



An Economic Analysis of GRDC Investment in Grain Research Updates



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Executive Summary

GRDC invests in Update events so that the outputs of research can be more rapidly communicated to grain growers by using a variety of delivery channels. An evaluation of the benefits of the GRDC investment in Updates over the three year period to 2008/09 has demonstrated that the Update events are likely to have been an effective investment. Events such as Updates are difficult to evaluate quantitatively because of the diversity of the material presented and the diversity of the participants. Using conservative assumptions, the three projects in the cluster are estimated to have contributed to a positive Net Present Value of the order of \$2 million from a GRDC investment of less than \$600,000 annually. The benefit assessed was additional grower profitability from an assumed speeding up of adoption of one year.

Although difficult to evaluate in terms of benefits, one clear indicator of the impacts of the Updates is their attendance levels. Nationally there are on average 4,000 attending 40 Adviser and Grower Updates each year at locations throughout the three GRDC Regions. This level of attendance is likely to have an across-industry influence given that some 14,000 larger grain farmers account for 80 percent of Australian grain production. In addition they increasingly employ consultants and fee for service advisers who use the Updates as a key source of information.

The Updates have evolved over the last 15 years. Their current role is as a prime vehicle for GRDC to access the most effective channels for delivery and feedback. The benefits of the Updates extend well beyond the immediate productivity gains from the more rapid adoption of new practices and new technology. Those attending give high priority to industry networking opportunities as a reason for attending. Agribusiness, retail advisers and consultants account for over half the audience at most adviser Updates. They have an important industry-wide role. Grain farmers are increasingly relying on links with their supply chain including commercial advisory services.

The diversity of participants at Updates is likely to contribute to a strengthened capacity of the grain industry to manage emerging industry issues. The feedback that GRDC and researchers get from Update presentations is also an important contributor to more effective research planning and communication. The potential for rapid feedback nationally coordinated is a feature distinguishing Updates from other more dispersed or centralised delivery channels contributing to extension and adoption.

The Updates undertake routine exit and follow up surveys of participants to evaluate their satisfaction and provide feedback. Support is uniformly high as are intentions to make use of information from the Updates. The high proportions planning to adopt or test new practices or technologies were used as a basis for estimating benefits. The Updates with their emphasis on new information were assumed to have a primary role in speeding up grower adoption by one year. An attribution of the benefits to the investment in Updates took into account the role of Updates within the context of the range of delivery channels used for communicating information in the grain industry.

Benefits were based on a range of values identified from other studies on research impacts. Areas adopting were based on conservative assumptions on the areas likely to be influenced by advisers and growers attending Updates. The benefits in terms

of crop profitability were estimated to be of the order of \$5 million annually, or equivalent in present value terms to \$1,260 per participant. However benefits need to be reduced to take account of costs incurred in attending Updates. These were estimated to average \$930 per participant. An imputed cost allowing for the participant's input of time accounted for two thirds of the attendance costs.

The benefits valued in this analysis are from increased profitability from speeding up adoption. They total \$4 million (present value terms) from a total investment of \$2 million (present value terms) providing a net present value of \$2 million and a benefit cost ratio of 2 to 1 (over 30 years, using a 5% discount rate). The Internal Rate of Return for the evaluation is 29 percent.

The following table (from Section 5 – Benefits) summarises the notable benefits resulting from the investment in the Updates.

Categories of Notable Benefits from the Cluster Investment

Benefit	Levy paying industry and its supply chain	Spillovers		
		Other industries	Public	Foreign
Economic	Increased profitability from more rapid adoption More effective and efficient planning and delivery of services to growers		Improved industry input into government rural policy	
Environmental	Increased awareness of industry challenges		Improved environmental stewardship	
Social	Enhanced industry skills and capacity from a more cohesive industry		Strengthened Australian rural and regional networks	

1. Introduction

Grain Research Updates have become established since the mid 1990s as focal events for the grain industry to keep up to date on the most recent research findings. They also provide a forum for discussion of a wide range of emerging industry issues and changing challenges in addition to tactical decision making requirements. Adviser Updates are held annually at one or more locations in each GRDC Region. They are followed by a series of smaller Grower Updates in main centres in each Region that are targeted more at local growers and groups.

The Updates have important roles including ensuring more rapid awareness and adoption of improved practices in addition to greater promotion of existing GRDC and partner research, development and extension investments. With activities spread through each GRDC Region, they are well placed to assess and respond to the needs of a diverse audience. They are also well placed to complement the communication roles of corporate publications and products. The Updates are major regional events held over two days and attracting large audiences and media coverage. They target fee-for-service and retail advisers, consultants and other key grain industry groups and achieve a high level of awareness and coverage across those groups. The audience diversity helps create a unique opportunity for broader networking, to update knowledge and to test the potential adoption of new research. In the GRDC Northern and Southern Regions, regular newsletters to the large networks of participants and former or potential participants provide information on developments and grain industry activities during the year. The data bases include a very high proportion of the potential market servicing the grain industry.

Updates also give GRDC and presenters (which include researchers) the opportunity to identify new issues and to get feedback on their presentations of the latest research, development and extension findings. This ensures more relevant communication activities and presentations at other venues. The Grower Updates are smaller events spread through each GRDC Region and typically only a one day event using relevant information from the Adviser Updates.

Evaluation of the benefits of the GRDC investment in Updates is tasked with isolating that part of the benefits from investment in research that can be attributed to the Updates. Updates are one of many ways that information is delivered and distributed to industry, and feedback is received from industry on research priorities.

Updates have a role in contributing to awareness and to adoption of a wide range of practices. It is clearly not feasible to build up the benefits from some attribution of the benefits from each of numerous practice changes. This evaluation will therefore need to find an alternative and more feasible approach. Such an aggregated approach will also need to recognise that benefits are shared along the inputs and outputs value chain. For example consultants and commercial advisers are well represented at Updates and are a key link in providing information to their grower clients. Updates help them plan their businesses in a range of ways including forecasting likely demand for inputs and for services.

Each Update event includes an exit survey of participants. There have also been surveys of the intention to adopt new practices based on information from the Updates. These sources have been used to estimate likely benefits. The outputs and outcomes from the uptake process are used to estimate impacts from economic,

social and environmental perspectives. A cost benefit framework is utilised and supported where possible with non-financial information on impacts. A sensitivity analysis of the assumptions is undertaken, confidence estimates are provided, and the conclusions and lessons learnt are then discussed in the final section.

