

Water Use, Technology and Higher Value Systems: Irrigation Farming in Southern NSW

Report to the Irrigated Cropping Forum

A report of the factors influencing management decisions and
irrigation farm productivity in southern NSW

Researched & Compiled by

Scott Glyde & Tony Dunn
EH Graham Centre for Agricultural Innovation
WAGGA WAGGA NSW 2678

December 2007

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1 Introduction

The following report represents the findings of a social research project that investigates what farmers understand as the factors influencing irrigation farm productivity in southern NSW and northern Victoria.

This research is part of a larger GRDC funded project that seeks to identify ways of lifting productivity on irrigation farms, particularly focusing on factors that enhance or inhibit the adoption of water efficient farm layouts and irrigation design, including the use of raised bed farming techniques.

2 Previous Research

Preliminary research using semi-structured interviews with individual irrigators in the Murray, Murrumbidgee, Coleambally and Jemalong Irrigation districts in southern NSW was conducted in 2006 (Glyde & Dunn 2006). The results of this study demonstrated that irrigators had a sound understanding of farm design, farm layouts and the options for change. It also revealed that decisions about farm layout and design were influenced by numerous other factors, including uncertainty about water supply, farm natural and physical features and access, availability and attitude to labour.

Summary findings of this research included:

- irrigation farmers (participating in this research) expressed clear ideas about achieving an ‘enterprise mix’ – mentioning personal preference and access to available markets as affecting the decision to diversify or specialise;
- the enterprise mix chosen by farmers drove their decision making about farm layout, rather than their knowledge of available layouts or design – the inference being that information dissemination about layouts was happening;
- many factors influenced how an enterprise mix was chosen - including physical makeup of the farm (portions of dryland) and preference or not for livestock;
- most farmers revealed their current farming system was operating at, or near, full capacity – given that they had no access to additional input such as labour units, water or land;
- farmers were aware that additional labour would enable diversification but they showed little interest in employing more labour ;
- farmers expressed much satisfaction with their farm’s capacity to perform despite variable water allocations;
- in the climate of uncertain water allocations farmers were wary of 'rash' investment decisions – such as, changes to farm layout; and,

- despite considerable knowledge and interest about alternative and complimentary crops in a rotation, choosing an enterprise mix was still dictated by access to markets.

3 Research Approach

The findings in this report are based on a qualitative research approach (see Patton 1990). Qualitative data is disparate (i.e. it reveals conflict and disagreement as well as commonality), and consequently a rich understanding of the variability in the data as well as common themes and agreement between farmers can be expected to be revealed from it. The qualitative approach utilised in this particular project was Focus Groups and the findings of this report are based on a series of focus groups conducted across southern NSW and northern Victoria in March and April 2007.

Six focus groups were conducted involving 74 participants in the following communities:

- Yanco and Hanwood (Murrumbidgee Irrigation Area - NSW);
- Coleambally (Coleambally Irrigation Area - NSW);
- Wakool and Finley (Murray Irrigation Area - NSW); and,
- Echuca (Goulburn-Murray Irrigation Area – Victoria).

As well as these focus groups, data were also recorded by NSW DPI staff from attending grower group meetings in Hillston and Forbes (Jemalong Irrigation Area).

Interviews were also held with staff representatives of Coleambally Irrigation Limited and Murrumbidgee Irrigation Limited for the purposes of general canvassing of ideas and implications concerning the data.

In addition to this data, a workshop held with irrigation officers and agronomists from NSW DPI and Victoria DSE prior to the focus groups commencing provided important background and ideas fundamental to the direction and focus of the project.

All focus groups were then organised by regional staff from NSW and Victoria DPI, who were instructed to invite participants from a range of irrigator ‘levels’ and arrange venues.

3.1 Focus Group Questions

The focus groups were used to explore the same four research themes; however, wording was varied to accommodate different district situations and group interests. These research themes and examples of questions included:

Understanding Farming Systems

- ‘Would you like to describe the different types of farming systems that exist in this area?’

Enterprise Choice / Interest

- ‘What sorts of enterprises / systems would you like to have if you could?’
- ‘What changes have you considered and what have been some of the issues that have occurred with these changes?’
- ‘What alternative crops or enterprises are there for your area?’
- ‘Would you like to explain reasons for these alternative crops and enterprises mentioned?’

Higher Value Systems

- ‘Some researchers talk about ‘higher value systems’. What does this term mean to you and what does it mean for farming systems in this area?’
- ‘Would you like to tell us what you understand by ‘higher value system’... and why?’
- ‘What, in your experience, drives the move to higher value systems?’
- ‘What is the role of rotations and what do higher value systems mean for them?’

Complexity, Information and Research

- ‘What are some of the difficulties in producing ‘higher value systems’ [as defined by this group]?’
- ‘What role does technology and research play?’
- ‘Where can Research and Development support a shift to ‘higher value systems’?’
- ‘Where would you like to see research investment?’
- ‘What will the industry look like in 10 years time?’

4 Setting the Scene

4.1 Enterprise Mix

A diverse range of industries and enterprises were mentioned by participants in the focus groups including; winter cereal cropping, livestock production (particularly prime lambs) and pastures. Rice was mentioned in all focus groups except Echuca, while maize was also mentioned in most groups. Other enterprises mentioned included hay (including export), silage, pulses, beans, dairy, horticulture and feedlots.

The common theme emerging from the groups was opportunistic production. Participants explained that in recent seasons their rotations were unpredictable – hence many enterprises had to be considered.

4.2 Participant Mix

Although no demographic or farm data were collected, it was noted that all focus group participants were primary producers and estimated as being between twenty-five and sixty years of age. Most participants were male.

4.3 Farm Types

Total farm size varied from 220ha to greater than 5000ha; however the irrigated portions of farms varied from 220ha to 2000ha. Irrigation entitlements also varied, for example, small farms with high allocations and large farms with small allocations. Participants frequently mentioned that they had dry land production as well as irrigation and all said they had knowledge of soil suitability to particular enterprises, especially rice.

5 Enterprise Choice and Interest

From the data we noted a move away from ‘traditional’ rotations of winter cropping, rice and pastures, supported by varying levels of livestock production, despite a clear statement that most participants would “maximise rice” if the circumstances allowed it. By inference, unfavourable seasons were the reason. Appendix 2¹ outlines some of the preferences identified by each group and while rice remained a preference in all southern NSW regions, there was no particular preference for any other enterprise or rotation.

Impacts on enterprise choice and interest in the current climatic circumstances was revealed from the focus groups with several factors worth noting, including variability across regions and no particular view dominating any particular focus group (apart from non-rice production in Echuca). The results (broadly represented in Appendix 2) are summarised under the following six points.

5.1 Trends

Increasing winter cereal production and low irrigation allocations were the main trend. Some participants explained that they were using low water allocations to ‘finish’ winter cereal crops while others said that they tried to “mimic the natural rainfall pattern” as much as possible.

Others discussed how enterprise choice had also been affected by the availability of labour in recent seasons (e.g. lack of desire to move siphons):

“... a lot of people [available labour] have left the region looking for more secure work...”.

