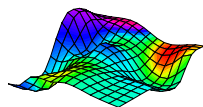


Final Report to

Dairy Australia

Cost Benefit Analyses
of Randomly Selected
Dairy Australia Investments

16 May 2008



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ACKNOWLEDGMENT

This report is the second in a series of cost benefit analyses completed for a number of Dairy Australia investments. The first report involved the derivation of financial sustainability measures for eight Dairy Australia investments that were deemed to have had a major impact across the Australian dairy industry. These eight projects, when compared to the total Dairy Australia investment between 2003/04 and 2005/06, demonstrated that a positive return has been generated for levy payers and Australia at large.

This study is the second in the evaluation series. Dairy Australia engaged BDA Group to undertake cost benefit analyses on a number of sub-program investments that were selected at random. The purpose of these analyses is to demonstrate the range of returns that are generated on Dairy Australia's investment through time. By building a pool of randomly selected cost benefit analyses of sub-programs over a three year period it has been proposed by the Council of Rural Research and Development Corporation Chairs that the mean investment return can be estimated with a high degree of confidence. This study reports the cost benefit analyses of four randomly selected sub-programs selected in the first year of the review process.

Mr David Roche, Dairy Australia's Manager of Strategy and Planning, has overseen this assignment and his support is gratefully acknowledged. Other Dairy Australia staff kindly provided background information on specific investments and feedback on preliminary evaluations. Their contribution is also acknowledged. Despite every effort to clarify issues raised any remaining errors or omissions are the responsibility of the authors.

David Collins

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Disclaimer: All surveys, forecasts, projections and recommendations made in reports or studies associated with the project are made in good faith on the basis of information available at the time; and achievement of objectives, projections or forecasts set out in such reports or studies will depend among other things on the actions of Dairy Australia and their partners, over which we have no control. Notwithstanding anything contained therein, neither BDA Group nor its servants or agents will, except as the law may require, be liable for any loss or other consequences arising out of the project.

EXECUTIVE SUMMARY

The Council of Rural Research and Development Corporations' Chairs (CRRDCC) has adopted an evaluation framework, based on cost benefit analysis, to provide objective and robust information on the returns delivered from their collective investment to Australia's primary producers and the Australian community more broadly. As part of this process Dairy Australia engaged BDA Group to complete a cost benefit analysis of four randomly selected investments made by Dairy Australia over the period 2003/04 to 2005/06. The purpose of the study was to provide an indication of the range of returns generated on Dairy Australia's investment.

Dairy Australia's investments included in this study were grouped on the basis of their sub-programs. The four sub-programs selected included:

Landscapes aimed at equipping dairy farmers with the on-going capability to identify and implement strategies that contribute to environmental improvements across different catchments.

Catchments aimed at improving riparian management in sub-tropical regions and in the Brucknell creek catchment through coordinated community action.

RDPs Regional Development Programs are aimed at coordinating the investment of funds at a regional level, and ensuring these funds are aligned, relevant and effective to the requirements of the dairy industry.

Health & Nutrition aimed at delivering scientific evidence on the health and nutritional benefits of dairy products in the human diet.

The investment made by Dairy Australia in these sub-programs has delivered a range of benefits to both dairy farmers and the wider community. As the focus of the study was on assessing quantifiable impacts, some benefits have not been included in the estimation of financial sustainability measures.

Financial sustainability measures are reported in the Table below for each sub-program evaluated. Returns to dairy farmers are based on direct economic benefits to them and the cost they incur through the payment of the dairy levy. Returns to Australia are based on economic, environmental and social benefits captured by the wider community (excluding dairy farmers) and the cost to the government through the provision of matching funds.

FINANCIAL SUSTAINABILITY MEASURES: RETURNS TO DAIRY FARMERS AND AUSTRALIA

Measure	Landscapes		Catchments		RDPs		Health & Nutrition	
	Farmers	Australia	Farmers	Australia	Farmers	Australia	Farmers	Australia
PVB	\$14.2m	\$15.8m	\$2.4m	\$2.4m	\$19.6m	\$12.8m	\$14.0m	\$9.5m
PVC	\$0.8m	\$0.8m	\$0.2m	\$0.2m	\$5.6m	\$5.6m	\$6.1m	\$0.7m
NPV	\$13.4m	\$15.0m	\$2.2m	\$2.2m	\$14.0m	\$7.2m	\$7.9m	\$8.8m
BCR	18	20	10	10	4	2	2	14

Note: PVB is present value of benefits, PVC is present value of costs, NPV is the net present value and BCR is the benefit cost ratio. All values are expressed in current dollars.

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1 INTRODUCTION

In 2006 the Council of Rural Research and Development Corporations' Chairs (CRRDCC) announced that "to help levy payers and the government better understand the value of the investment in rural research and development (R&D), the Rural Research Corporations (RDCs) have embarked on an ambitious plan to estimate aggregate RDC returns.¹" This will enable individual research and development corporations to develop improved in-house evaluation systems as well as enabling evaluation results to be aggregated across all these corporations. The evaluation framework is based on cost benefit analysis methods with standardised time frames, discount rates and treatment of investment risk.

