CASE STUDY SEVEN

Reaping efficiency rewards with PA adoption

It pays to be at the front of change for the Baldock family, who are currently utilising yield and protein mapping to identify soil shortfalls on their Eyre Peninsula property.

Farm profile

Farming personnel: Graeme and Heather Baldock, Tristan and Lisa Baldock

Farm location: Buckleboo, Eyre Peninsula, SA

Annual rainfall: 300 millimetres – 210mm GSR

Soil types: Sandy loam and red loam with a clay subsoil, grey Mallee loam and with some white salacious sand

Farm area: 6000 hectares (owned and leased)

Topography: Gently undulating

Enterprises: Wheat, barley, oats (hay), canola, peas and lentils

Average wheat yield: 1.6 tonnes per hectare

SPAA member: Yes

PA consultant: N/A

Agronomy consultant: Andy Bates, Bates Consulting

PA timeline

Guidance –	**2002**
Yield mapping –	**2003**
Autosteer –	**2004**
Variable rate –	**2009**
Inter-row seeding –	**2014**
Liquid seeding system –	**2010**
On-the-go protein mapping –	**2016**

Top PA tips

- ***Focus on adopting PA tools which will provide long term results***
- ***Consider what level of adoption is best suited to your business, and don't be afraid to outsource expertise***
- ***Focus on getting data behind what you already know to make better informed decisions***

Why did you choose to adopt precision farming technology?

We are fortunate that mum and dad have always been early adopters of practices and technologies. That started with yield mapping and autosteer after the introduction of no-till farming in the mid-1990s. After that, the inclusion of precision farming technology was a natural progression, driven by the quest for the next improvement in yield or reducing costs. Looking back, autosteer was an early technology which delivered real, tangible savings. The year before we adopted GPS guidance, I recall dad saying that we planted an extra 400 hectares in headlands and overlap. The introduction of autosteer was a tangible benefit straight away because we didn't plant 10pc more than what we had to. The main drivers really are the quest for improved efficiencies, improved yields and lower costs. As precision farming technology has developed into inter-row sowing, on-the-go protein mapping and split applications of fluid fungicides, the quest has always been improved efficiency and productivity and to make things simpler.

Which technology tools or components have you adopted and (which do you) continue to adopt?

We began with guidance in 2002, which led to yield mapping in 2003, and on to autosteer in 2004. With autosteer comes section control, however we haven't put this on our air seeder yet. We are currently running a 24-metre seeding bar, so having section control on that would be beneficial.

The yield mapping has developed into the use of protein mapping. We are currently working on a project with Next Instruments, which manufactures protein testing machines for headers, as well as Michael Ayres and Ed Scott from Injekta Field Systems to use the maps generated from this equipment to generate nutrient replacement values for a range of nutrients, not just nitrogen and phosphorus.

Variable rate seeding began for us in 2009, which was driven by the millennium drought. Three years of virtually no crop made it easy for dad to produce hand-drawn maps of soil types. This was driven by input cost, as we would put our fertiliser where we would get the best return in tight years.

We have been applying fluid fertiliser since 2010 and began inter-row seeding in 2014. Since then, we have been playing around with how we apply fungicides in the furrow by splitting the application of liquid fungicides, placing half of the fungicide on the soil surface and half in-furrow below the seed. We have also just invested in a deep-ripping machine, where we are placing fluid nutrition into the rip line. We have been doing subsoil work for over seven years

with the Buckleboo Farm Improvement Group (BFIG) and we are now working with GRDC and CSIRO to see whether this will provide some return.

We also have soil moisture probes and a weather station on our property. One of the probes and the weather station has been set up by BFIG and forms part of a 12-station network across the Kimba district. The other probe was set up by the Eyre Peninsula Agricultural Research Foundation and Minnipa Ag Centre and forms part of a greater network across the EP. We still have work to do to get the best use from the moisture probes, however it has been useful in informing decisions around grain marketing. The weather station is a great investment and is used almost daily to monitor for frost, inform better spray application decisions and to monitor the harvest fire danger index.

What are the factors that motivate you to adopt and use each of the different tools or PA components?

