√	√		
Northern YP - Mid North	√	√	√	√	√		√	√	√	√	√	√
Wimmera-Bordertown	√	√		√	√	√	√	√	√	√	√	√
SA Upper South East	√	√	√	√	√		√	√	√	√	√	√
Central Vic	√		√	√	√	√	√	√	√	√	√	√
Nth Central Vic	√		√	√	√		√	√	√	√	√	√

TABLE 7. THE LIKELY CONTRIBUTION OF VARIOUS PA APPLICATIONS TO PROFIT ACROSS THE MEDIUM RAINFALL REGIONS BASED ON SUITABILITY AND AREA AFFECTED WITH GREEN BEING HIGHLY LIKELY, YELLOW SOMETIMES LIKELY AND ORANGE LESS LIKELY

MEDIUM RAINFALL ZONE	STRATEGIC			TACTICAL									FLEXIBLE			
	Drainage mapping	Zoned claying/ delving	Zoned ripping/ spading	Zone management through variable rate application of:				Vehicle autosteer	Implement steering (Protrakker)	Compaction management with CTF	Inter-row or on-row sowing	Site specific weed detection and control	Decision support for soil & crop monitoring	Mapping weeds	Protein Mapping	On farm trials
				Lime	Gypsum	Seed	N, P, K, S									
Lower EP																
Central YP																
Lower YP																
Northern YP - Mid North																
Wimmera-Bordertown																
SA Upper South East																
Central Vic																
Nth Central Vic																

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High rainfall zone

Are you aware of which factors are *most likely* to influence grain yield in your region and on your farm?

TABLE 8. FACTORS THAT ARE LIKELY TO INFLUENCE GRAIN YIELD IN EACH HIGH RAINFALL ZONE

HIGH RAINFALL ZONE	PLANT AVAILABLE WATER	SANDY SOILS	ACID SOIL	SALINITY	SODICITY	WATER LOGGING	COMPACTION	NPKS NUTRITION	FALLOW MANAGEMENT	HERBICIDE RESISTANCE	FROST	HEAT STRESS
SA Lower South East + Kangaroo Island	√	√	√	√	√	√	√	√	√	√		
Southern Vic	√		√	√	√	√	√	√	√	√	√	√
North East Vic slopes	√		√	√	√	√	√	√	√	√	√	√
Tas Grain	√		√		√	√	√	√	√	√	√	

TABLE 9. THE LIKELY CONTRIBUTION OF VARIOUS PA APPLICATIONS TO PROFIT ACROSS THE HIGH RAINFALL REGIONS BASED ON SUITABILITY AND AREA AFFECTED WITH GREEN BEING HIGHLY LIKELY, YELLOW SOMETIMES LIKELY AND ORANGE LESS LIKELY

HIGH RAINFALL ZONE	STRATEGIC			TACTICAL									FLEXIBLE			
	Drainage mapping	Zoned claying/ delving	Zoned ripping/ spading	Zone management through variable rate application of:				Vehicle autosteer	Implement steering (Protrakker)	Compaction management with CTF	Inter-row or on-row sowing	Site specific weed detection and control	Decision support for soil & crop monitoring	Mapping weeds	Protein Mapping	On farm trials
				Lime	Gypsum	Seed	N, P, K, S									
SA Lower South East + Kangaroo Island																
Southern Vic																
North East Vic slopes																
Tas Grain																

1. What are the profit gain opportunities for the farm business?

Focusing on the highest impact area for the business will invariably bring the best results.

What are the yield constraints on the farm? Is the enterprise choice and rotation right to maximise profit with sound agronomy? Are variable costs too high? Is there an opportunity to ameliorate a soil issue? Is timing an issue?

Roles for advisers:

- Get to the root cause of each issue or opportunity, and make sure that the right issue or opportunity is identified.
- Work with the grower to put realistic assumptions around the potential upside (or downside) from addressing the issue or opportunity.
- Provide a sounding board to help growers prioritise issues or opportunities and work towards those with the biggest impact.
- Ensure that any options or solutions proposed are agronomically sound and do not have unforeseen impacts. For example is there a minimum or maximum rate of fertilizer that should be applied regardless of soil type?