There are three parts to the evaluation framework adopted by the CRRDCC. These are²:

1. Cost benefit analysis of randomly selected projects each year to provide an indication of the range and trends from the total RDC investment portfolio over a three year period. The chosen sample is to be statistically representative of all RDC investments to ensure that the mean of returns estimated across the sample is within 0.35 standard deviations of the population³ mean. A pool of evaluations will be built over three years.
2. Benefit cost analysis of significant and successful projects from the RDC portfolio to demonstrate that the entire portfolio is delivering private and public benefits. This part of the framework has been called the Hero Study. Dairy Australia commissioned BDA Group to undertake these evaluations. A final report⁴ was submitted to Dairy Australia in November 2007, and in that report BDA Group estimated that a minimum return of \$6.60 on every dollar invested by Australia dairy farmers had been achieved. Further, it was estimated that additional returns of \$10.10 to Australia at large was generated on every dollar of funds invested by all parties involved. On total matching funds of \$43m (current dollars) in present value terms, and total benefits to Australia excluding Dairy farmers of \$851m in present value terms, returns to Australia were estimated at \$20 on each dollar of matching funds provided.
3. An analysis of two early stage collaborative projects to measure the value of "work in progress".

In 2008 Dairy Australia engaged BDA Group to undertake the evaluation of the randomly selected projects. Four projects were selected and estimated returns from these projects are provided in this report.

1 CRRDCC 2006 The Benefits of Rural R&D, September 5.

2 CRRDCC 2007, Guidelines for Evaluation, May.

3 Population refers to the total RDC investment portfolio over a minimum of three years.

4 BDA Group 2007, Cost Benefit Analyses of Research Funded by Dairy Australia, November.

This report is divided into five main sections. The next section provides details of how projects were selected and the financial sustainability measures reported. In the final four sections a detailed benefit cost analysis of each of the three randomly selected projects is provided.

2 SAMPLE DETAILS & EVALUATION

A workshop was held in Canberra on Thursday 16th August 2007 to discuss issues surrounding the randomly selected projects. Attendees included representatives from some of the RDCs as well as a number of economic consultants that had been engaged by the RDCs to complete the benefit cost analyses. At that meeting concerns were raised about how the population should be defined and the sample selected to ensure that the sample was representative and results meaningful. Workshop participants suggested that ACIL Tasman⁵ should conduct the random selection to ensure that the sample and results were both robust and representative of the population.

After follow-up discussions with ACIL Tasman it was decided that the population should be based on Dairy Australia's sub-programs over the period 2003/04 to 2005/06. Following a random selection process suggested by ACIL Tasman, five sub-programs were selected by Dairy Australia's Managing Director, Dr Mike Ginnivan. The five sub-programs, selected included (in order of selection):

1. Sub-Program 3⁶ – *Landscapes.*
2. Sub-program 4 – *Sustainable Catchments.*
3. Sub-program 29 – *Regional Development Program.*
4. Sub-program 36 – *Health & Nutrition.*
5. Sub-program 33 – *On-farm innovation change management.*

Five sub-programs were selected. Although only three sub-programs were selected for further evaluation, an additional two sub-programs were selected as back ups in case a sub-program had to be excluded for confidentiality or other reasons. Sub-program 3 included investment in the "Dairying for Tomorrow" outcome that was considered in the Hero Study evaluation of major projects. Because of this it was decided that an additional sub-program should be included. Consequently, the three additional Dairy Australia sub-programs included in this study are Sustainable Catchments (3), Regional Development Program (29) and Health and Nutrition (36).

⁵ ACIL Tasman had been engaged to provide administrative support to the CRRDCC.

⁶ Dairy Australia had 42 sub-programs over the evaluation period. Only sub-programs that had a matching government contribution were included in the population.

Cost benefit analysis was used in this study to derive financial sustainability measures. Evaluation guidelines developed by the CRRDCC were followed with economic, environmental and social benefits quantified where possible. Financial sustainability measures are only reported at the sub-program level and no attempt has been made to reconcile these measures at the portfolio level.

This report differs from the Hero Study⁴ in that the initial focus is on the sub-program investment rather than the outcomes achieved. Consequently, invested funds have only been considered at the aggregate Dairy Australia level, including funds collected through the levy as well as the government matching contribution. Economic benefits to dairy farmers are considered against the levy funds collected, while economic benefits to other sectors and environmental and social benefits are considered against the matching funds provided. Only those sub-programs that were eligible for matching funds were considered.

Financial sustainability measures reported include:

- **PVB** present value of benefits generated to either dairy farmers or Australia more broadly.
- **PVC** present value of costs – either invested funds collected through the dairy levy or through matching funds provided by the federal government.
- **NPV** net present value of the investment - calculated as the difference between PVB and PVC.
- **BCR** benefit cost ration - which expresses the value of benefits for each dollar invested.
- **IRR** internal rate of return, which provides a measure of the required discount rate where the PVB equals the PVC.

Caution should be exercised in extrapolating the returns reported here to comment on anything other than the minimum return achieved on Dairy Australia's investment. The analysis does not demonstrate, or otherwise, that government support of R&D through matching funds is justified from a social perspective. This would, as noted by the Productivity Commission, require an evaluation of the extent that government support leads to more R&D being undertaken and whether the benefits were diffused⁷. Further, details of ACIL Tasman's sampling method have not been provided to BDA Group and hence the statistical robustness of financial sustainability measures can not be provided here.

In the Appendix issues surrounding the use of evaluation results reported here is discussed in detail. The simple examination of historical investment returns on individual investments can be misleading as it is the portfolio return, or pay off, that is critical. Moreover, such a simple approach does not adequately pay credit to the outcome focussed strategic planning process that Dairy Australia has developed.