¹ While the data reflected in the appendices might at first appear to be ‘hard’ data, it’s important to note that on their own, the appendices cannot capture the context and the meaning of the data.

More pointedly, several participants commented that they had no desire to take on more labour at this time in their life and consequently they felt their enterprise choices were limited.

5.2 Market Options

Participants from several focus groups highlighted the importance of rice production as the preferred enterprise mix - one important reason being that farmers could always rely on being able to sell their produce, as one older farmer said:

“.....[we’ve] never not been paid for rice...”.

Furthermore, all NSW focus groups pointed out that a major benefit of growing rice was it was never necessary for farmers to seek a market for the product, because the industry (presumably Sunrice) was ever reliable as a marketer.

5.3 Existing Physical Resources

In all groups it was clear that soil management was crucial to what enterprises were chosen. As one farmer said [enterprises chosen] were “driven by soil type” and personal likes and dislikes don’t come into it. This was particularly relevant for rice production, where farmers set aside dedicated areas for rice (linked to discussion of the role of Land and Water Management Plans).

Existing farm infrastructure (including machinery) was mentioned in all focus groups and also influences enterprise choice. Several participants explained that their existing machinery dictated their choices about enterprises and that the current circumstances (low water allocations coupled with the capital tied up in existing machinery and debt) meant they would be unable to adjust quickly even if alternative enterprises became available.

5.4 Production Efficiency

Many participants discussed how recent seasons highlighted the need to target greater outputs per unit of water and this had a big impact on enterprise choice. Relevant comments consistent with this theme included:

“... [we need to] target higher yields per ML of water...”;

and,

“..[focus has got to shift to]..lower inputs, higher yields and higher returns...”.

5.5 Enterprises and Rotations

In terms of rotations, participants in all focus groups commented along similar lines, that while a traditional rotation (defined as winter cropping, rice and pastures) did exist, in any case, rotations in recent seasons had been dominated by four main factors:

- opportunity (to take advantage of available water);
- focus on maximising soil health;
- disease management; and
- weed management.

Most participants indicated that while traditionally they were a rice - winter cereal - pasture rotation, there were now “endless combinations” of rotations in use, depending on the circumstance and opportunity.

5.6 Personal Choice / Lifestyle

Several participants commented that enterprise choice was a personal matter, subject to a variety of life related factors including their age and stage (and also their children’s ages). Others talked about their preferences, such as livestock over cropping:

“.....younger farmers prefer crops over livestock because they’re less work...”;

and,

“...my father prefers to work with the livestock, so that’s his focus and he’s not likely to change now...”.

Participants from several focus groups emphasised the point that most of their decisions were financially based:

“.....we do what we like to do as long as we make money...”.

6 Higher Value Systems

The notion of ‘higher value systems’ was a key feature in this research and we sought to learn what farmers understood about the concept and whether they saw it as being integral to increased irrigated farm profitability via its adoption at the farm level.

The responses created considerable discussion with various views being expressed. In some instances responses conflicted and were contradictory and in some cases there was considerable overlap between some perspectives.

No particular response dominated a group or region and there were no obvious differences between regions. Nevertheless several findings emerged – for instance, farm scale and industry wide issues which are explained below.

6.1 What is ‘Higher Value’?

The first point raised about the concept of higher value systems was ‘what does it mean?’ A few of the comments raised are worth repeating to reveal the diversity of views and mindsets about what participants thought of when they heard the term ‘higher value system’.

- “Do you mean profit or infrastructure?”
- “Do you mean return or investment?”
- “Do you mean scale or intensity?”
- “Do you mean enterprise or industry?”
- “Rice is high value when packaged”.
- “It takes 3ML to deliver 1ML of water to South Australian wine growers: is that high value?”
- “Environmental value or production value?” (reference to water)
- “Whose value: government or farmer?”
- “Wine in the bottle is high value”
- “Is it value *related* to the water? Mulwala house prices have gone through the roof because of the recreational value of the water.” (author emphasis)

The variety of responses and questions indicated that participants felt ‘high value’ is an industry issue, not just an on-farm issue. They also said that ‘value’ is a subjective term in that the value of water to production often differed from that which the wider community place on it.

6.2 Higher Capital Investment (modifying the system)

Participants from all focus groups raised the point that a higher value system could be associated with higher *on-farm* capital investment. Some participants also felt that a higher value system meant modifying their existing system. Such investment included:

- machinery and infrastructure;
- soil improvement and/or extensive modification of the landscape;
- increased inputs such as fertilisers;
- higher overheads;
- bigger, and enterprise specific machinery;
- less reliance / dependence on labour (more automation);
- more efficient irrigation systems;
- modified layouts to suit particular enterprises (dedicated areas for rice, winter cereals and pastures), including high flow systems; and,

- greater intensification with the overall production system.

Questions were raised about what level of investment was required at an ‘entire system’ level, what value was sufficient and whether such investment must occur at all levels of the farm system and across more than one enterprise – all constituting an informed debate by participants. Lengthy discussion on this topic revealed that many participants felt that adoption of higher value systems (as requiring higher capital investment) was a risky strategy, especially in the current climate.

6.3 High Flow Systems

A higher value system was also seen by some as relating to a high flow system in a modified farm layout. Where this was the case, some farmers observed even when irrigation allocations were high the existing irrigation infrastructure didn’t have the capacity to supply the quantity of water necessary to support high flow systems, obligatory for the adoption of alternative farm layouts.

Despite substantial discussion on this issue, there was no claim for a specific flow rate. Many participants indicated, however, that their system was, in part, affected by the rate of flow delivered to the farm. Furthermore, some also suggested that the utilisation of a high flow system would be difficult for some to achieve given their position in the supply line.

Overall there was good understanding of what a high flow irrigation system implied for layout, design and farming method and the potential for the use of high flows to modify existing farming systems should be investigated further.

6.4 Production Efficiency of Existing System

While some felt a higher value system was dependent on increased inputs, others felt that a higher value system was already operating on their farm and that increasing value meant extracting more out of existing inputs and infrastructure, focusing on making sure every stage of the production process was fine tuned and operating at its maximum output:

“...we’re not in the business of growing low value crops...”.

The emphasis within this approach lay with analysing the production cycle more closely and adjusting production performance within the existing system already in place. Some of this adjustment might require innovative approaches or components:

“...our existing system is already high value; all we need to do is use technology to tweak it...”.

Other comments included increased water-use efficiency, reduction in production overheads, increased production from the same or less value of labour units (conflicting with the view of those believing it required more labour), and increase in gross margin per water unit (GM/ML)

6.5 Sustainability

Several participants talked about a higher value system as being a total farm system that was sustainable or stable in the longer term:

“... not affected by boom or bust, but secure enough to encourage ongoing investment...”

and most particularly, being able to maintain the farming operation for subsequent generations. Pertinent to this point, several participants also commented that a higher value system was one that:

“.... takes full advantage of the natural system....”

or,

“.... maximises the benefit of the natural landscape...”

and, more particularly,

“....can get the best out of the natural rainfall events...”.