2. Does PA have a role in addressing those constraints/opportunities?

Once the opportunity or issue is clearly identified, does PA have a role in addressing it? Is an optical spot sprayer required to improve summer weed control, or should the spraying program just start earlier? Is there enough soil type variability to warrant using different fertiliser rates? Can we reliably identify the different zones we want to vary? Can we make decisions in a timely manner to get things done, or will it complicate things and slow us down?

Roles for advisers:

- Assist with ground truthing an issue and exploring why it is occurring.
- Help growers to identify and quantify the variability that exists in paddocks, and leverage from their knowledge of soil types and historic performance on the farm.
- Suggest some approaches to trial or test the response to different strategies, before moving to broader implementation.
- Provide a perspective on what has worked for other growers in dealing with this issue or opportunity.

3. What is the cost and benefit of implementing the PA practice as determined using a partial budget approach?

The financial benefits from implementing PA are highly situational and it is imperative that each grower does their own numbers! Results can vary widely between farms due to differences in equipment, skills, and the farming system and rotation in place. Where is the payback going to come from? Is this strategy going to increase yield? Will it reduce costs? How often will this occur? What new costs will be incurred? Is the payback in a single year or does it continue over time?

Roles for advisers:

- Validating the likely agronomic responses possible from the practice.
- Eliminating errors and testing the assumptions on both the benefits and the costs.
- Discussing the likely response that would occur with different seasonal conditions, to provide a range of outcomes for the grower to work through. For example, in a dry year there might be no response to variable rate nitrogen, in a wet year it may increase yield by 0.5t/ha.
- Work through the appropriate levels of data collection to inform a decision. For example, agronomically, is intense sampling required or will some targeted sampling suffice for this decision? This can have a major bearing on costs of adoption.

4. Are there other benefits or barriers to consider?

Whilst the economics are a vital part of adoption, other intangible benefits can sway a decision to adopt. Will this approach free up time for other tasks? Will addressing the soil pH improve weed control at the same time? Will this data that I am collecting serve another purpose in the future?

Roles for advisers:

- Recognise that decision making is not always based on economics and that there may be other considerations in play.
- Help the grower get the maximum benefit from any investment in data collection or sampling.

5. Does the business have the capacity to usefully implement the technology?

Making a good decision to implement PA will not generate a profit if poorly implemented. Do we have the skills in the business to make this work? If not, who can we connect with to help us? Are we all on the same page about what we are trying to achieve? Do we have a clear plan to execute this? Are our timeframes and expectations realistic? What is the contingency plan if things go wrong?

Roles for advisers:

- Work collaboratively with other providers such as PA consultants or equipment specialists to get the best outcome for the grower. Cloud based systems are making this easier to share information between different providers as needed.
- Discuss with the grower some contingency plans so that the timeliness is not affected if there are problems with technology. A blanket rate may still be better than being late!
- Assist with the review process so that lessons are learnt, and improvement is noted for the future.
- Revisit agronomic assumptions each year and ensure they are still appropriate given changes in input and commodity prices, and farming systems over time.
- Show an active interest in what the grower is up to and how they are progressing with the new practice.
- If possible, access a copy of what has happened in the paddock (eg zone map or application maps) so that you can take this into account when assessing the paddock performance or issues in the future.
- Offer to help design on farm trials including assessment of trials strips and providing rigour to data collection, results analysis and interpretation.

Summary

Agronomic advisers are a critical decision support tool for many grain growers and offer great insight into potential production and profit opportunities for each of their clients.

This insight can greatly enhance the economic impact of PA if advisers take an active role in assisting the decision making processes associated with PA adoption.

Acknowledgements

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References

GRDC RDP00013 (2015), Project report for The integration of technical data and profit drivers for more informed decisions, authored by Rural Directions Pty Ltd, Macquarie Franklin, Meridian Agriculture, Agripath, and Corporate Agriculture Australia

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