⁷ Productivity Commission 2007, Public Support for Science and Innovation, Research Report, Productivity Commission, Canberra.

3 LANDSCAPES

3.1 OVERVIEW

Dairy Australia's Landscapes sub-program largely involved investment in the "Dairying for Tomorrow on the Ground" outcome that was evaluated by BDA Group in 2007 as part of the Hero study⁴. Much of Dairy Australia's investment under this sub-program was made in developing evaluation tools, increasing awareness among dairy farmers of environmental management systems and assisting them to develop and implement appropriate action plans. The successful legacy of investment in the sub-program program has been to equip dairy farmers with an on-going capability to identify strategies that contribute towards environmental improvement across different catchments. This has increased the effectiveness of environmental management initiatives being developed and delivered across the industry by the many different groups that work closely with farmers and the broader community.

Dairying for Tomorrow (DfT) involves the use of regional facilitators that are funded through the Regional Development Program initiative of Dairy Australia. Two examples of the regional impact of sub-program investment are GipRip and Montagu.

GipRip Between 2002 and 2007 500 farmers participated in the GipRip project, participating in learning groups, workshops, field days and other activities with the purpose of improving their riparian and nutrient management. Environmental outcomes achieved included exclusion of stock from 37.5 kilometres of Gippsland's streams and rivers, extensive replanting of native vegetation, stabilisation of banks and improved water quality. Projects to reduce effluent and nutrient runoff have been and continue to be implemented on farms throughout the region. Floodgates to protect fish breeding habitats have been erected at Corner Inlet. Increases in biodiversity- the number and variety of plants, birds and other wildlife- are being seen throughout the catchment.

Montagu Investigations have been undertaken in the Montagu region of North west Tasmania to determine where nutrient loads are coming from in the catchment and to develop (and promote) management practices to alleviate contributions from dairy farms. Catchment scale modelling is occurring and the farm level work, coupled with 'targets for change', has resulted in 29 of the 30 farmers in the catchment developing nutrient maps, nutrient budgets and nutrient management plans. Since the Montagu project started, Tasmania has recorded the biggest increase (DfT Survey, 2006) in awareness of the need to reduce nutrient losses of all dairy regions rising from 25% (well below the national average) to 47% (above the average of 44%).

In total, Dairy Australia's investment between 2003 and 2006 has resulted in 1,120 farmers either implementing or committed to an action plan for on-farm change, generating economic, environmental and social benefits.

3.2 FINANCIAL SUSTAINABILITY MEASURES

Financial sustainability measures were estimated across different sectors of the Australian community and are reported in BDA Group's 2007 report. In TABLE 1 estimated benefits across different sectors are provided.

TABLE 1: ESTIMATED INVESTMENT BENEFITS: BY SECTOR: \$ MILLIONS

Year	Dairy Farmers	Australia			TOTAL
		Environmental	Dairy Consumers	Economic Activity	
2003	\$4.3m	\$0.2m	\$0.5m	\$2.6m	\$3.3m
2004	\$4.8m	\$0.4m	\$0.5m	\$2.9m	\$3.8m
2005	\$5.8m	\$0.7m	\$0.6m	\$3.5m	\$4.8m
2006	\$5.8m	\$4.6m	\$0.6m	\$3.5m	\$8.7m
2007	\$2.0m	\$0.9m	\$0.2m	\$1.2m	\$2.3m
2008 - 2010	\$2.0m	\$0.9m	\$0.2m	\$1.2m	\$2.3m

Note: From 2010 it was assumed under the counterfactual that benefits would have been realised (i.e. 7 year lag)

Financial sustainability measures for levy payers and on matching funds provided by the federal government are reported in TABLE 2. For levy payers, relevant costs include payments made by growers via the output levy on dairy production and relevant benefits include only those gains to dairy farmers. For Australia, relevant costs include matching funds provided and relevant benefits include gains to Australia (excluding dairy farmers). Measures are reported for costs and benefits realised up to 2014 with all values expressed in 2007 dollars. Because some benefits are described as a one-off value reporting measures for a shorter future time period would be misleading. Further, the IRR was not derived because it would have no sensible interpretation given the way that benefits have been described. Finally, no measures were derived for costs and benefits realised to date as no benefits have been realised.

TABLE 2: FINANCIAL SUSTAINABILITY MEASURES: LEVY PAYERS AND AUSTRALIA

Measure	Levy Payers	Australia
PVB	\$14.2m	\$15.8m
PVC	\$0.8m	\$0.8m
NPV	\$13.4m	\$15.0
BCR	18	20

Note: PVB is the present value of benefits and PVC is the present value of costs.

4 SUSTAINABLE CATCHMENTS

Over the evaluation period 2003/04 to 2005/06 Dairy Australia invested in a number of projects aimed at understanding catchment scale impacts of dairying. This work followed on from the dairy industry's involvement in the National Land and Water Resources audit and in response to the federal government's adoption of a regional delivery model for managing natural resources.

The Sustainable Catchments sub-program formed part of Dairy Australia's broader investment in understanding catchment scale impacts of dairying. Other sub-programs included Water and Nutrients, Soils and Nutrients, Landscapes and On-farm Change and Environmental Management Systems. From 2006/07 Dairy Australia's investment was restructured to give greater emphasis to identifying economically viable farm management practices that would lead to environmental improvements at the catchment scale. A successful outcome from this investment has been the *Dairying for Tomorrow – On the Ground* investment which has resulted in over 1,100 dairy farms adopting improved nutrient, water and riparian management practices⁸.