6.6 Scale and Individual View

There were conflicting views about the influence of scale on having a higher value system. Some participants argued that higher value was dependent on larger scale, particularly in light of economies of production.

Others believed that scale was not important, but that a higher value system came down to an individual’s goals and farm situations (a personalised concept):

“... it’s [higher value system] not about bigger scale, but a function of your personal requirement,....., it’s a system that represents your highest values, what you see as most important in your farming system....”.

Within this perception, it was argued, anyone could define a higher value system as one that was independent of any physical or economic production variable.

6.7 Double Cropping

Double cropping was not discussed at length - mainly because participants believed that its application was limited by availability of water, and even when it was available, not everyone would nor could practice double cropping.

From these discussions it emerged that the definition of double cropping varied. For instance, the practice wasn’t the same in each region, being summer-winter in some locations and winter-summer in others. In any case, it was accepted that the window for double cropping was small or not reliable in most years and that it was wrong to assume

that it was the most profitable approach. Indeed, several participants indicated that they felt additional land would probably be a better option for them rather than double cropping.

6.8 Other Variables

Despite the range of definitions and perceptions about what constituted a ‘higher value system’, a common theme across all focus groups was that to maximise the value out of any existing or improved system was dependent on a number of factors. These factors, many of which are closely related, included:

- increased reliability of irrigation allocation;
- increased investment security; and,
- higher reliability, or greater consistency, of return.

7 Research Investment

Questions about research investment were asked once discussion about higher value systems was finished. The approach taken was to ask how research investment could assist farmers put in place a ‘higher value system’. Consistent with the previous section responses depended on each farmer’s particular situation – their personal goals and farm resources. However, agreement was reached on specific areas for research investment and several themes emerged that could be used by research organisations.

7.1 Water and Climate

Participants from all groups said that more needed to be done to secure water supply. Some participants said that investigations of cloud seeding in the catchment areas were warranted, while others wanted more work on the impacts of agroforestry plantations (Blue-gum versus Pine, for instance) impacting on the ‘problem’ of reduced run-off in water catchments.

Climate change and global warming were discussed by some participants – particularly the uncertainty and potential impacts on irrigated agriculture in eastern Australia. Several mentioned their concern about water that flows into the sea each year. One idea was to research the problem by modelling the potential benefits this water could create if turned inland.

7.2 Cropping

Crop production research was discussed – the strongest point being made by participants in several groups about the timing of irrigation to maximise gross margin, given any seasonal conditions:

“How can I time water application to maximise the dollar value?”

There were several slants on this issue. Some participants wanted to know if watering a specific volume of water at a particular time of the season was the only option they had, or would they be better off financially or otherwise if they held onto that water, or sold it on the market. Others wanted modelling done on the consequences of watering and not watering – especially as it affected different crop growth stages through the season. Similarly, some participants wanted answers to questions about economic impacts or benefits of taking rice out of the enterprise mix in a given season. Was there an allocation ‘trigger’ relevant to their particular property that would allow them to put in place the ‘best’ enterprise mix for that particular season?

Several other cropping research issues were discussed. Some participants revealed that they’d like to see research on transpiration efficiency, while others discussed the need to focus on yield rather than disease resistance. There was considerable discussion about alternative crops, with participants wanting to see more regional based on-farm trials, including consideration for access to local markets.

Feelings were also strong for greater research into irrigated winter cereal varieties, focusing on high yields / ML, with many claiming that winter cereals are only bred for the dryland broad scale part of the industry. Rice varieties were also discussed, with several suggesting that not enough has been done to improve rice yield potential, nor cold tolerance. Some participants discussed an interest in understanding more about the viability of higher value crops (higher GM/ML) in their area, while others expressed an equal interest in considering the options for lower water use crops, particularly the establishment of broader scale trials of their use.

7.3 Soil Management and Health

Many participants raised the importance of good soil health to their production system and wanted to see further research investment into ways they can improve and maintain one of their most valuable resources. Particular emphasis was given to understanding more about the carbon cycle, in particular how carbon can be reliably captured and measured, possibly opening up an avenue to participate in future carbon trading opportunities.

7.4 Off-Farm Investment Research

Several participants across most focus groups revealed a strong interest in accessing advice and information about suitable ‘off-farm’ investments they could invest in rather than investing their capital back into their own farm. While, generally speaking, there

was a desire to invest back into their own business, most comments reflected a high level of disenchantment concerning the negative return for such investment and all felt that ‘sitting tight’ was their only option when it came to further on-farm investment and improvement:

“...there’s so much [political and environmental] uncertainty at the moment,....., hard to know whether to try to change or just tread water...”

This however, posed a dilemma, as many participants acknowledged that ‘treading water’ often meant exposure to being ‘left behind’.

7.5 Technology

Discussion about technology is presented in this section because it was part of the discussion on research investment. Technology and research was considered a seamless subject and research outcomes were the product of research investment.

Interestingly, however, was the relevance and perhaps role of technology to the future. Several participants, despite the variable comments on what constituted a higher value system, commented on how technology was *necessary* to support the implementation of higher value systems. Furthermore, many also indicated that, if history was any guide, technology was in the main not taken up without water reform:

“.....water reform forces growers to take up technology that has been around for twenty years...”.

There was also debate about technology uptake and whether its benefits should be measured by additional returns, cost saving or production efficiencies.

Generally the discussion concerning research investment was positive and proactive; with participants from all focus groups identifying priorities for their region (see Appendix 4 for regional details). All groups realised the limitations of the existing research efforts within the current climatic circumstances and the generally positive nature of the discussions of research investment is perhaps best captured by a couple of participants in Wakool who suggested:

“What we need is high yielding, short season, cold tolerant, self-harvesting, dryland rice varieties....”!!

7.6 Other research interests

Other suggestions for research investment included:

- market generation, including for alternative enterprises;
- incorporation of deep rooted perennials into existing systems;

- improved delivery or research outcomes;
- more field-based researchers;
- increased on-farm research;
- quality control in grain production;
- reduced chemical reliance; and
- improved terraced based systems for winter use.

8 Irrigation Design & Layout

There was a sound understanding of all the available options on farm layout – as promoted by NSW DPI, research organisations (such as the GRDC) and other groups. In fact, participants in more than one focus group considered discussion about design and layout as being a bit ‘old hat’:

“Everyone’s known for a good while about the different options being put forward, but what most have got in place, certainly in my case, is what’s best for my set up....”.

The consensus amongst participants was that farmers were doing what they could to improve their systems - with a strong focus of fixing known ‘poorer’ areas of their farm. Overall, there were a number key farm design and layout points mentioned by participants across the focus groups and these points include the following.

8.1 Soil Type

Participants across all focus groups revealed that their irrigation layout and design was generally determined by natural features or resources, especially soil type. There was use of, and interest in, pivot based systems, but their use was restricted to lighter country of suitable terrain. In most cases, history determined the predominant land use and several commented that the options to change relatively quickly were limited on soils that have been under rice long-term.