2. Project Investment

Projects Funded by GRDC

Three projects have been funded by GRDC in this investment cluster as listed in Table 1. The projects were part of the GRDC Output Group 1 – Practices. The GRDC objective for Practices is: *Better practices developed and adopted faster*". Updates have a dual role: to target faster adoption and improve identification of better practices. Details on the projects have been extracted from the project reports and Services Agreements for the delivery of Updates and newsletters.

Table 1: Details of Research Updates Funded by GRDC 2006-2009

Project Code and Title	Other Details
ICN00006 - Northern Region Research Update Services	Organisation: Independent Consultants Australia Network (ICAN) Period: 1/7/2006 to 30/6/2009 Principal Investigator: John Cameron
JCL00011- Southern Region Research Update Services	Organisation: Jon Lamb Communications Period: 1/7/2006 to 30/6/2009 Principal Investigator: Jon Lamb
DAW00150 – Further Development of the Crop Updates Partnership	Organisation: Department of Agriculture and Food Western Australia (DAFWA) Period: 1/7/2006 to 30/6/2009 Principal Investigator: Greg Shea

The organisations involved had all run previous Updates so the events run during the period to be evaluated followed a process that had proved successful previously in terms of satisfaction levels. (Note there have been changes in the organisation arrangements for the post 2009 Updates in the Southern and Western Regions).

Table 2 provides a summary of the common objectives of each project.

Table 2: Project Codes, Titles and Stated Objectives

Project Code and Title	Stated Objectives
ICN00006 - Northern Region Research Update Services	<ul style="list-style-type: none"> To facilitate the operation of the Northern Region Research Update Services and the production of Northern Region Newsletters
JCL00011- Southern Region Research Update Services	<ul style="list-style-type: none"> To facilitate the operation of the Southern Region Research Update Services and the production of Southern Region Newsletters
DAW00150 – Further Development of the Crop Updates Partnership	<ul style="list-style-type: none"> To encourage a coordinated approach to the delivery of autumn Update information to growers by hosting events in partnership with grower groups, agribusiness, GRDC, research partners and DAFWA.

Investment Inputs

Estimates of the total funding by GRDC for the three projects are provided in Table 3 over a three year period. Table 4 shows the funding for each year. GRDC contributed 72 percent of the total funding. The proportion is higher than usual compared with when the partners are government research agencies. For this investment two of the contracts were with consultants who could be expected to be operating on a fully costed basis with no matching funding provided as was the case with DAFWA.

Table 3: Investment by GRDC and Partners in the Three Projects (nominal \$)

Project	GRDC	Partners	Total
ICN00006	513,800	0	513,800
JCL00011	939,000	0	939,000
DAW00150	291,751	672,391	962,142
Total	1,744,551	672,391	2,416,942

Table 4: Total Investment by GRDC and Partners for Years Ending June 2007 to June 2009 (nominal \$)

Year ending June	GRDC	Partners	Total
2007	566,857	210,345	777,202
2008	584,828	223,860	808,688
2009	592,866	238,186	831,052
Total	1,744,551	672,391	2,416,942

3. Activities and Outputs

A summary follows of the principal activities and outputs for the three projects. The outputs as contracted and as summarised in the typical annual activities below were all achieved.

Typical Annual Activities

Adviser Updates- Grain Research Updates were organised, publicised and run annually in the Northern, Southern and Western grains Regions. In the Northern Region Updates are held in Goondiwindi and Dubbo. In the Southern Region locations were Adelaide, Bendigo and Wagga Wagga. The Western event is held in Perth. Updates are generally held over two days. A one day event was held at Dubbo. Routine evaluations of the Adviser and Grower Updates are undertaken based on exit surveys.

Grower Updates - these are single or half-day seminars held in a range of Regional locations. There were on average 8 in the Northern, 14 in the Southern and 11 in the Western Region annually over the three year period. Topics for Grower Updates are chosen by groups of local growers and agronomists to ensure relevance to their Region. They are also able to draw on the material and the experience from the larger Adviser Updates. Locations of the Grower Updates vary each year. Papers

from past Adviser Updates are located for general reference on the GRDC website (www.grdc.com.au/researchupdates).

Newsletters and Proceedings – Annual production of six newsletters in the Northern and Southern Regions is an integral part of the Update process. Approaches to distribution of newsletters have evolved as email has become more accessible. For example in the Northern Region, newsletters were posted or emailed to a diverse list of 2,000 recipients. As an indication of the organisational complexity and scope of the Adviser Updates, in the Western Region a comprehensive proceedings containing up to 100 papers is published and also made available on the DAFWA website. Many of the papers include contributions to more sustainable farming. However, of the 100 papers, there were only a few that directly targeted off-farm environmental impacts and issues.

General information on attendance and on the stated occupations of participants is presented in Table 5.

Table 5: Numbers and Occupations of Participants at Adviser and Grower Updates in the three Regions from 2007-09.

Category	GRDC Region			Total (or Average)
	Northern	Southern	Western	
Adviser Updates				
Events	2	3	1	6
Annual Attendance	410	740	370	1,520
Occupations (%)				
Agribusiness/Retail	47	39	32	40
Government /Research	18	22	51	30
Private consultant	21	15	9	15
Farmer	12	9	4	10
Other	2	15	4	5
Total	100	100	100	100
Grower Updates				
Events	8	14	11	33
Annual Attendance	680	1,085	673	2,438

Source: Compiled from DAFWA (2008 and 2009) and various progress reports provided quarterly to GRDC.

Demographic details are collected regularly on participants. In summary and based on the DAFWA surveys (2008 and 2009) participants at Adviser Updates have an average age of about 40, 15 years experience in the grain industry and a high proportion (more than a third) attend regularly. About three quarters are male and the majority work in the private sector for example in agribusiness or retail businesses servicing agriculture, or are consultants to farmer groups. Attendance at Grower Updates is predominantly from growers but there often a proportion of local retailers and consultants.

4. Outcomes

The previous section demonstrated success in the primary role of delivery of research updates to advisers and growers. This section will assess the impacts in terms of benefits to the grains industry. The shorter-term outcomes are expected to be primarily from increased awareness leading to some practice change which will contribute to improved productivity on farm. Capacity building is also a feature. The Updates cover a wide range of topics on new practices and on experience with practices currently being adapted and adopted. Whilst the Grower Updates are clearly targeted more directly at growers, the Adviser Updates also achieve practice change through intermediaries in the input and output value chain. Agribusiness, retail advisers and consultants account for over half the audience at most Adviser Updates. The Updates contribute to their businesses in a variety of ways, for example in improved forecasting of sales of inputs to farmers and in updating skills required to advise farmer clients or market farm inputs.