Through the Dairying for Tomorrow program Dairy Australia has supported the establishment of regional coordinators that provide a central contact and access to broader networks to assist local communities to develop, implement and source external funding for environmental action plans.

Dairy Australia's investment in the Sustainable Catchments sub-program had two major components.

1. A riparian management project in Queensland that was aimed at increasing community awareness of the role that riparian vegetation plays in stabilising stream banks, improving water quality and providing a habitat to support local biodiversity.
2. A project that assessed the stream condition down Brucknell Creek (Victoria) and how different land uses and seasons impacted on stream condition. The project also sought to establish base line water quality data so that the impact of different farm management practices could be assessed in the future.

4.1 INVESTMENT DETAILS

The Queensland riparian management project was undertaken under the supervision of Dr R. Chataway from the Queensland Department of Primary Industries and Fisheries. Dairy Australia invested just over \$200,000 between July 2004 and June 2007. The work by Dr Chataway involved a number of farm surveys to better understand how dairy farmers valued riparian areas and identify any constraints to better management. The

⁸ This outcome was included in BDA Group evaluation of major projects

research also involved an appraisal of riparian condition on most of the farms included in the survey. Research findings demonstrated that riparian knowledge and tools from temperate areas of Australia were not suitable for assessing the impact of different riparian management practices in subtropical areas.

Associate Professor J. Sherwood from Deakin University (Warrnambool campus) supervised the Brucknell creek project. Dairy Australia invested just under \$60,000 in the project, which was carried out between April 2004 and December 2005. The research involved two longitudinal studies of water quality and four spatial surveys (over 4 – 6 hours) across 24 sites across the catchment. Research findings indicated that water quality in the Brucknell creek was variable and that the catchment was losing more nutrients than other rivers in the region.

Both projects were successfully completed, but only provided a better understanding of riparian health and management. No on-farm changes have occurred to date as a result of this investment. However, use of the research findings in the on-going development and extension of improved riparian management practices is expected to result in farm level changes in the future.

4.2 INDUSTRY IMPACT

Research outputs from the Dairy Australia projects will contribute to future changes in riparian management in Queensland and Brucknell creek. Through the Dairy Australia Dairying for Tomorrow program a process has been established to enable dairy farmers to assess the impact of different riparian management strategies and to assist them source external funding support, as typically there is little economic incentive (and time is limited) for farmers to finance changes themselves.

Progress has been made towards improving water quality in Brucknell creek. In early 2006 WestVic Dairy employed a Dairying for Tomorrow coordinator, partly funded by Dairy Australia and through the Federal EMS program. The coordinator meet with several landholders in the region to discuss the Sherwood report and agree on a process to implement change. Further meetings were held with farmers followed by a whole of community meeting. In May 2007 the community won a \$260,000 Landcare grant to develop and implement a catchment management action plan. The plan has been completed and on-ground works are anticipated in the future.

Progress in Queensland has been slower. Extension of riparian health assessment tools developed under the project started in 2006 and researchers have provided support to farmers in completing applications for funding through the federal government's Envirofund for financial support for on-ground work (7 applications have been successful).

Through time on-ground works will be undertaken and this will lead to an improvement in water quality, riparian areas and nutrient run-off. While it is unlikely that every farm in the Brucknell creek catchment (200 farms) and in Queensland (734 farms) will implement changes, many will be in a position to undertake improvements. For the purpose of this evaluation it was assumed that 100 farmers in each area would undertake on-ground works in the

near future. The sensitivity of derived financial sustainability measures to different adoption assumptions is examined in Section 4.5. In addition, further support from Dairy Australia would be required, such as that provided through the Dairying for Tomorrow coordinators⁹.

Impacts from on-ground works are assumed to be the same, on an average per farm basis, as those estimated under the BDA Group (2007) evaluation of the Dairying for Tomorrow outcome. Impacts include:

- improved management of 107 metres of rivers and streams per farm.
- 1 ha of buffer strips and environmentally sensitive areas per farm where remnant vegetation has been preserved or pasture areas replaced with native vegetation.
- reduced runoff of 112 kg of phosphorus per farm.

4.3 TRIPLE BOTTOM LINE BENEFITS

Benefits estimated in this section are based on the reported industry impacts in the previous section. Benefits are expected to be realised through farm level changes between 2009 and 2013. It was assumed that all farm level changes involved rehabilitation or protection of riparian areas with 50% of farms implementing changes to their fertiliser practices¹⁰.

Economic

The average annual fertiliser cost per farm has been estimated at \$24,000¹¹ and a 25% saving represents a benefit \$6,250. To account for possible on-going management cost a net saving of \$5,000 per farm was assumed. Across 100 farms where fertiliser cost savings are likely to have been made, the total industry benefit would be some \$0.5m a year.

⁹ Adoption was assumed to be higher in Brucknell creek as the plan is being implemented at a catchment level rather than relying on individual action. For the DfT evaluation the response rate was around 11% with uptake over a 3 year period. Uptake in this evaluation was assumed to be slower and occur over a five year period. Future costs are estimated at \$60,000 a year from 2007b to 2012.

¹⁰ This assumption was consistent with changes that have occurred under the Dairying for Tomorrow program. No change in irrigation practices was assumed as current recommendations in the two areas focus on managing riparian lands and fertiliser applications.