Raised bed farming was also discussed – the point being made that soil type was the essential factor. Participants argued that bed farming required suitable soils and because of this, its use was not widespread. Water supply factors and incompatibility with livestock systems also inhibited adoption.

8.2 Existing infrastructure

There was a lot of discussion about ‘why farmers did what they did’. The overwhelming consensus from all groups was that, first and foremost, farmers managed their systems in relation to the type of infrastructure in place and the resources available. Many

participants commented that their layout was a function of their existing machinery; that they continued with what they had in place because their existing (and aging) machinery supported it:

“...every second farmer out here owns a laser bucket....”.

As well as this, any capacity to change layout in the absence of appropriate machinery depended on the availability of relevant contractors. The reliance on contractors was an important issue for a number of participants, with some being reluctant to rely on their availability to do major work while others were mindful of the need to ‘keep them in work’ to ensure they remain available.

8.3 Water Availability

There were two major aspects concerning water availability: security and supply.

For those participants who had considered layout change, almost all agreed that major layout change was not going to occur while uncertainty about seasonal water allocation and the political debate associated with Murray Darling Basin reform continued. Much of the discussion on this issue was highly opinionated reflecting the ideas participants had for making layout adjustment on their own farms. However, the dominant theme was the lack of confidence in getting a return on investment for major structural changes – either in the short or long term.

Discussion about water supply centred on the capacity of the supply system to deliver water in a manner different to now. Participants argued that change to a layout that depended on high flow must consider supply capability. Across the regions discussion revealed that participants were not confident that their supply system could provide enough flow.

9 The Future

Discussion from the focus groups concerning the future for irrigation farming centred on themes of industry composition and water.

9.1 Industry Composition

Some participants believed that the industry will become dominated by ‘multiple farm’ businesses, a continuation of recent trends:

“...[it’s been] estimated that farm businesses have decreased by 2/3 in the last 10 years....”.

The make-up of these ‘multiple-farms’ was expected to be either ‘connected’ larger farms or individual farms separated by short distances to enable utilisation of the same machinery units.

Some also believed that the shape of the industry would be more heavily influenced by farms owned by corporate businesses and superannuation funds. Associated with this were concerns expressed at most focus groups about the lack of younger generation farmers that existed in their region and the apparent lack of interest for a future in farming from own children, both considered indicators that the corporatisation of agriculture is even more likely to occur.

9.2 Water Trading

Water trading was regarded by some farmers as a major threat to the industry's future, with many expressing concerns for water leaving their irrigation district. Particular concerns were raised about the consequences of water trading for irrigation supply fixed costs, while others discussed the dangers and fears of stranded assets.

Several groups discussed concerns about water being traded away from agriculture, that commodity values needed to increase:

“...otherwise people won't grow crops; they'll only trade water...”

However, others countered these arguments by suggesting that water only has value if it's used for production.

9.3 Farm Structure and Management

There was also some discussion about farm layout and how farms might be managed in the future. There was consensus that all farms would become land formed to ensure water was being used as efficiently as possible. However, no specific layouts were proposed, with all groups pointing out that layout was a function of soil type.

Some participants commented that water use efficiency would become increasingly important across all enterprises and that consequently soil and water monitoring would become more common.

A key revelation that emerged from four focus groups was the importance of understanding how the farm was accountable for its productive performance. Specifically, many participants commented that 'weak' or 'poor' areas of any farm had to be isolated and 'fixed up', both in terms of production inefficiencies and impacts on the region (leaky soils), with some participants implying that the latter areas which could not be restored should be taken out of production altogether.

9.4 Flexibility and Versatility

Most groups highlighted the increasing importance of having farm systems that are adaptable, flexible and versatile enough to support a variety of enterprises. All groups talked about recent seasons as focusing on opportunities to produce whatever they could, whenever they could. While some lamented what this meant for rotations and in particular the benefits of rotations toward disease and weed control, all were unanimous

that opportunistic management was an important key to survival in sequences of low allocation.

9.5 Security of Water

The overriding issue concerning the future, however, was the level of concern regarding the security of water supply. Many participants commented on the impact government policy and negative community perception was having on the degree of forward planning and on-farm investment. While some were reluctant to discuss specific details of their personal situation, a number of participants directly and indirectly commented on how farmers were reluctant to take risks whilst ever there remained uncertainty for surrounding water entitlements. The ramifications of this view meant that farmers are most likely to stay with their existing infrastructure and farm layout (what they know) rather than invest in changes to their management approach.

10 Discussion

Some important findings reflected in this report dominated discussion more than others and equally so across all focus groups. Given they were discussed so vigorously, they are considered in further detail in this section.

10.1 Personalisation of ‘Higher Value’

The concept of a ‘higher value system’ attracted extensive discussion at all focus groups, much of which is summarised in Section 7 and the range revealed in Appendix 3. Several important messages emerged out of these discussions in response to the question ‘what does the concept of a higher value system mean to you?’ and it’s important to note that all focus groups followed a similar path way in expressing their views.

Initially all groups considered the concept related to high value *output*; the value of products produced *by* the system, both on-farm and the extended value (value added) of the product off-farm. Many participants mentioned rice as the ‘highest value’ product they could produce and also pointed out its value added benefits. The ‘high value-ness’ was its capacity to provide benefits to all levels of industry – the farmer, the processor and the marketer. Strong emphasis was also placed on system and market reliability to ‘guarantee’ maximum price. Consequently many considered a high value system was a rice-based system (wine grapes were also mentioned). Consistent with this belief, some participants argued that they were already managing a high value system.

There was no initial mention of on-farm system properties (farm structure, layout, rotation etc.) as being related to high value. Nor was the notion of ‘lifestyle’ initially discussed.

The natural flow of discussion then tended to qualify the initial comments by suggesting that a high value system was dependent on high value *inputs* or infrastructure; for

instance ‘capital intensive’ was mentioned frequently. Scale was mentioned as an important factor, with only larger scale farmers capable of capturing benefits associated with increased intensification and input expenditure. High flow infrastructure was also mentioned as part of discussions concerning modified layouts, yet many participants commented that the irrigation supply system was unable to support the high flows needed.

Quickly the arguments then shifted to defining a high value system as one dependent on the establishment of production efficiencies and maximising output from given input, with some participants arguing that high value could be achieved without necessarily ‘going overboard’ on inputs, nor modifying their existing layout.

In time, however, all groups began to consider other definitions and meanings, including consideration of the *whole* system, not just its products or inputs. The shift away from thinking that a higher value system was defined by the value of the output is best summed up by one participant (although variations of this comment were mentioned by participants in all groups):

“.....if too many people grow high value crops, it’s not high value anymore because supply is too great,...., today’s boutique crop can be tomorrow’s commodity...”.

The personalisation (how each person had their own personal view) of the definition then emerged. At least one participant in all groups discussed how ‘high value’ was a personal matter:

“...a function of your personal requirement....”.