Efficiencies drive our decision making around the adoption of PA. As the old analogy goes, 'you can't manage what you can't measure', so there is always a focus on getting data behind what you already know. My dad knows every soil type in every part of the paddock like the back of his hand, but it's good to get the data behind what you inherently know to make better informed decisions. Every day we are learning something new about our land and our soil types. The focus we have on nitrogen and phosphorus in the soil has moved to additional nutrients such as zinc and copper, and now onto other micronutrients. We need to measure these things so we can manage them on our property and then unearth the next important step towards efficiency and productivity.

What types of data and information are you collecting to guide your decision-making to adopt or not adopt each PA component?

Yield and protein data collection has been valuable for us. Research and development, both public and on-farm, has helped with decision-making to a degree. Market research, talking to other growers and our own experiences are the main things we look at when deciding to adopt PA.

You really cannot undervalue hands-on personal experience and talking to other people. The good thing about the ag industry is that people are willing to share their experiences. Before we went to inter-row sowing and replacing the seeding bar, I had been working as an agronomist for 10 years and had spent three of those years working with growers who had the same machine and were utilising that practice successfully. The other driver is personal choice and what you are interested in adopting.

Has the adoption of PA increased profitability on your farm? How?

Yes, it has. PA options such as autosteer gave immediate returns. Yield mapping has been hard to quantify at times, but the project with Next Instruments and Injekta Field Systems working with 12-14 years' worth of data should show information that delivers results. Yield mapping has been good for building variable rate maps for the seeder but we haven't necessarily seen a direct return. Protein mapping at harvest time has given tangible results, as we know the quality of the grain that is coming and can mix loads or store it accordingly. Hopefully in the long term, the protein mapping will become a bigger contributor to building variable rate maps.

As an agronomist, I worked with several clients to add liquid fertilisers to their seeding systems, and that has been another part of our system that has seen good results. Our crops now generally have an extra leaf at six weeks, meaning they are establishing earlier and will likely be healthier and more disease resistant. These are the results that are giving us a dollar return.

How are you using the data generated by PA? Is it leading to further practice change? If so, what kind of practice change?

The main data we are currently using is the yield and protein maps. We are looking at the range of nutrient removals and then verifying the results using soil testing to figure out what is happening in these areas of the paddock. This is an ongoing project and if this delivers the right outcomes, it will deliver further practice change with liquid fertiliser. We currently have a four-year R&D commitment on using fluid injection in subsoils which will hopefully lead to further practice change. As we continue to be challenged by pests and disease, splitting application of liquid fungicide in-furrow can all help combat that. We are also looking into variable rate spreading and what could come of that in a low-rainfall system. As the next challenge appears, PA will play a role in what we do.

Who is influencing or assisting you with the adoption of PA?

Agronomists and consultants can offer a different view and expose their clients to other options. Farm visits and R&D has also been helpful. We have been utilising Next Instruments' expertise in PA, who have helped us collate and analyse our yield and protein data. Analysing data is not something we do very often, so bringing someone in with expertise from outside the business has helped. In everything we do, we outsource where we do not have the strengths or passion. The area of PA support is often the biggest limitation in adoption and what level of adoption is best suited to your business. It is important to have the support around you to make informed decisions about what level of adoption is suitable for you.

Are you planning to adopt more or less of these various precision farming technology components in the future?

Variable rate spreading is something we are looking at, along with the results from the yield, protein and soil maps project. We have begun looking into variable depth deep ripping, but this is only early days.

Collation of data in one place is an important step forward for us. We are currently using AgWorld to manage paddock operations and John Deere Operations Centre for everything else. Both systems now talk to each other which has helped us compare data when on-farm issues arise. Once you have begun using PA technology, there is always something new you can do and you never know what is around the corner.

There will always be change, but it pays to be at the front of that change. With PA we're comfortable letting the innovators make the mistakes, learning from them and then reap the rewards of early adoption.

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Acknowledgements:

This case study was supported by SPAA Society of Precision Agriculture Australia Inc through funding from the South Australian Grain Industry Trust Fund as part of project SPAA118 ***- Conversations with Farmers: Agricultural Practice Change with the "PA-Early Adopters"***

Produced by ***AgCommunicators P/L*** *and* ***Lightning Designs***