¹¹ ABARE 2007, Australian dairy, Report 07.2, AGPS

Environmental

Environmental benefits will include improved biodiversity and water quality from better management of riparian lands as well as reduced run-off of nutrients and increased areas of native vegetation. Benefits estimated by BDA Group for the Dairying for Tomorrow program have been used in this evaluation. These include:

- Benefits of \$25,000 (as a one-off) from improved riparian land management will accrue to the broader Australian community. Across 19 kms of restored riparian land, this equates to a benefit of \$0.5m.
- The environmental cost of phosphorus entering waterways was estimated at \$14,280 per tonne. On 11.2 tonnes, the annual benefit or reduced phosphorus run-off would be under \$0.2m.
- The final area where environmental gains have been achieved is through the restoration and preservation of native vegetation areas. The environmental value was estimated at \$1,000 per ha. This value would be a one-off gain and across 200 ha of restored lands the total benefit would be \$0.2m.

Social

Social gains will also be realised as a result of increased farm profitability and the associated economic activity generated in regional areas. For every dollar of economic benefit captured by Australian dairy farmers, production, as measured by milk revenue, will expand by an estimated \$1.13. The increased profit earned on this extra production is included in the farm level benefits estimated earlier. However, this increased production will generate additional demand for dairy inputs, including employed labour. The additional economic activity was estimated¹² at 54 cents of every dollar of economic benefit captured by dairy farmers

4.4 FINANCIAL SUSTAINABILITY MEASURES

Financial sustainability measures were estimated across different sectors of the Australian community, including dairy farmers (as levy payers) and the Australian community more broadly. In TABLE 3 the distribution of benefits across different sectors is provided. It was assumed that 90% of economic benefits realised on-farm were captured by dairy farmers with the remainder captured by dairy consumers¹³.

¹² Derived from ABS Input-Output Tables for Dairy – Cat. 5209.0.55.001

¹³ Based on CRA and BDA Group Economic models as discussed in the 2007 Hero study report.

TABLE 3: ESTIMATED INVESTMENT BENEFITS: BY SECTOR: \$'000

Year	Dairy Farmers	Australia			TOTAL
		Environmental	Dairy Consumers	Economic Activity	
2009	\$90	\$144	\$10	\$49	\$203
2010	\$180	\$148	\$20	\$98	\$266
2011	\$270	\$152	\$30	\$147	\$329
2012	\$360	\$156	\$40	\$196	\$392
2013	\$450	\$160	\$50	\$245	\$455
2014 - 2020	\$450	\$40	\$50	\$245	\$335

Note: From 2020 it was assumed under the counterfactual that benefits would have been realised (i.e. 7 year lag)

Levy Payers

Financial sustainability measures were derived first for levy payers. Relevant costs include payments made by growers via the output levy on dairy production and relevant benefits include only those gains to dairy farmers. Financial sustainability measures are reported in the table below. Measures are reported for costs and benefits realised up to 2020 with all values expressed in 2007 dollars. Because some benefits are described as a one-off value reporting measures for a shorter future time period would be misleading. Further, the IRR was not derived because it would have no sensible interpretation given the way that benefits have been described. Finally, no measures were derived for costs and benefits realised to date as no benefits have been realised.

The payoff to levy payers was estimated at \$2.2m in net present value terms or a return of \$10 for every dollar invested through the farm levy.

TABLE 4: FINANCIAL SUSTAINABILITY MEASURES: RETURNS TO LEVY PAYERS

Measure	By 2020
PVB	\$2.4m
PVC	\$0.2m
NPV	\$2.2m
BCR	10

Note: PVB is the present value of benefits and PVC is the present value of costs. BCR is excludes rounding errors.

Australia

Financial sustainability measures were derived secondly on matching funds provided by the federal government. Relevant costs include matching funds provided and relevant benefits include only those gains to Australia (excluding dairy farmers). Financial sustainability measures are reported in the table below for the same reporting period as used for levy payers.

The payoff to Australia was estimated at \$2.2m in net present value terms or a return of \$10 for every dollar invested through the farm levy.

TABLE 5: FINANCIAL SUSTAINABILITY MEASURES: RETURNS TO AUSTRALIA

Measure	By 2020
PVB	\$2.4m
PVC	\$0.2m
NPV	\$2.2m
BCR	10

Note: PVB is the present value of benefits and PVC is the present value of costs. BCR excludes rounding errors.

4.5 CONCLUSIONS AND SENSITIVITY ANALYSIS

Investment in the Sustainable catchments sub-program was estimated to deliver a positive return to both levy payers and Australia. Although investment benefits are modest the relatively smaller investment cost will increase the likelihood that a positive return is generated. However, the financial sustainability measures reported in the previous section are predicated on the assumption that on-ground works will ultimately be undertaken in the two areas considered.

To test the strength of the adoption assumption a break even analysis was carried out. It was estimated that adoption of improved riparian area management would only be required across 21 farms (with fertiliser savings on 10 of these) for the investment to break-even. This would represent just over 2% of dairy farmers in sub-tropical areas and across the Brucknell creek catchment undertaking on-ground works, compared to adoption of 21% that was assumed in this study. Whether or not adoption will exceed the break-even level can only be tested with time.