For instance, while some considered high value was reflected only by cropping enterprises, others revealed that by personal preference, the existence of a non-irrigated portion of farm and / or the role played by a parent in assisting with the farm business meant that their high value system included a considerable livestock component.

It was then argued that sustainability was the most important principle for a higher value system, a system characterised by longevity and reward for ongoing investment and improvement. In the current climate this was a challenging aspect of the discussions, as many participants recognised the difficulty of thinking ‘long-term’ in the face of reduced allocations and recent low or negative farm incomes. Indeed, some participants raised the suggestion of identifying suitable off-farm investment options as part of research investment discussions later in the meeting.

However, associated with the ‘flow on’ thinking that typically occurs within focus group discussions, many participants then went further on with the idea of sustainability by revealing that scale wasn’t as important as having a system that was highly flexible and highly versatile, positioned in such a way to take full advantage of any opportunity that came their way to generate farm income (supporting the earlier statements made about ‘opportunistic cropping and rotations’ when discussing enterprises existing in the region). This is about higher value *within* the whole system.

What constitutes flexible and versatile was very much revealed to be a consequence of physical (soil type especially) and personal (lifestyle preference) factors. There was substantial discussion about having in place a farm system that made the best use of

existing farm resources, such as physical soil properties and suitability for specific enterprises, as well as labour units, machinery and scale. Furthermore, mention was also made about the lack of compatibility between bed farming and livestock. In this vein, many participants highlighted that what was high value for them was unlikely to be high value for someone else. Consequently, to apply an example, while ten farmers might put in place higher value systems for their own farms, each approach and implementation is likely to be unique to that particular farm and the farmer concerned, highlighting the personalisation of higher value.

The lack of formal definition for a higher value system and the personalisation of how it is interpreted has important ramifications for research bodies or extension agencies in trying to promote its adoption. Most participants expressed uncertainty and unfamiliarity with the concept and many suggested that a formal definition was necessary.

10.2 Research, Technology & Change

Much of the discussion about technology is subjective to what an individual would define as technology, in that some might regard any research outcome as a form of technology, whilst others might consider technology as something that you can hold or see, a form of 'hardware', or new machine.

For the purposes of this study, we never clarified what might have been any perceived difference between research and technology; rather the terms were used interchangeably to imply much the same thing. That said, the general consensus when it came to technological advances is that most groups felt that there was no 'silver bullet' or 'magic wand' to improve their situation. Indeed, all groups commented on how 'advanced' they felt their systems were, that in terms of water use efficiency and productivity, their systems were finely tuned and, as many suggested, operating at high value already.

Interestingly, however, while many participants commented on research needs along lines of varietal improvements, increasing water security and improving soil health (see Section 8), most of these comments were about developing research outcomes and technology that *fitted in* with their *existing* system. There were no radical proposals to modify layouts or adopt completely new enterprises, despite the fact there was substantial knowledge of the extent of research developments and efforts in these areas. Rather, most of the discussion centred on developing or improving methods of doing 'what they already do'. This is particularly highlighted by the revelations concerning enterprise choice with few participants nominating enterprises different to what they already had in place, notwithstanding the fact that given certain market reliability and availability, some alternative crops might be grown.

There appears no great demand, nor expectation, for the perfect solution and an overwhelming observation across all focus groups, at the risk of repeating what has already been said in other ways, was that the systems most participants had in place reflected the most suitable system given their physical, environmental and personal objectives.

That said, many participants commented in a proactive manner on the need to conduct more regionally based research, especially in terms of irrigated cereal varieties, where all

felt a little like the ‘poor cousin’ when came to varietal improvements over the past twenty years. Some also expressed concern over the perceived lack of research staff in regions and felt that existing research efforts weren’t been consistently supported.

10.3 ‘Modernised’ Farming and Whole of System Management

The understanding of alternative farming systems, specifically layouts and use of intensive practices such as double cropping was substantial in all focus groups. However, there was a clear message that despite knowledge of these approaches, farmers still made choices that reflected their personal views and objectives.

Many participants commented that despite known benefits associated with the use of beds, for instance, unless a significant proportion of their farm was suited to the application of beds, they were unlikely to use them because of the costs involved to establish and maintain their use, including the requirement for specific plant and equipment.

Another factor impacting on layout that was mentioned by many participants was that modifying layout would likely require changes to plant and equipment and the costs involved didn’t justify the benefit, especially in light of recent seasons of low allocation. A number of comments were also made about how a lot of farmers owned laser buckets and associated equipment that reinforced their existing farm layouts.

A further common view amongst all focus groups was that a number of farmers are nearing retirement age and consequently they were unlikely to be interested in making any wholesale changes to their existing layout and system.

The struggle for some farmers, it seems, is ‘marrying’ personal choice with innovative intensive irrigation practice, even though the innovative approaches are well understood. Some participants argued a strong desire, for instance, to continue with livestock production despite being made aware of the benefits of alternative layouts and irrigation systems. More than one participant commented that field days teach farmers a lot about agronomy and crop production, but not how to manage the implications of these practices on existing livestock enterprises or indeed the entire farming system. Whole of system research is necessary to fully understand the implications of system modification and to assist farmers in embracing system change.

11 Recommendations

There are a number of revelations from this report that should impact on future investment by research organisations and industry bodies. While emphasis and importance of these revelations will vary according to each particular interest group, five particular factors are recommended worthy of further investigation or action, in no particular order.

11.1 Research Investment

The findings show that farmers evaluate the outcomes of research investment and they do this by fitting them into their existing farm system. It is recommended that any research investment occur within a strong framework of knowledge and understanding of the existing farm system and that the research proposals consider the potential impacts of research outcomes, positive and negative.

For adoption to occur researchers need to consider if the purpose of the research is to introduce change within the system (what farmer participants called ‘system tweaking’), or whether it’s a whole of industry or wholesale system change.

11.2 Higher Value Systems

What constitutes a higher value system was discussed at length - revealing a lack of consensus on any universal definition. Although several participants suggested a universal definition was necessary, this is not likely to happen; however, what is important is that research or industry groups clearly define what aspect of the system is being targeted for ‘higher value’.

This report provides strong evidence that farmers can contribute to discussions on improving particular aspects of systems. Using farmers’ knowledge and experience, ‘higher value systems’ will emerge that are specific to a research target and also consistent with their personal goals and objectives.

11.3 Field Research

Many participants wanted more field trials and greater access to research staff, especially those with an awareness of the importance of understanding systems implications of change (including an acknowledgement of the potential for indirect system changes). Farmers’ knowledge should be utilised to establish priorities for trials on a needs and regional basis. Agreed farm systems are an obvious place to start.

11.4 Water Options

Focus groups revealed a sound knowledge and awareness of enterprises options and layouts, however, many participants expressed a need to know about water availability at any given stage of the season. For instance, several expressed an interest for assistance in deciding about selling water, buying water, or growing a different enterprise given the seasonal conditions and the specific time of year.

Interest was expressed for ‘water options’ models that applied on a region scale, and that took into account the supply system, and the potential for this should be investigated.