The various pathways to adoption and the extent and distribution of benefits will be considered in subsequent sections. The extent to which the Updates achieve a high level of coverage of key influentials in a region is also a key factor in determining potential benefits. The contracts for the Updates require the agencies to maintain databases of networks including research institutions, grower groups, and regional agribusiness. The latter include consultants and a range of fee for service advisers together with retailers of farm inputs. It is understood that the data bases do achieve a very wide level of coverage. (Personal Communication, John Cameron, 2010) Because the audience is diverse and have a range of motivations to attend an uptake event, there are numerous practices potentially involved given the number of papers presented.

Demographic data from surveys of the participants demonstrate the Updates are likely to have an important role in training and capacity building. Typically one fifth of participants have less than three years experience in the industry. The routine current awareness and educational role of the Updates is illustrated by the high proportion that is regular attenders.

High levels of audience satisfaction are a feature of the adviser and grower Updates across the three Regions. Examples from particular events will be used to illustrate the high satisfaction levels that are consistently achieved. Satisfaction levels will be useful in terms of assessing benefits if attendance is motivated by intentions to translate awareness of relevant new information into practice change. Updates have been running for many years and have an established role. Planning of the content in close consultation with industry ensures that the Updates remain highly relevant and of interest to diverse audience. The continuity in attendance could also be expected to be of value by enabling feedback from previous events. The updates contribute to research planning in a number of ways. For example attendance by research agencies and by members of GRDC Regional Panels ensures timely and relevant information for research planning.

Two examples of the high level of satisfaction achieved follow. For the Southern Updates in 2007, an average of over 80 percent was highly satisfied with the following aspects of the program

- sensible topic selections,

- enough access to specific agronomy recommendations,
- opportunity to attend issues of greatest interest,
- intellectual stimulation, and
- the chance to explore selected topics in depth.

The Northern Region provides a further example of the satisfaction levels achieved. Participants at three Grower Updates were asked to respond to the value of the Updates; 89 percent rated the Updates as a 4 or a 5 on a 1=poor to 5 = excellent scale.

Two surveys in the Western Region were taken after the Adviser Updates. They have more detailed information on likely adoption and practice change than that available from the exit surveys in the Northern and Southern Regions. Given that information on satisfaction levels was generally similar for the three regions and for Grower Updates, the adoption information was assumed to be generally relevant.

As an indication of potential outcomes, the motivations for attending are illustrated in Table 6 from the main reasons for attending based on the two surveys of participants. Responses from the 266 participants were open ended and coded to standard answers.

Table 6: Top Six Reasons for Attending the Perth 2008 and 2009 Adviser Updates (DAFWA, 2009)

Reason* for Attending	Respondents (Percent)
Networking in general	50
Keep up to date on research (R&D)	38
To present/ chair a session	20
Access up to date information /what's changed	19
Current issues in the crop industry	16

* Note Respondents were not limited to one reason.

Whilst three of the six reasons relate directly to improved productivity, the importance of networking is an indicator that capacity building and social outcomes are also significant. In particular, the diversity of participants is likely to contribute to a strengthened capacity of the grain industry to plan research and manage emerging industry issues. The degree of inclusiveness would also develop a more cohesive response to opportunities arising from changes in the industry operating environment. Networking would also lead to practice change by giving participants the opportunity to tap into and learn from experience in other situations and add value to content from presentations.

An example of how participants plan to translate information gathered at the Updates was provided by the response to the question from Southern Adviser Updates exit survey in 2007:

"What is the likelihood that you will use three pieces of information from this conference in your business?"

The average response from 330 respondents was an 85 percent likelihood.

As shown in Table 7, the Western Region surveys provide more definitive data on intentions to achieve various categories of adoption following attendance at an Update. As there are only a small proportion of growers attending Adviser Updates, the information is from Advisers and would therefore relate to their experience working with growers.

Table 7: Adoption Outcome as a Direct Consequence of Attending a Western Region Adviser Update.

Adoption Category as a Direct Consequence of Attendance	Participants (%)
A significant amount adopted	3
A significant amount adopted partially	6
Some aspects adopted or tested	29
Some aspects adopted or tested partially	42
Absolutely no adoption at all	20
Total all Categories	100

Source: (DAFWA 2008, 2009) from a follow-up survey of 266 participants at Adviser Updates in 2008 and 2009

In summary the Outcomes section has built on the Outputs from the previous section and shown that the Updates lead to outcomes related to capacity building and to adoption.

5. Benefits

The major benefit delivered by the investment has been the increased profitability of grain production. There are also associated benefits to input suppliers. However most of the benefits are to farmers in the form of increased yields, improved product quality or the reduction in input costs. The benefits are a consequence of adoption in the form of practice change being accelerated by more timely information on the latest research developments.

The information presented typically includes practices which also contribute to more sustainable production systems and improved environmental stewardship, for example through improved management of nutrient losses and from maintaining soil cover. However overall environmental benefits off-farm are considered to be relatively minor apart from where Updates give priority to topics such as salinity management. From a research planning perspective, the Updates provide a unique opportunity to develop an industry perspective on emerging environmental issues.

Networking opportunities are advanced by participants as a major reason for attending Updates. The diversity of participants and their coverage across the grains industry in terms of the supply chain, contribute to Updates having a key role in developing a more cohesive industry approach to emerging issues.

Overview of Benefits

An overview of benefits in a triple bottom line categorisation is shown in Table 8.

Table 8: Categories of Notable Benefits from the Cluster Investment

Benefit	Levy paying industry and its supply chain	Spillovers		
		Other industries	Public	Foreign
Economic	Increased profitability from more rapid adoption More effective and efficient planning and delivery of services to growers		Improved industry input into government rural policy	
Environmental	Increased awareness of industry challenges		Improved environmental stewardship	
Social	Enhanced industry skills and capacity from a more cohesive industry		Strengthened Australian rural and regional networks	

Public versus Private Benefits

The benefits identified from the investment are predominantly private benefits, namely benefits to grain producers and their supply chains, particularly input suppliers and advisers to grain producers.

Benefits to other Primary Industries

Benefits to other industries are minor.

Distribution of Benefits along the Grains Supply Chain

Most benefits accrue to grain producers and to a lesser extent their supply chains, particularly input suppliers and advisers to grain producers.

Benefits Overseas

It is unlikely that any of the outputs produced by this investment will benefit overseas grain industries.