5 REGIONAL DEVELOPMENT PROGRAMS

Dairy Australia, through its predecessor the Dairy Research and Development Corporation, established the Regional Development Programs (RDPs) in the early 1990s. There are eight RDPs, coordinated and managed as independent entities across different Dairying regions of Australia. The eight RDPs are¹⁴:

- Subtropical Queensland and Northern NSW – called Subtropical Dairy;
- NSW – called Dairy Industry Development Company (DIDCO);
- Murray region and the Riverina of NSW – called Murray Dairy;
- Gippsland Victoria – called GippsDairy;
- South-west Victoria – called WestVic Dairy;
- Tasmania – called DairyTas;
- South Australia – called DairySA; and
- Western Australia – called Western Dairy.

Dairy Australia's RDPs provide a link between dairy farming and processing and research, development and extension (RD&E) activities. Through their operation the industry as a whole is able to gain a better understanding of regional issues, needs and opportunities. By providing financial support each RDP is able to develop and implement regionally focussed RD&E, education and industry development activities. This approach increases awareness and support for dairy farmers' investment in collective action and enables external funds to be raised¹⁵.

Dairy Australia provides funds to RDPs using a formula based on regional milk production to ensure that there is an equitable distribution of funds across levy payers. Each RDP develops an operating plan each year based on agreed regional farm sector priorities that are developed through industry consultation. Dairy Australia funds are then used to broker regional partnerships with external parties to ensure that appropriate RD&E activities are developed and implemented.

5.1 INVESTMENT DETAILS

A breakdown of Dairy Australia's investment in each RDP over the evaluation period is provided in Table 6. In total Dairy Australia invests around \$4m each year. The average leverage achieved is some \$3 for every \$1 from Dairy Australia, with total external funding averaging around \$12m a year. In 2004/05 for example, RDPs

¹⁴ Details of RDPs can be found in Dairy Australia's Annual reports.

¹⁵ Information provided by Chris Murphy as part of Dairy Australia's 2009-2013 business planning process.

invested funds across 180 projects – of which 131 were initiated in that year and 117 completed. Projects are typically short term in nature, although there is some involvement in longer term projects such as those that target natural resource management. As extension is a primary focus of the RDPs, dairy farmer participation at issue-related events (such as drought management and Target 10) is high – 578 were events held with 10,196 dairy farmers participating¹⁶.

Table 6: Regional Development Program Cost: \$'000

RDP	2004		2005		2006	
	DA	External	DA	External	DA	External
<i>Subtropical Dairy</i>	\$512	\$2,533	\$512	\$2,603	\$492	\$2,501
<i>DIDCO</i>	\$374	\$34	\$374	\$1,511	\$364	\$1,471
<i>Murray Dairy</i>	\$955	\$4,298	\$955	\$4,153	\$895	\$3,892
<i>GippsDairy</i>	\$682	\$181	\$682	\$1,780	\$645	\$1,683
<i>WestVic Dairy</i>	\$685	\$1,623	\$685	\$2,305	\$646	\$2,174
<i>DairyTas</i>	\$272	\$388	\$272	\$976	\$260	\$933
<i>DairySA</i>	\$298	\$278	\$298	\$318	\$285	\$304
<i>Western Dairy</i>	\$222	\$257	\$222	\$932	\$214	\$898
TOTAL	\$4,000	\$9,592	\$4,000	\$14,578	\$3,801	\$13,857

Note: 2005/06 external costs are estimates based on the assumption that the leverage obtained in 2006 was the same in percentage terms as 2005.

The range of investments made by RDPs primarily covers RD&E activities. To illustrate the range of investments made several projects funded by Murray Dairy and Subtropical Dairy are described below.

*Murray Dairy*¹⁷

- In 2004/05 the dairy industry commenced the *30:30 Project* to improve farm profitability. Murray Dairy provided funds to establish a partner farm in the region and funds to support a network of farm businesses involved in the project.

¹⁶ Dairy Australia 2004/05 Annual Report

¹⁷ Murray Dairy Annual Report 2004/05

- Murray Dairy, in partnership with the Victorian government, ran a series of workshops and provided information to help dairy farmers understand and respond to water market reforms - including how current irrigation systems could be improved, how to secure water and how to assess development options and associated risks.
- Investigated the potential benefits of a quality assurance approach to monitoring and evaluating environmental performance in irrigated agriculture. This work has contributed to the understanding of environmental quality assurance requirements and the development of suitable environmental management systems.

Subtropical Dairy¹⁸

- Training days were held in collaboration with the Queensland government and dairy processors to increase dairy farmer's computer and Internet skills. This involved training in how to manage computer data, accessing milk production and payment information and protecting data from viruses and unauthorised use.
- Basic nutrition courses were developed and delivered. Topics included feeding protein meals, starch intake, silage quality and increasing milk yields through nutrition management.
- Investment was made in a project to develop a workbook and case studies on different aspects of managing animal waste products. The project was done in collaboration with the federal government and local catchment and regional groups. An incentive was available for farmers to undertake on-ground works to reduce waste and apart from dairy, pigs, feedlots and chicken enterprises were also included.

5.2 INDUSTRY IMPACT

RDPs are likely to generate a number of industry impacts. These would include:

1. Increase the efficiency in the delivery of major Dairy Australia initiatives that utilise RDP staff and networks.
2. Provide a learning and information dissemination vehicle for dairy farmers within each RDP region through the many networking opportunity provided.
3. Provide a source of industry feedback on regional issues to Dairy Australia to help strengthen Dairy Australia's investment planning process; and

¹⁸ Subtropical Dairy Annual Report 2005/06

4. To leverage funds from external parties to increase resources available to the dairy industry for collective action, and ultimately improve the productivity of dairy operations across Australia.