11.5 High Flows

Water availability and delivery systems was discussed in most focus groups, especially as they affected farmers' ability to use modified farm layouts. Farmers asked questions about flow capacity in different parts of a delivery system and region. Do research agencies take such factors into account in their research designs and if not, why not? What is the potential and interest for modified flow rates and the capacity of each system to accommodate such interest?

12 Concluding Comments

This research project revealed that across a range of environments, farmers had a sound understanding of new technologies and the consequences of their adoption. In particular this meant that farmers had thought about (and in many cases experienced) the effect of change on farm layouts and management. The study also reminded us of the uniqueness of every farm – their resources and goals, and the need (or not) for change.

Each farm system had a potential based on its resources (including human) and was limited and enhanced by its environment. Such 'outside' factors included water security, political uncertainty, natural and physical features. 'Internal' features included personal preferences and labour, and (to some extent) appropriate new technologies. Amongst this uniqueness and diversity common features and knowledge were revealed, for example agreement about enterprise mix and irrigation layout – two key features investigated by this project.

What does this mean for driving change (from the farmers' perspective) and for the GRDC research program?

First, that farmers' knowledge (especially about their own farm and district) is knowable and often compatible with RDC research results, even though it is often not generalisable, but specific to their own farm.

Second, where such knowledge is not generalisable across farms or districts; it should nevertheless be built into research recommendations.

Third, in planning research programs a whole farm system approach should be the basis for projected outcomes.

Fourth, forces that are driving change at the farm level are often outside the control of farmers and production researchers – (this is why a whole farm systems approach is the place to start). Such forces are often macro-economic, market and political and can overarch areas of interest such as those in GRDC's ambit. Consequently farmers can be interested but not prepared to act on production level changes and innovations.

What GRDC needs to know is how such a hierarchy of needs and forces for change will affect their interests/products, not whether or not their products are good in themselves. Thus such products should only be judged within a socio-economic / political environment –and 'locally' - from a farmers' viewpoint.

13 Acknowledgements

Regional NSW and Victorian DPI staff were responsible for organising participants and venues for the study, and their contribution is gratefully acknowledged.

Members of the Irrigated Cropping Forum, and in particular Bryan Clark and John Lacy, provided valuable assistance and feedback throughout the duration of this research.

A special thanks also to all farmers and irrigation company staff who willingly gave up their time to participate in meetings and interviews.

14 References

Glyde, S. & Dunn, A. (2006) 'Layouts, Enterprises & Rotations: a Snapshot of Irrigation Farming in Southern NSW'. Report to the Irrigated Cropping Forum.

Patton, M. (1990). *Qualitative evaluation and research methods*. 2nd Ed. Sage Publications.

15 Appendices:

Please note: The appendices reflect much of the 'bare' data without context or meaning. Consequently, while the ranges of responses are captured there has been no effort made to quantify any responses, nor reflect their relative value to any discussion or question. In this manner, only the report should be used to reliably reflect the context, meaning and priority of the findings of this report and the appendices used to reveal the response range.

Appendix 1: Types of Farming Systems

Finley	Yanco	Griffith	Coleambally	Wakool	Echuca
Livestock	Livestock	Livestock	Livestock	Livestock	Livestock
Sheep	Sheep	<ul style="list-style-type: none"> 1st cross ewes 	<ul style="list-style-type: none"> Sheep 	<ul style="list-style-type: none"> Prime lambs 	<ul style="list-style-type: none"> Beef
<ul style="list-style-type: none"> prime lambs fatten lambs for export feedlots 	<ul style="list-style-type: none"> fattening fat lambs Merinos (wool –esp. dryland) 1st cross breeding 	<ul style="list-style-type: none"> Merinos crossed with white face suffolk Cattle fattening. However cattle wreck beds. Reduction in water → opportunistic cattle 	<ul style="list-style-type: none"> opportunity livestock fat lambs wethers for 'housekeeping' i.e. weed control 	<ul style="list-style-type: none"> Wool Feedlot Dairy 	<ul style="list-style-type: none"> Fat lambs Dairy
Cattle	Cattle	<ul style="list-style-type: none"> Opportunistic stock 	<ul style="list-style-type: none"> Cattle fattening and breeding 	<ul style="list-style-type: none"> Beef to supply feedlot and market 	<ul style="list-style-type: none"> Dairy industry moving out of summer pastures. They are going to import feed and grow annual pastures.
<ul style="list-style-type: none"> Dairy Feedlots finishing cattle 	<ul style="list-style-type: none"> cattle fattening feedlot (Rockdale) 	Pastures	<ul style="list-style-type: none"> Breed 1st cross ewes 	<ul style="list-style-type: none"> Lucerne hay and seed 	<ul style="list-style-type: none"> Lucerne hay
Pastures	Pastures	<ul style="list-style-type: none"> Incorporate pasture rotation in cropping rotation. E.g. lucerne on terrace (grown for seed and grazing) Pasture sown to control weeds 	Pastures	<ul style="list-style-type: none"> Irrigated pasture (annual clovers, grasses) 	Cropping
<ul style="list-style-type: none"> annual & perennial lucerne pasture seed e.g. lucerne, clover 	<ul style="list-style-type: none"> lucerne: hay, pasture and seed silage for feedlots (corn, forage sorghum and oats) 	Cropping	<ul style="list-style-type: none"> Winter pastures Clover Lucerne (seed and hay) 	<ul style="list-style-type: none"> Rice – main industry but no water at present. Grow rice in rotation with winter cereals. Cereals sown into rice stubble 	<ul style="list-style-type: none"> maize for grain irrigated wheat grain legumes in rotation - depending on profitability
Cropping	Cropping	<ul style="list-style-type: none"> Rice and wheat on lasered country. Rice is great for weed control. ↑ rice → ↓ weeds Rice on terrace Maize and wheat on beds 	Cropping	<ul style="list-style-type: none"> Straight winter cropping. 	<ul style="list-style-type: none"> oaten hay
<ul style="list-style-type: none"> dryland & irrigation cereals e.g. oats, wheat, triticale grazing cereals e.g. triticale, Whistler wheat, Wedgetail, oats. 	<ul style="list-style-type: none"> rice row cropping Corn uses less water than rice for a similar yield but for a lower price. An advantage is that it is possible to put the whole farm under 		<ul style="list-style-type: none"> Corn o Grit o Feed o Waxy o Hiarnylase Rice 	<ul style="list-style-type: none"> Canola Field peas Chick peas 	<ul style="list-style-type: none"> Wheat Barley Oats Less and less tomatoes. Sedenko are going to