Match with National Priorities

The Australian Government's national and rural R&D priorities are reproduced in Table 9.

Table 9: National and Rural R&D Research Priorities 2007-08

Australian Government	
National Research Priorities	Rural Research Priorities
1. An environmentally sustainable Australia 2. Promoting and maintaining good health 3. Frontier technologies for building and transforming Australian industries 4. Safeguarding Australia	1. Productivity and adding value 2. Supply chain and markets 3. Natural resource management 4. Climate variability and climate change 5. Biosecurity <i>Supporting the priorities:</i> 1. Innovation skills 2. Technology

Table 10 identifies the relative importance of the rural research priorities addressed by the cluster as a whole.

Table 10: Categorisation of Benefits by Priorities

Benefit	Research Priorities Addressed	
	National	Rural
Increased profitability	Priority 3 *	Priority 1*** Priority 2 *
Capacity building		Supporting Priority 1**
More effective delivery of services		Supporting Priority 2*
Environmental stewardship	Priority 1**	Priority 3**

*** Strong contribution **Some contribution * Marginal contribution

Additionality and Marginality

The investment in Crop Updates was targeted principally towards benefits to grain producers and to a lesser extent to input suppliers. These projects would have been regarded as a high priority by levy payers. In the event that the government matching contribution to GRDC was restricted, it is likely that much of the investment would still have been made, assuming a levy system was still in place. It is likely that scope would then have been explored to bring the Updates closer to self-funding by a stronger user pays approach. However, such an approach would need to be considered in the broader perspective. The Updates are a flagship for promoting GRDC research and are costing less than a percent of the R&D budget.

If no public funding at all had been available for GRDC, it is estimated that the investment would have been limited to about 80 percent of the investment actually recorded. The state agencies and other players in the supply chain would probably not have contributed more resources to meet the GRDC shortfall. This could have

resulted in a somewhat less effective investment. A summary of the potential response to reduced public funding is provided in Table 11.

Table 11: Potential Response to Reduced Public Funding to GRDC

1. What priority were the projects in this cluster when funded?	High priority for GRDC and industry
2. Would the investments still have been made in this cluster if 50% less public funds were available to GRDC?	Yes, but with less total funding
3. Would industry and others have funded this cluster if no public funds were available to GRDC?	Yes, to the extent of about 80% of that actually funded

6. Pathway to Adoption

The Crop Updates have features that distinguish them from other delivery channels contributing to extension and adoption. A key one is the ability to identify and address priority issues in a timely way and to secure feedback on appropriate responses to issues. The Updates are also well placed to work across the industry and cater to the increasingly important roles that consultants and private agronomists have in communication with grain growers.

The recent GRDC Grower Survey (IPSOS-Eureka 2010) shows that similar to 2008 results, growers who believe they are innovative or progressive tend to have a specific set of traits. They are more likely to:

- Currently pay for agronomic advice or related services (49% vs. 35%).
- Have attended a GRDC crop research update seminar in the past year (27% vs. 11%).

Full IPSOS data can be found at

<http://www.grdc.com.au/director/about/corporategovernance/GRDC%202010%20Grower%20Survey%20Results>

In WA as shown in Table 7, 80 percent of those attending had at least partially adopted or tested some aspects as a consequence of attendance. Similar results were obtained from exit surveys in the other Regions confirming the Updates have a direct role in practice change and not simply a role in increasing awareness.

The Updates projects also rely on a range of printed and web-based material that reinforces presentations at Update events. In the Northern and Southern Regions, newsletters at a frequency of six annually are used to reflect on recent events, promote coming events in the industry generally and provide timely and targeted information additional to the annual Adviser and Grower Updates. Table 6 also showed that networking was listed as the most important reason for attending in the Western Region surveys. Participants would therefore have been able to not only take on board new information on practices –they would also be able to test its applicability in their situation and to integrate experience from other locations.

A key aspect of the Update pathway is the ability of farmers and advisers to assess selected elements of complex technologies rather than have to consider a full

package. Murray-Prior et al (2006) assessed how research & extension messages about high yield wheat packages were adopted by WA farmers. Farmers adopted elements of the package although most don't know it as a package. Furthermore many farmers are not aware of the original source of the research underlying the package.

In many cases research is undertaken by a research agency and then results are fine tuned for application in different environments by private sector advisers and consultants. This makes it very difficult to identify pathways to adoption and to assess attribution of benefits in terms of the agencies with a potential role. The many sources reported by farmers for two components of the high yield package are listed in Table 12. Typically the response given included two sources each of which could justify some attribution of the benefits of adoption to expenditure by the source.

Table 12: Main Sources of Information on Varieties and Seeding Rate used by Farmers based on a Western Australian Telephone Survey.

Source	Percent of Respondents (of 89)	
	Varieties	Seed rate
DAWA (now DAFWA) people	39	23
DAWA (now DAFWA) publications	40	7
Grower groups	0	3
Private consultants	34	26
Company agronomists	20	19
Own experience	40	44
Other farmers	48	23
General media	20	4

Source: Murray-Prior et al (2006), note multiple responses as to source were accepted.

Other farmers are clearly one of the most important sources of information. The process begins with early adopters and it is likely that the Updates have a key role in increasing awareness to promote early adoption.

The GRDC Grower Survey showed that the most common source of information for growers regarding farming practice change (from unprompted response) is other growers at 18%. Over four in ten of all growers (42%) who are taking action to ensure long-term sustainability of their farm note these actions are in some way a result of GRDC activities. GRDC is having less of an impact on actions to improve production and quality with 24% of growers indicating some influence.

The Updates process has a central role in publicising new research. In addition it stimulates discussion so that research can be applied more confidently in a wider

range of environments. Networking has a key role in that process of testing and extending new information. The emphasis on networking value adds and contrasts with a transfer of technology approach with its simple pathway to adoption, but recognising that such a simpler approach can be most effective when appropriate.

7. Measurement of Benefits

The outputs specified for the Updates include a quarterly evaluation of effectiveness. Evaluation has been achieved primarily by exit and follow up surveys of participants. The survey information has been the main source used to value the identified benefits. A summary of the key assumptions made in estimating benefits is presented at the end of this section in Table 15.

Benefits will be estimated by first describing participants at Updates as a basis for estimating their potential influence in terms of areas of grain crop subject to practice change. Potential benefits/ha will then be estimated based on topics presented at Updates and on estimates of benefits from other analyses of GRDC investments in similar topics. The remaining assumption to calculate benefits is the rate of adoption in terms of the area adopting new practices or products that can be attributed back to attendance at an Update.