In this evaluation only the impact associated with the leveraging of external funds has been considered. Many of the benefits associated with other RDP impacts would be included in the evaluation of other Dairy Australia initiatives (for example the Dairying for Tomorrow initiative), and including them in this evaluation could potentially result in double counting.

With both Dairy Australia and leveraged funds the RDPs invest in a range of projects that have both short-term (for example feed management) and long-term (for example natural resource management and skill development) effects. Previous economic evaluations of RDPs have shown that benefit cost ratios are in the order of between 1 and 3¹⁹. However, the extent to which the counterfactual has been considered in these evaluations is unclear.

Without Dairy Australia support it is reasonable to assume that the RDPs could access some level of external funding, however the ability to fund overhead costs associated with their operations is questionable.

Without the RDPs, regional investment activities and sourcing funding would need to be managed centrally by Dairy Australia. Given the emphasis of federal and state governments on investing in activities with a demonstrable regional impact, that foster regional networking, and address local catchment issues it is unlikely that the same amount of external funds could have been leveraged without the RDPs. Dairy Australia has estimated that without RDPs only 30% of external funds would have been directed to dairy specific regional investments.

The RDPs play a crucial role in coordinating investment of funds at a regional level, and ensuring these funds are aligned, relevant and effective to the requirements of the dairy industry. Without this regional function, the potential for duplication of effort and/or lack of responsiveness to regional issues is high.

5.3 TRIPLE BOTTOM LINE BENEFITS

In this analysis only economic and social benefits are quantified. It is evident from the range of project investments made by RDPs that there will be environmental benefits through improved resource management across dairy farms (in fact, 44% of RDP funds are invested in natural resource management activities). However, much of the environmental benefits can be attributed to other Dairy Australia and partner investments (such as *Dairying for Tomorrow*). Further, strong regional links achieved with the RDPs strengthen Dairy Australia's

¹⁹ Data provided by Dairy Australia as part of strategic planning process.

priority setting process and ensures that opportunities to maximise industry take-up of new technologies (products, processes or information) is enhanced.

Economic

For the purpose of this evaluation it was assumed that funds invested through the RDPs delivered a nominal return of at least 1 to 1. That is, the external funding parties investment at least breaks-even, as it would be unlikely that such parties would invest if they did not believe that benefits exceeded costs²⁰. Estimated economic benefits through time are reported in Table 7. Two scenarios are considered. The first is where benefits equal external funds invested and the second is where benefits exceed these costs by a factor of three. A lag of two years between when the investment was made and when benefits are realised was assumed.

Table 7: Estimated benefits from RDPs: \$m

Year	Scenario 1			Scenario 2		
	<i>Benefits</i>	<i>Counterfactual</i>	<i>Net</i>	<i>Benefits</i>	<i>Counterfactual</i>	<i>Net</i>
2006	\$9.6	\$2.9	\$6.7	\$28.8	\$8.6	\$20.2
2007	\$14.6	\$4.4	\$10.2	\$43.8	\$13.1	\$30.1
2008	\$13.9	\$4.2	\$9.7	\$41.7	\$12.5	\$29.2

Note: Scenario 1 assumes benefits equal external funds managed through the RDPs and Scenario 2 assumes benefits are three times greater than the external funds managed through the RDPs. The counterfactual is based on 30% external funding.

Social

Social gains will include consumer benefits from a more competitive dairy sector as well as flow on impacts from increased production across regional areas of Australia. It was estimated²¹ that 90% of the economic benefits would be captured by dairy farmers and the remainder largely captured by Australian consumers.

²⁰ This assessment is consistent with Dairy Australia's value analysis carried out as part of their strategic planning process. Further, a more modest return suggests that without the RDPs Dairy Australia would invest elsewhere because returns are likely to be higher.

²¹ Based on CRA and BDA Group Economic models as discussed in the 2007 Hero study report.

Benefits to regional economies can be described in terms of flow on impacts to regional economies as a result of increased dairy production. Dairy production will increase as a result of greater profitability realised through Dairy Australia's investment. For every dollar of economic benefit captured by Australian dairy farmers, production, as measured by milk revenue, will expand by an estimated \$1.13. The increased profit earned on this extra production is included in the farm level benefits estimated earlier. However, this increased production will generate additional demand for dairy inputs, including employed labour. The additional economic activity was estimated²² at 54 cents of every dollar of economic benefit captured by dairy farmers.

5.4 FINANCIAL SUSTAINABILITY MEASURES

Financial sustainability measures were estimated across different sectors of the Australia community, including dairy farmers and the Australian community more broadly. In TABLE 8 below the distribution of benefits across different sectors is provided. Only Scenario 1 is presented here. Scenario 2 is used in Section 5.5 to test the sensitivity of financial sustainability measures to a different benefit assumption.

TABLE 8: ESTIMATED INVESTMENT BENEFITS: BY SECTOR: \$MILLIONS

Year	Dairy Farmers	Australia		
		Dairy Consumers	Economic Activity	TOTAL
2006	\$6.0	\$0.7	\$3.3	\$4.0
2007	\$9.2	\$1.0	\$5.0	\$6.0
2008	\$8.7	\$1.0	\$4.7	\$5.7

Note: Dairy farmers capture 90% of generated benefits.