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<ul style="list-style-type: none"> • canola • faba beans, • soy beans • field peas • lupins • coriander • sorghum • millet • maize • rice • hay (irrigated lucerne and dryland cereal) • vegetables e.g. potatoes & tomatoes • viticulture 	<p>corn which you cannot do for rice.</p> <ul style="list-style-type: none"> • horticulture <ul style="list-style-type: none"> ○ citrus ○ grapes ○ melons • export hay • seed in every winter & summer crop e.g. wheat, barley, canola, pulses, sunflowers, safflowers, oats. • grazing oats • oats also grown for silage and feed 	<ul style="list-style-type: none"> • Maize on terrace and beds • Winter wheats (graze and cut) • Sell small squares of straw to Sydney • Oaten hay • Beans: • Summer beans • Soy beans • Faba beans • Canola • Grapes (flood system) 	<ul style="list-style-type: none"> • Winter crops • Biscuit wheat • Durum wheat • Canola (seed) • Pearl barley • Barley • Triticale • Sorghum (seed) • Soybeans • Faba beans • Straw 	<ul style="list-style-type: none"> • Faba beans • Dryland lupins on sandy soils • Corn • Millet • A lot of these are opportunity crops. <p>Horticulture –</p> <ul style="list-style-type: none"> • vines • stone fruit • citrus • potatoes 	<p>grow all their own tomatoes.</p> <ul style="list-style-type: none"> • Most of the beans have been tried but they are not suitable to the extreme hot, dry conditions. They need a variety that suits their area. • 2 known crops of soybeans in VIC. Very poorly run industry and battle with competition from dryland farmers. There has been little yield improvements in the last 20 years.
<p>Recent Trends</p>	<p>Rotations</p> <ul style="list-style-type: none"> • Use to be traditional, set rotation - now an opportunity rotation. Aim = cash flow. • Disease and weed based e.g. faba bean & corn rotation • Rotations generally destroyed by market and water. • E.g. rice → wheat every second year → rice → clover pasture (fat lambs) for 2yrs. • E.g. corn → faba bean → summer spell → wheat. Faba beans must follow corn and not the other way around - cannot get beans off early enough • Cereal rotations allow rotation of herbicides. 	<p>Rotations</p> <ul style="list-style-type: none"> • Use rotations for weed control. • Need to watch chemical use for rotation flexibility. • Lack of water security impedes rotations. Can't stick to a set rotation due to lack of water security. • "Living on the edge". No set long-term rotation - drought and lack of water security. • The drought has increased the number of different rotations employed. Farmers are looking for more options. • General feeling is 'to be flexible'. • Break crops important for disease control. 	<p>Horticulture</p> <ul style="list-style-type: none"> • Prunes (small scale) • Olives (small scale) <p>Layout</p> <ul style="list-style-type: none"> • Border checks • Beds • Bankless channels <p>Rotations</p> <ul style="list-style-type: none"> • Rice or maize or soybeans → wheat or barley. • 4 year pasture → rice. • Endless combinations. • Incorporating stubbles to increase soil health • Less rice being grown due to water constraints. • Opportunistic. 	<p>Irrigation systems</p> <ul style="list-style-type: none"> • Border check and lasered contour most common • Centre pivot and lateral move. Started 3-4 years ago. Not many around. • Horticulture on drip and overhead sprays. • Bed farming developing. Not very widespread. <p>Traditional System</p> <ul style="list-style-type: none"> • mixed cropping (rice and winter cereal rotation) and livestock supported by clover pasture. • 1 year rice → cereal → fallow → cereal → 2-4 year pasture. 	<p>Layout</p> <ul style="list-style-type: none"> • Mostly border check and lasered. 98% of country is laser graded. • Only a few pivots and laterals. • Almost everything can be grown on beds but they're dependent on soil type. <p>Rotations</p> <ul style="list-style-type: none"> • Depend on farm size. • e.g. wheat, barley, faba beans between tomatoes. • Driven by dollars.

Appendix 2: Enterprise Choice – What would you prefer to grow if you could?

Finley	Yanco	Griffith	Coleambally	Wakool	Echuca
<ul style="list-style-type: none"> rice, supported by a cereal crop on rice fallow soils not suitable for growing rice, the second preference is irrigated lucerne we use to be 'dairy farmers' or 'croppers' - now we're all irrigation farmers – grow anything that is profitable Opportunities are driven by water security, allocation, costs 	<ul style="list-style-type: none"> maximise rice anything low input, high return, high yield and have a good reliable return livestock and rice, cover crop pasture. All stopped by no water rice has weed control benefits. Decreases herbicide resistance. Seed crops are clean after rice 	<ul style="list-style-type: none"> water determines enterprises lack of water security makes it difficult to plan for the future "Can't plan without water security" need to know your allocation before you put the crop in 	<ul style="list-style-type: none"> grow 'max' rice maximise GM / ML diversify to spread risk finish off the crop you've already sown and then spread the risk. rice and pasture work well if rice 'fails' then corn is the next best yielder whatever you have an established relationship in the market for – e.g. canola 	<ul style="list-style-type: none"> rice - it is foolproof to grow rice/cereals require same infrastructure. They go well together soil type drives choice - soils are not suited to 8 tonne wheat crops better country in under border check and sown to cereals, other country contour and is sown to rice carryover water helps 	<ul style="list-style-type: none"> summer crop followed by winter crop e.g. corn, faba beans, row crop winter dominant utilising border check farmers are satisfied with their existing systems don't want to do different things, but want to do what's done better not a lot of changes required except minor modifications on how the farm is set up likely to see more automation, more recycling push for less labour dependent systems – no siphons try to adopt systems that use less energy as fuel costs are a major impact

Appendix 3: Higher Value Systems: What does it mean?

Finley	Yanco	Griffith	Coleambally	Wakool	Echuca
<ul style="list-style-type: none"> • “More for your grain” • requires higher reliability of allocation and greater returns per ML • needs security and you need to get a good price/ha to pay for it • requires high capital investment • if we all grow high value crops, they won't be worth anything - supply > demand • consistent market. • no standard rotation • no high standard high value crop - what is considered high value depends on the farm • high value depends on inputs, not on gross margin • rather than focusing on shelf-price, we should focus on farm-gate price – mark-up at retail level doesn't mean high value at farm level • water goes to the person who needs it the most - who this person is changes all the time. 	<ul style="list-style-type: none"> • Capital intensive. Too intensive → need more machinery • Dedicated areas to rice. Rest of farm flexible. • Using technology to lift average e.g. yield mapping • existing system is high value - use technology to “tweak it” • high value system is water dependent • “something that gives you a high return on your invested return every year”. • dependent on niche (value added) markets and water. • not a bigger scale - a function of your personal requirement.” 	<ul style="list-style-type: none"> • returns > cost of production • profits are double the cost of production • less labour requirements • consistency i.e. not high value one year and low value next year • “today's boutique crop can be tomorrow's commodity” • “if too many people grow high value crops, it's not high value anymore because supply is too great” • guarantee of return • keeping overheads down (per ML or per ha) = efficiency • scale has an influence. • in the future, contracting will be a necessity due to the increasing cost of new equipment • less labour requirement 	<ul style="list-style-type: none"> • value adding • focus on things that have a higher value • higher return (↑ gross margin/ML) • expensive system e.g. pivot or spray or drip irrigation. You don't grow low value crops on it • drought forces efficiency • more production from same labour unit or less. But if you reduce the number of employees and doing more work yourself – is this increasing efficiency? • increased use of contractors • it's about having versatility and flexibility • all aspects of the system are fine tuned • long term financial security • targeting of best possible off-farm value for product • more automation • crop variety improvements 	<ul style="list-style-type: none"> • “rice, that's why we grow it” • profit or infrastructure? • Not susceptible to boom/bust. • low cost of production • Related to labour costs • depends on water security e.g. permanent plantings • maximising WUE • it's about sustainability • it's about enterprise mix without intensive farming • economies of scale comes into it • includes automated watering systems - labour shortage here • maximum \$ per ML – involves layouts, better management etc. • be as flexible as you are practical - be able to change enterprise mix without too much cost • centre pivots are only profitable with high yields • simulate natural rainfall as much as possible 	<ul style="list-style-type: none"> • bigger overheads • increased water use efficiency • generally more efficient - taking advantage of rain • intense production e.g. tomatoes and veges → increases labour costs → greater risk • larger scale • need higher return • minimum tillage (direct drill, zero drill) • low input and high return • involves double cropping • efficiencies in labour, drill and inputs. • flexibility important - beds are flexible – allows you to be ready for summer or winter • higher value system requires greater market stability – the market must have greater capacity to absorb higher costs (not pass them all onto the producer)