The benefits resulting from the Updates are those additional to what would have been available in the absence of the Updates. The benefits could be evaluated by developing a "With" investment scenario and then compared that with the "Without" scenario to estimate the additional benefits. The "Without" scenario, also termed the counterfactual, can be accounted for in this analysis by more simply estimating the extra benefits in one step. Such an approach is appropriate because the Updates have a key role in speeding up adoption by presenting in-demand new information. Their major benefit is therefore assumed to be from bringing adoption forward. The approach is consistent with the assessment in the Final Report (DAW00150) for the West Australian updates: *"Prior to the instigation of Agribusiness and Grower Crop Updates there was a fragmented approach to research and development information exchange in Western Australia. This resulted in delays in integration of new R&D, and duplication or conflicting information."*

Table 7 provided information on intentions to adopt from surveys following the Western Region Updates. Table 5 did show that a higher proportion of those attending in the Perth Adviser Updates were from the government/research category compared with other Regions. (This may cause some small bias in the responses to surveys but this has not been allowed for).

In summary Table 7 showed that 9 percent had adopted a significant amount at least partially. A further 72 percent responded that at least some aspects had been adopted or tested partially as a direct consequence of attendance. When asked which technologies had been adopted or tested the top six responses averaged over 2008 and 2009 were:

- Weed control 16%
- New crop varieties 10%
- Liming sub sample work/soil health 10%
- Herbicide resistance technology 10%
- Crop management 7%
- Precision farming 5%

Benefits/ha

A common feature of the top six technologies adopted or tested is that they are each actually a package or bundle of many management practices or tactics which are still evolving and being refined by both further research and farmer adaptation. Several of the top technologies adopted or tested have been the subject of previous GRDC Impact analyses of R&D undertaken over a period of a few years. (See for example GRDC 2009).

Table 13 lists the average benefit/ha estimated for six technologies closely related to the top six responses. Before considering how the benefit/ha estimates can be used in this analysis, two key aspects of the data need to be considered.

- Each technology remains a focus of ongoing research building on and adapting previous research.
- Each technology is a bundle of numerous practices, or varieties and variety-specific management in the case of breeding programs.

For example the weed control analysis reviewed results for 26 different tactics used to control weeds. The benefit of \$8/ha is actually the average benefit for each practice. The benefit was also in agreement with an alternative approach used to estimate benefits. Some of the 26 tactics are alternatives and at any given time farmers are only likely to be adopting or adapting a few different practices for weed control.

The Northern Region Farming Systems analysis (GRDC 2009) shows a similar pattern in terms of practices. In total 39 practices were identified. But again only a few were being adopted at any given time by a specific farmer.

Table 13: Estimates of Additional Benefits/ha from the R&D Investment in a Range of Practices Developed by GRDC Research Clusters

Impact Analyses of GRDC Research Clusters	Benefit*/ha
Weeds	8.0
Barley Breeding – National	8.6
Wheat Breeding – WA	9.6
Northern Farming Systems	10.5
Diseases – WA	2.9
Precision Agriculture	2.0
Average	7.0

Source: Various Impact Analyses undertaken by Agtrans Research. See examples at <http://www.grdc.com.au/impactassessment>

* Note: The benefit is an estimate of the additional benefit attributable to the GRDC and partner investments in a research cluster and is not a measure of the profitability to a grower of a particular technology, product or practice.

Adoption

As shown in Table 7 and in the preceding text, there was a high proportion of participants stating it was their intention to make use of information from the

Updates. The more detailed follow-up survey in Table 7 showed 9 percent planned to adopt a significant amount and a further 71 percent stated that some aspects would be adopted or at least tested partially. It can be concluded that a high proportion of those attending would contribute to rapid adoption of at least one practice. Taking into account that the essential role of the Updates is clearly to promote, learn and discuss new information, it can be assumed that a key role for the Updates is likely to be in bringing adoption forward. The comparison is with a hypothetical scenario with no Updates. For that scenario, it is assumed that adoption eventually would have occurred, but the pathway to adoption using alternative sources of information would be diverse and dispersed, and lacking the focus that the Updates provide. The focus is a key factor in concentrating attention by the media and others involved in communication and extension.

When asked which technologies had been adopted or tested, the top response as shown above for Western Australia was weed control. Weed control practices continue to evolve with the emphasis shifting to a wider range of measures within an IWM (Integrated Weed Management) approach. An Update event could include new information on several different weed control measures with a new emphasis on reducing the seedbank rather than more efficient spraying for example. A person attending could provide information tailored to the individual situations of a number of farmers, for example a consultant could have 20 or more farmers in a consultancy arrangement.

For simplicity, the evaluation assumes that adoption is brought forward by one year compared to what would have otherwise been the case. The major Adviser Updates are held early in the calendar year to facilitate winter crop planning. As this analysis is conducted on a financial year basis the benefit is assumed to occur with a one year lag, that is, in the next financial year after the Update activity.

Having established the extent of the potential benefit, the extent to which the Updates are likely to lead to adoption, and the lag period, the remaining factor to be established is the influence of those attending on the crop area involved. Assumptions on the influence will be shaped by three characteristics of the industry that have emerged more strongly over the last decade. These are:

- the increasing dominance of large grain farms with over 1,000 ha cropped, for example high and very high intensity cropping farms account for 58 percent of grain producers and 80 percent of revenue from grain crops (ABARE 2010, definitions include grain producers having more than 100 ha grain crop and high intensity are farms with more than 40 percent of area cropped).
- the increasing reliance of grain farmers on various commercial advisory services including consultant and fee for service advisers employed by over 40 percent of grain farmers (Llewellyn and D'Emden 2009, and IPSOS, 2010).
- the current slowdown in broadacre productivity growth associated with the effects of drought, the reduction in public R&D expenditure, and possibly other factors including a slowing in the uptake of new technologies (ABARE 2010).

Based on the first two characteristics, advisers attending updates could therefore be expected to influence a number of growers and a substantial area of grain crop. Similarly those attending from company agronomists would have an influence on their staff. The third point on a slowdown in productivity growth points to adopting a

conservative approach to the assumptions. The assumptions used in the analysis are summarised in Table 14.

The key assumptions determining total benefits are the benefit/ha level and the area benefitting. The latter depends on the proportion adopting as guided by the data presented in Table 7 and with the important assumption that data from Adviser Updates could be used for growers. They are based on broad judgements as to plausible estimates and therefore they will be the focus of sensitivity analyses to be carried out in the following section.

