PA Investment Pays its Way in Grains
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Does investing in precision agriculture (PA) pay? That is the question commonly posed by producers in all industry sectors. Two projects supported by GRDC and the SA Grains Industry Trust, have generated case studies on the economics of PA using real data from 12 grain growers in WA, NSW and SA. Both projects showed investment in PA provided annual improvements in gross margin that can result in capital payback within three years. Complete copies of both reports are available on the SPAA website - www.spaa.com.au

SPAA research project 'Case Studies on the Economics of Precision Agriculture in South Australia' quantified the economic benefits of investment in PA on six grain growing properties, in different cropping regions of SA. Researched by Matthew McCallum, McCallum Agribusiness Consulting, the project gathered information on:

- Area of cropping program, crops grown, crop yields, gross margins, rainfall, soil types;
- Variable input costs including: fuel, fertiliser, seed, pesticides, machinery and labour per hectare;
- GPS and PA equipment purchases, costs and purpose;
- Evidence that PA is working on their farm for example less overlap, or variable rate applications;
- Other benefits of PA for example conducting on-farm agronomic trials and experiments.

This data was collated, analysed and a case study written on each farm.

Tables 1 and 2 summarise the farms involved, and the costs and benefits from PA. In each case the annual benefits from cost savings and increased production were enough to cover the cost of purchasing guidance and auto-steer equipment within one to five years. The savings in overlap per hectare (Table 3) are generally lower than in the CSIRO study, this may be due to farmers in the SA study being owner-operators or employing regular staff while the WA study farmers may use more casual labour. In SA air-seeder width is generally 20% less than in WA, which could influence this difference.

The payback period for yield monitoring and variable rate technology (VRT) equipment ranged from one to 10 years. This large range is primarily due to the high price paid for yield monitoring equipment in the mid to late 1990's, before this equipment became standard, as is the situation on most harvesters less than 10 years old. Another factor was a 'lag phase' between purchasing and using VRT equipment. Although farmers had some information on paddock/yield variability they were not confident enough to use full VRT, until they had evidence it would work. Therefore, this lag between purchase and implementation increased the payback period. To implement VRT some farmers reduced overall fertiliser input, while others targeted inputs to increase production on low phosphorus areas within paddocks e.g. sand dunes.

I propose that farmers who are considering adopting PA are in a better positioned to make VRT pay within two to three years because of access to lower cost equipment, increased industry experience and more information on the likely financial returns.

Table 1 Summary of the six broadacre cropping farms researched in SA

Farmer	Region	Annual rainfall (mm)	Soil types	Area cropped (ha)	Years of PA experience
Buckley	Mallee	250	Dune/swale, sandy loams, shallow red loams over limestone	3000	7

Sargent	Mid north	400	Clay loam, sandy loam	1600	8
Wilksch	Lower Eyre Peninsula	425	Red brown earths, sandy loam over sodic clay	2700	2
Turner	Mid north	400	Red brown earths, sandy loam over clay	2340	10
Baldock	Upper Eyre Peninsula	300	Dune swale, sandy loams, red loam over clay	4475	5
Branson	Lower North	475	Black cracking clay, red brown earths	1200	10

Table 2 Farm case study summary including level of financial investment in PA, annual gross margin benefit and period to initial investment pay back

Farmer	Capital invested in PA**		Annual benefit		Payback period (years)	
	total	$/ha	total	$/ha	VRT equipment	Autosteer & guidance
Buckley	$ 68,500	23	$ 32,850	11	1	4-5
Sargent	$ 98,500	62	$ 20,180	13	10	1-5
Wilksch	$ 73,000	27	$ 57,240	21*	-	1-2
Turner	$ 34,432	15	$ 35,100	15	6	1
Baldock	$ 52,000	12	$ 47,842	10*	-	5
Branson	$ 73,800	62	$ 44,880	37	9	3
Average	*$ 66,705*	*$34*	*$ 39,682*	*$18*	*7*	*3*

*estimated potential, not proven
** excluding cost of capital

Table 3 Summary across the six SA cases studies of $/ha benefit by category

Farmer	Annual benefit $/ha			
	Savings in overlap	Savings using VRT	Increased production using VRT	Other production increases**
Buckley	4		7	
Sargent	5	5		3
Wilksch	3			18*
Turner	5	10		
Baldock	2		8*	
Branson	10	9		18
Average	*$5*	*$8*	*$7*	*$13*

* estimated potential, not proven

** includes reduced soil compaction, inter row sowing etc

Other major benefits

The reduction in fatigue was highly rated by all six farmers as a benefit gained from guidance and autosteer. The ability to conduct their own agronomic experiments was an important benefit for two farmers; these experiments have the capacity to lead to better whole-paddock or whole-farm decisions that increase profit.

Management time spent by farmers on PA

Most of the farmers interviewed spent three to seven days per year organising yield and variable rate maps. Most used basic software supplied by manufacturers and machinery dealers. Although the software was basic, it is fair to say the level of computer and GPS literacy amongst these farmers was high. This may be a significant barrier for further adoption of VRT. Some farmers used the advice of a PA or agronomic consultant in preparing variable rate maps. In contrast, it was found that guidance and autosteer take very little training and on-going management.

Evaluating the economics of PA on your farm

As with any capital investment decision, farmers need to evaluate the likely returns from PA before investing in equipment. To maximise the return on investment, PA equipment should pay for itself in two to three years, particularly given the expected lifespan of PA equipment is likely to be only five to 15 years. The rapid improvement in 'value for money' for new GPS products means that equipment is likely to be worthless after 10 years.

I propose a feasibility study of PA investment is an important first step. Those involved in the study reported that involvement with organisations such as SPAA and PIRSA were important in helping to verify potential returns from PA.

Key findings:

- Scale of operations. Larger farms can afford to invest more money in PA and will achieve a greater return over time. Smaller farmers should consider syndication or sharing of PA equipment.
- Computer literacy. A reasonably high level of GPS knowledge and computer skills are required for successful VRT implementation. This is not the case for autosteer and guidance.
- Conduct a feasibility study first to work out a budget, and then shop around the GPS manufacturers for a product that suits your requirements. Consult advisors and other farmers in making this decision.

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