Appendix 4: Research, Technology & Change: Where should money be invested?

Finley	Yanco	Griffith	Coleambally	Wakool	Echuca
<ul style="list-style-type: none"> water security - don't add to allocation, but make it more secure build another dam pipe water to towns e.g. from Dartmouth to Adelaide if farmers are assured of water security, they will do the research themselves better quality control in grain better return on capital better rice varieties better quality assurance program - want to be able to trace grain back to the grower 	<ul style="list-style-type: none"> plant varieties e.g. reduce water use, resistance off-farm investment the way research is implemented and products of research results of cloud seeding research into water holding capacity of the canopy of gum trees versus pine trees retrieving river flows which go out to sea educate city people. get empathy and understanding grains for fuel educate primary school kids about agriculture more irrigation research less research based in Western Australia wheat belt market based research for alternate crops dollars available if you take it out of rice production 	<ul style="list-style-type: none"> there has been a lot of on-farm research and development R&D on carbon cycle terracing in a wet winter – infiltration rates crop agronomy / nutrition need on-farm R&D, not R&D in a lab in the city to see research stations come back private ag only do research on stuff that can be patented / profitable. R&D needed to be done cannot be patented - private ag not interested. R&D on wheat for irrigation, not dryland canola yields current marketing structures, market failure (competition policy) farmer bargaining power "you take on the new technology that best suits you". system can't supply high flow to everyone → take this to the irrigation companies. 	<ul style="list-style-type: none"> better crop varieties that yield better → increase gross margin. want irrigation varieties, not those adapted from dryland. long term security e.g. negative government policy stops investment because no security high value systems dependent on markets sheep aren't high value systems but they fit in with the rotation greater rep'n of irrigators on GRDC board. rice research cold tolerant varieties rice varieties, not gmo & use less water followed through research with good end results that are reported back to farmers want all departments and organisations working together – more co-operative research 	<ul style="list-style-type: none"> increased transpiration efficiency want to be able to time water application to maximise dollar value they receive deep rooted perennials suited to sodic subsoil research work on poor subsoils wheat breeding and management more researchers need a change in focus. focus on yield rather than resistance. better understanding of soil micro-organisms n fixation in wheat and rice long-term viability of so-called higher value crops what should we do with trash? burn it? bale it? 	<ul style="list-style-type: none"> improved varieties with disease and drought resistance generation of markets how do we market the product of research? need to promote the benefits of improved product. irrigation varieties ethanol – new product for new use - won't affect other markets. Brazil and Argentina will eventually destroy any Australian ethanol production better delivery or research results – little dissemination support for farmer based research groups irrigated cropping is fragmented in northern Vic – if you grow rice it's ok, but if not, little information or support apply consistency between states on water national variety trials under irrigation

Appendix 5: Layouts and Double Cropping

Finley	Yanco	Griffith	Coleambally	Wakool	Echuca
<ul style="list-style-type: none"> depends on soil type and enterprise raised beds: only good in a wet year and in some soils terrace dries more quickly no beds - can drive over banks, no weeds can water more quickly - change rice to maize wue is at a maximum. can't get too much more efficient. water security is necessary so that farmers and investors can plan with confidence - it will keep people in the region. recreational users use water without paying would double crop with water reliability double cropping not always about crops – e.g. can fatten lambs on opportunity work out the best use of your water - if everyone could double, crop, not irrigate more ha 	<ul style="list-style-type: none"> mostly border check raised beds heavily influenced by soil type running livestock not compatible with raised beds really depends on mix of enterprise – if a farmer has a lot of dryland as well, not likely to invest in machinery need to run beds double cropping usually involves rice then winter cereal triple cropping sometimes an option definition for double cropping is fluid presumption is that double cropping is profitable, but might be more profitable to use more water or irrigate more ha 	<ul style="list-style-type: none"> no improvements can be made on layout - already extremely efficient and productive fix up the poor areas of the farm yield mapping. rice in rotation limits layout changes terrace + high flow is the best irrigation layout. most efficient. it - however you need to shift a lot of dirt - the jury is out on wet years. can't incorporate beds and livestock - terrace is not suitable in all situations. everyone will want high flows - not possible - channels won't be able to supply and deliver water quick enough for everyone. bank less channels take up too much land on small farms but give easy access to block what is holding everyone back from implementing a terrace + high flow system - capital investment, traditional values every second farmer owns a laser bucket a lot of soil disturbance involved. terrace = flat paddock → initially people couldn't grasp this concept. pivots on lighter country ok rice rotation limits options for layout change terrace (minimum 80mm up to 150mm) experience positive- flexibility for crops 1:20000 slope up bay and zero sideways reduce drainage (but risky if get a rain event) – need to have it attached to a storage system 	<ul style="list-style-type: none"> border check bed farming bank less channels centre pivots few used only for winter crops because there is not enough moisture in summer. which layout you use depends on natural features of the landscape. mixed farm layout limits choice beds allow double cropping with flexibility double crop after rice or corn / beans on beds with winter cereal problems with timing control – can't predict low allocation years it's about looking for any opportunity 	<ul style="list-style-type: none"> double cropping winter crop followed by a summer crop. can't continually grow a winter crop after a summer crop e.g. rice → wheat → rice → wheat because can't get summer crop off early enough to sow the winter crop in time wheat and barley are bread and butter - canola is grown for a disease break don't need to get technical and complicated with sprinklers etc and get caught up in policy this area doesn't need technical irrigation systems - we have natural attributes 	<ul style="list-style-type: none"> a lot of border check beds used, depending on soil type and natural grade of the soil 98% of country is laser graded trickle used, particularly for tomatoes a few pivots and lateral move systems in place, depends on soil suitability no standard rotation – corn x 5 yrs and barley x 3 yrs no standard applies to double cropping – depends on the size of the window