The extent of influence in terms of area of crop subject to practice change is obviously a key decision. There is some limited data supporting the impression that the Updates are likely to involve either growers with larger areas of crop or advisers involved with growers of larger areas. One survey of those attending Grower Updates at Goondiwindi, Jandowae and Pittsworth indicated an average area cropped of the order of 2,500 ha. (Northern Grains Research Update Report, September 2006). Many growers in WA would also have similar or larger areas but data on areas of growers and areas covered by consultants attending Updates are not available.

Table 14: Estimation of Area Benefitting /Adviser and /Grower Attending Updates

Item		Assumption	Source
Advisers			
a)	Proportion Influencing Adoption (%)	25	Table 7 including categories of at least a significant amount adopted (9%) plus about one quarter of total of some aspects adopted or at least tested partially (71%)
b)	Number of Farmers influenced/Adviser attendee influencing adoption	10	Assumed half of typical estimate of 20 farmer clients/ consultant or /fee for service adviser
c)	Average area benefitting /farm of farmers influenced	500 ha	Estimated by relevant area, assumed to be half of average farm area cropped of 1,000 ha for intensive cropping farms (ABARE 2010).
	Area benefitting /adviser attending Updates	1,250 ha	(a)/100x(b)x(c)
Growers			
d)	Proportion Adopting (%)	50	Table 7 including categories of at least a significant amount adopted (9%) plus about one third of total of some aspects adopted or at least tested partially (71%).
e)	Average area benefitting /farm for proportion adopting	500 ha	As for Advisers above
	Area benefitting /Grower attending Updates	250 ha	(d)x(e)

Attribution

The extent to which additional adoption can be attributed solely to the investment in the Updates is the final key assumption to be made. The basis assumed is that the Updates have a primary role in (a) bringing adoption forward and (b) making information more relevant to the region or location, compared to what would have otherwise been the case. The Update role would then be as a catalyst. Information from other sources would also be used to support a practice change.

In Table 12 it was demonstrated that farmers on average use information from more than two sources to support decisions on varieties. Furthermore and to complicate the attribution process, the original source of the information is usually not clear. There are in addition numerous media and approaches to extension used. An example is provided by the following. Five years of activity in the most recent Central Queensland Farming Systems project as cited in GRDC (2009) included:

- 500 'Cropping Central' quarterly newsletters distributed by mail and email

- 107 media releases
- 40 conference papers
- 35 Field Days and Workshops (additional to grower group meetings)
- 25 radio and TV interviews
- Action learning packages developed and delivered
- Action learning groups developing priorities and providing feedback
- 4 bus tours and field visits with school teachers and students.

The Impact studies in Table 13 typically assumed that 50 percent of the benefits from the R&D investments listed were attributable to the R&D investments and 50 percent to numerous other research and extension agencies contributing to the process. The Updates are part of the remaining 50 percent attributable to other agencies. A distinguishing feature of the Updates compared to alternative sources of information is the relatively high costs incurred by participants, particularly for the two day adviser updates.

That part of the \$7/ha benefit attributed to the Updates is assessed as follows. Overall it was assumed that of the \$7/ha benefit for one year from the R&D, the proportions that could be attributed to the Updates were 25 percent for Adviser and 33 percent for the Grower Updates. The attribution was for the role of the Updates in bringing forward adoption by one year.

Costs incurred in achieving benefits

Advisers and growers attending Updates incur costs in terms of travel, the time involved and accommodation for the two day events. The Registration cost is effectively a transfer item, being a cost to participants but a benefit to the organising agency. Registration is generally set at a level to cover the immediate costs of the event, for example venue hire, catering and some costs for speakers. The assumptions for costs are in Table 15.

Benefits not Valued

Capacity to change is likely to be the main benefit not valued. The analysis has valued the Updates in economic terms by their role in bringing forward adoption of research findings by one year. Industry capacity would also have been increased by the increased knowledge of participants leading to more effective adoption in future, and more effective identification of research priorities.

Another additional benefit that can be identified but has not been specifically valued in the analysis are social benefits related to the strengthened capacity of the industry to identify and respond more cohesively to emerging industry issues. Those attending Western Australian Adviser Updates ranked networking as a main reason for attending along with keeping up to date with the latest R&D. Networking will also have a more direct role in adoption and would have therefore contributed to the economic benefits that have been estimated.

The evaluation has not specifically valued environmental benefits. To the extent that grains R&D generally encompasses more sustainable production, there will be environmental benefits. However no analysis was undertaken of Update topics to indicate this.

Summary of Assumptions

A summary of the key assumptions made is shown in Table 15.

Table 15: Summary of Assumptions

Item	Assumption/Person Attending Updates		Source (Author Estimates if no Source)
	Adviser Updates (2 day)	Grower Updates (1/2 day)	
Benefits			
Registration revenue	\$270	\$37	Weighted Average from Update Reports
Number attending	1,520	2,438	Actual, from Table 11
Area of grain crop benefitting/attendee (ha)	1,250	250	From Table 14
Benefit/ha	7	7	From Table 13
Adoption after Update Event	Following year only	Following year only	Speeding up adoption by one year
Attribution of per ha benefit to Updates	25%	33%	Share attributed to Updates of total benefits from original investment in R&D
Costs (participants)			
Kilometres Travelled	\$138	\$53	\$0.75/km standard rate applied to distance travelled from surveys at Updates.
Accommodation	\$157	0	Weighted average of actual rates and estimates of length of stay and proportion away from residences.
Allowance for Time Attending and Travelling	\$1,000	\$300	Estimated at \$50/hour for all participants (based on Australian Government Remuneration Tribunal – lowest daily rate for part time appointments).
Registration	\$270	\$37	Weighted Average from Update Reports

Results

All past costs and benefits were expressed in 2009/10 dollar terms using the CPI. All benefits after 2009/10 were expressed in 2009/10 dollar terms. All costs and benefits were discounted to the year of the final investment, 2008/09 using a discount rate of 5%. The base run used the best estimates of each variable, notwithstanding a high level of uncertainty for many of the estimates. All analyses ran for the length of the investment period plus 30 years from the last year of investment to the final year of benefits assumed.

Investment criteria were estimated for both total investment and for the GRDC investment alone. Each set of investment criteria were estimated for different periods of benefits. The investment criteria were all positive as reported in Tables 16 and 17. A feature of the analysis is the rapid early increase in benefits reflecting the rapid adoption achieved in the early years of the investment.

Table 16: Investment Criteria for the Total Investment and Total Benefits for Each Benefit Period from 2008/09 (discount rate 5%)

Criterion	Years from 2008/09						
	0	5	10	15	20	25	30
Present value of benefits (m\$)	0.83	5.56	5.56	5.56	5.56	5.56	5.56
Present value of costs (m\$)	2.81	2.81	2.81	2.81	2.81	2.81	2.81
Net present value (m\$)	-1.99	2.75	2.75	2.75	2.75	2.75	2.75
Benefit cost ratio	0.29	1.98	1.98	1.98	1.98	1.98	1.98
Internal rate of return (%)	neg	29	29	29	29	29	29

Table 17: Investment Criteria for the GRDC Investment and Benefits to GRDC for Each Benefit Period from 2008/09 (discount rate 5%)

Criterion	Years from 2008/09						
	0	5	10	15	20	25	30
Present value of benefits (m\$)	0.60	4.01	4.01	4.01	4.01	4.01	4.01
Present value of costs (m\$)	2.03	2.03	2.03	2.03	2.03	2.03	2.03
Net present value (m\$)	-1.44	1.98	1.98	1.98	1.98	1.98	1.98
Benefit cost ratio	0.29	1.98	1.98	1.98	1.98	1.98	1.98
Internal rate of return (%)	neg	29	29	29	29	29	29

The annual cash flows of undiscounted benefits are shown in Figure 1 for the 30 year period from the final year of the investment. The pattern shows that the benefits are only for a three year period and are lagging the investment by one year. The pattern is determined by the assumption that the major impact of the Updates was to bring adoption of particular new practices forward one year. Therefore benefits lag costs by one year on a financial year basis.

The contributions from the three components of total benefits are presented in Table 18. The benefits attributed to the Adviser Updates are approximately double those for the Grower Updates, largely due to the assumption regarding the multiplier influence of the Advisers.

Table 18: Contribution of the Sources of Benefits to Present Value of Benefits

Source of Benefit	Contribution to Present Value of Benefits (%)
Via attendance at Adviser Updates	50
Via attendance at Grower Updates	24
Registration Fees*	26
Total	100

* Note Registration Fees are effectively a transfer item being a benefit to the Update function but an equivalent cost to participants attending.

Table 19 shows the allocation of the benefits valued to the Rural Research Priorities.

Table 19: Allocation of Quantified Benefits to Rural Research Priorities

Rural Research Priority	Allocation
1. Productivity and adding value	100%

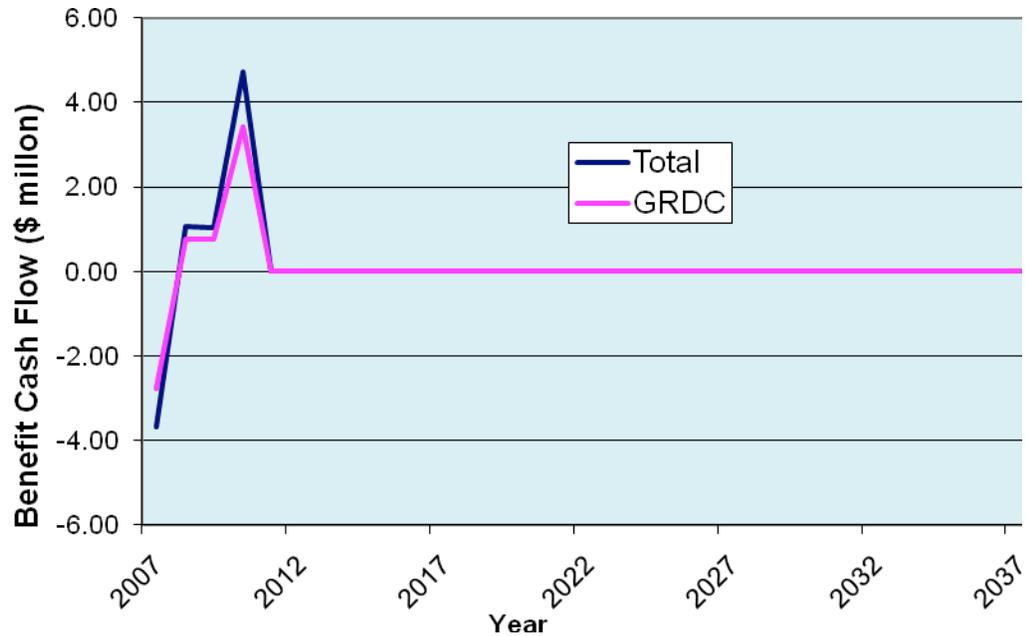


Figure 1: Annual Benefit Cash Flow

Sensitivity Analyses

Sensitivity analyses were carried out on key variables. The results are reported in Tables 20 and 21. The key variables were selected to take account of assumptions about which there was most uncertainty. All sensitivity analyses were performed using a 5 percent discount rate with benefits attributed to GRDC taken over the life of the investment plus 30 years from the year of last investment. All other parameters were held at their base values.

As shown in Table 20, the results are not sensitive to the discount rate to any extent. The lack of sensitivity results from the incidence of costs and benefits being close together with only a one year lag for benefits.

Table 20: Sensitivity to Discount Rate
(GRDC investment, 5% discount rate, 30 years)

Criterion	Discount rate		
	0%	5%	10%
Present value of benefits (m\$)	4.13	4.01	3.88
Present value of costs (m\$)	1.84	2.03	2.24
Net present value (m\$)	2.28	1.98	1.64
Benefit cost ratio	2.24	1.98	1.73

Table 21 shows the sensitivity of the investment criteria to the key assumptions determining the benefits. A conservative estimate of benefits can be made by assuming that the willingness of those attending to pay for their costs of attending provides an indication of the minimum level of benefits they expect from attending. The attendance costs are as used in the analysis and are itemised in Table 15. The average imputed cost for the two day Adviser Updates was \$1,600. For the Grower Update of one day or less the average cost was \$400. Given the one year lag between attendance and benefit, a desired minimum return of 10 percent was assumed.

Table 21: Sensitivity to Assumptions on a Minimum Willingness to Pay Basis, Halving Participants Costs and to Doubling Benefits compared with the Base Case
(GRDC investment, 5% discount rate, 30 years)

Criterion	Benefit Assumption			
	Minimum* Willingness to Pay Basis	Base case	Participants Costs Halved	Production Benefits Doubled
Present value of benefits (m\$)	2.19	4.01	6.38	14.79
Present value of costs (m\$)	2.03	2.03	2.03	2.03
Net present value (m\$)	0.16	1.98	4.34	12.75
Benefit cost ratio	1.08	1.98	3.14	7.27

*Assumed benefits in the financial year following attendance were equal to attendance costs plus a 10 percent return.

Table 21 shows that if benefits were only assumed equal to a Minimum Willingness to Pay Basis equivalent to attendance costs plus 10 percent, the benefits would be at about a break-even level. Attendance costs are of the order of 80 percent of the costs accounted for in the evaluation and are much higher than the GRDC investment. (Note that the benefit/cost ratio is calculated by first reducing benefits by participant costs so that the ratio is in relation to the investment cost only). This sensitivity case provides a robust conclusion on benefits. Because the benefits actually achieved by participants are highly likely to exceed their attendance costs, the Updates will be close to break even for any reasonable assumptions on participant costs.

The indication from Table 21 that attending the Updates was of benefit to participants over and above their attendance costs could suggest that a user pays approach is justified. However current registration costs would need to be more than doubled to meet the GRDC project costs as well as function costs. The surveys after

the Western Region Adviser Updates sought information on pricing of registration. The optimal price, defined as midway between those who thought the cost too dear and those who thought it too inexpensive was \$285. It is likely that the responses were to some extent anchored by the actual rate of \$400 for early registrations. In any case higher registration costs would reduce attendances, and a user pays approach ignores that there are likely to be substantial benefits other than short term benefits to participants

Halving the participant costs increases the benefits substantially but does not have as large an impact as doubling the production benefits. The "Production Benefits Doubled" case shows the evaluation is sensitive to the assumptions on benefits. The sensitivity is high because benefits are reduced by the participants' costs which are a fixed amount for that case.

8. Confidence Rating

The results produced are highly dependent on the assumptions made, many of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 22). The rating categories used are High, Medium and Low, where:

- High: denotes a good coverage of benefits or reasonable confidence in the assumptions made
- Medium: denotes only a reasonable coverage of benefits or some significant uncertainties in assumptions made
- Low: denotes a poor coverage of benefits or many uncertainties in assumptions made.

Table 22: Confidence in Analysis of the Updates Investment

Coverage of Benefits	Confidence in Assumptions
Medium	Low

9. Conclusions and Lessons Learned

The evaluation of investment in the three Crop Updates projects has demonstrated that the projects have had a high level of impact. An obvious measure is in terms of the attendance which have been consistently high with total annual attendances of the order of 4,000 at the 40 Adviser and Grower Updates held each year across the three GRDC Regions.

Because the Updates provide up to date information on a wide and large range of RD&E topics, estimates of the direct impacts on grower profitability are inherently difficult to evaluate with any confidence. However exit and follow up surveys indicate that a high proportion of participants were planning to adopt or at least test some information from the Updates. Based on conservative assessments of possible benefits, the Updates are likely to return a Benefit Cost Ratio of the order of 2 to 1.

The two day Adviser Updates attract in total 1,500 attendees annually and have high levels of attendance from consultants, private agronomists and farm input suppliers. Their attendance ensures that GRDC is well placed to meet changing information needs and to respond to emerging delivery channels. Attendance at Grower Updates averages 2,500 annually and ensures information from the major Adviser Updates is made available throughout each GRDC Region. The impact the Updates have in terms of their reaching such a large and influential segment of a widely dispersed industry is a highly noteworthy impact – one achieved by a GRDC investment of less than \$600,000 annually.

The number of participants averaging 4,000 annually is a significant and influential segment of the industry nationally. The participants include larger grain producers and advisers and consultants who are increasingly influential in term of the number of farmers they influence. The level of attendance is likely to have a substantial industry coverage and influence. The 4,000 attending is an effective proportion, given that some 14,000 larger grain farmers now account for 80 percent of Australian grain production. Further, close to half of grain producers employ advisers and consultants.

The benefits valued in this analysis are from increased grower profitability from speeding up adoption. They total \$4 million (present value terms) from a GRDC investment of \$2 million (present value terms) providing a net present value of \$2 m and a benefit cost ratio of 2 to 1 (over 30 years, using a 5% discount rate). The Internal Rate of Return for the evaluation is 29 percent.

The evaluation is subject to a high degree of uncertainty because of the nature of the benefits. It is doubtful if the precision could be improved by more intensive monitoring and surveying of participants to determine likely benefits. An exception could be follow up surveys at a later date to determine practice change. However attribution to Updates would need careful consideration unless topics launched exclusively at Updates were followed up. The exit surveys demonstrate a uniformly high level of satisfaction from the participants. Satisfaction levels coupled with their willingness to invest in attending should be sufficient evidence that the investment by GRDC gives a high return to those attending. Additional investments in using the Updates to seek feedback on issues and practices could be expected to be more valuable than improved evaluation of the Updates as such. Evaluations of benefits to those not attending and of the relative importance of the Updates compared with other delivery channels are likely to have more value in research and communication planning.

The Updates are likely to become an increasingly important component of the GRDC communication strategy given the penetration they have achieved of key markets and their understanding of the networks and channels involved as the role of the internet continues to evolve. The increasing use of audience response systems is an example where the Updates can be expected to make increasingly valuable contributions in research planning in addition to their current key role in frontline communication.

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References

ABARE (2010). "Australian grains: Financial performance of grains producing farms, 2007–08 to 2009–10" Australian Grain Series 10.1, (by ABARE for GRDC), Canberra.

GRDC (2009). "An Economic Analysis of GRDC Investment in Farming Systems in the Northern Region". Impact Assessment Report Series, by Agtrans Research:
http://www.grdc.com.au/uploads/documents/GRDC_ImpAss_FarmingSysNth1.pdf

DAFWA (2009). "Agribusiness Event Satisfaction". Survey undertaken by Taverner Research. DAFWA, Perth.

DAFWA (2008). "Agribusiness Event Satisfaction". Survey undertaken by Taverner Research. DAFWA, Perth.

IPSOS-Eureka (2010). "2010 Grower Survey – Final Report. GRDC Organisational Performance Research".
<http://www.grdc.com.au/director/about/corporategovernance/GRDC%202010%20Grower%20Survey%20Results>

Llewellyn, R. And D'Emden, F. (2009). "Adoption of no-till cropping practices in Australian grain growing regions". GRDC and CSIRO.

Murray-Prior, R., Sirisena, W., Martin, L. and Rola-Rubzen, M. (2006). "Assessing the adoption of research & extension messages about high yield wheat packages by WA farmers". Practice change for sustainable communities: Exploring footprints, pathways and possibilities, Proceedings of APEN International Conference, Beechworth.