Levy Payers

Financial sustainability measures were derived first for levy payers. Relevant costs include all Dairy Australia costs less matching funds and relevant benefits include only those gains to dairy farmers. Financial sustainability measures are reported in the table below. As all benefits have been realised to date only one time period is reported.

²² Derived from ABS Input-Output Tables for Dairy – Cat. 5209.0.55.001

The payoff to levy payers achieved to date from investment between 2003/04 and 2005/06 was estimated at \$14.0m in net present value terms or a return of \$3.50 for every dollar invested through the farm levy.

TABLE 9: FINANCIAL SUSTAINABILITY MEASURES: RETURNS TO LEVY PAYERS

Measure	To date
PVB	\$19.6m
PVC	\$5.6m
NPV	\$14.0m
BCR	3.5
IRR	88%

Note: PVB is the present value of benefits and PVC is the present value of costs

Australia

The final segment for which financial sustainability measures were derived was the Australian community at large, based on matching funds provided by the federal government and invested by Dairy Australia in RDPs. Benefits include those that have been realised by Australian consumers of dairy products and regional economies. Financial sustainability measures are reported in the table below and provide an indication of the estimated return to matching funds provided.

TABLE 10: FINANCIAL SUSTAINABILITY MEASURES: RETURNS TO AUSTRALIA

Measure	To date
PVB	\$12.8m
PVC	\$5.6m
NPV	\$7.2m
BCR	2.3
IRR	54%

Note: PVB is the present value of benefits and PVC is the present value of costs

The payoff to Australia to date from matching funds provided between 2003/04 and 2005/06 was estimated at \$7.2m in net present value terms or a return of \$2.30 for every dollar contributed by the federal government.

5.5 CONCLUSIONS AND SENSITIVITY ANALYSIS

The return to levy payers of \$3.50 on every levy dollar invested by Dairy Australia in the RDPs was estimated to be positive, but less than the estimated minimum portfolio return of \$6.60²³. The return to dairy farmers was estimated to be higher than the return generated on external party funds because of the significant leverage that has been achieved for the direct benefit of Australian dairy farmers. However, estimated financial sustainability measures were found to be sensitive to the level of benefits assumed. In the Table below measures are derived using a higher assumed benefit – those assumed under Scenario 2.

TABLE 11: FINANCIAL SUSTAINABILITY MEASURES: BENEFITS SCENARIO 2

Measure	Levy Payers	Australia
PVB	\$58.6m	\$38.1m
PVC	\$5.6m	\$5.6m
NPV	\$53.0m	\$32.5m
BCR	10.5	6.8
IRR	213%	156%

Note: PVB is the present value of benefits and PVC is the present value of costs

Whether or not benefits generated under the RDP investment are higher than that assumed under scenario 1 requires a more detailed analysis than that undertaken here. However, it is reasonable to assume that benefits are likely to be more modest through the RDPs as their focus is on creating a more equitable distribution of benefits across dairy regions in Australia rather than the dairy industry as a whole. Further, it is a stated federal and State government objective to support regional development initiatives as this delivers on their stated equity objectives for regional Australia. As such external parties (which are mainly government) would be prepared to accept a lower return on their investment to achieve their regional development targets.

²³ BDA Group Cost Benefit Analysis of Dairy Australia's Major projects

6 HEALTH & NUTRITION

Dairy Australia and its predecessor the Dairy Research & Development Corporation, has had a long term involvement in health and nutrition research. The focus of the Health & Nutrition sub-program has been on delivering scientific evidence on the health and nutritional benefits of dairy products in the human diet. Through time scientific researchers world-wide have been able to better understand the health and nutrition benefits of different foods. However, consumers have tended to over-estimate the amount of fat in milk and dairy products and have increased their consumption of new calcium fortified foods that compete against milk as a unique and natural food product²⁴.

Scientific research into the health and nutrition needs of dairy products continues to demonstrate that milk products can play an important role in the prevention and management of major health problems (such as the metabolic syndrome, high blood pressure and obesity) and bone and muscle development and function. The Health and Nutrition sub-program provides the²⁴:

- scientific validation that is the foundation of the work of Dairy Australia's Nutrition Communications team whose aim is to reduce the negative advice on the part of the medical profession about dairy and increase the positive advice that the medical profession disseminates about dairy.
- scientific evidence that is necessary to positively influence the policy and regulatory area, ensuring that those in policy environments are accurately informed about the nutritional and health benefits of dairy foods and will therefore recommend dairy consumption.
- scientific evidence that influences national documents such as the Dietary Guidelines and Nutrient Reference Values. Such documents form the basis of all dietary recommendations by health professionals as such it is imperative that scientific findings support the consumption of dairy as part of a healthy diet.
- scientific evidence to counter debate on the contribution of dairy to key health issues which can act as significant restrictors to dairy consumption

Tracking studies by Dairy Australia have shown that Dairy Australia was the most recognised supplier of patient information to general practitioners (August 2005). Because the information delivered has a solid scientific base it has been possible to change GPs perception of the role of dairy in the diet²⁵.

²⁴ Dairy Australia 2007/08 Value Chain Innovation Strategic Planning documents for internal resource allocation

²⁵ Dairy Australia (2005) Annual Report 2004/05

- In 2005, some 70% of GPs believed that 3 daily serves or more of dairy products was a healthy target for female patients aged over 40 – up from 56% in 2001;
- In 2005, less GPs were telling their obese and overweight patients to reduce the consumption of milk – down from 39% in 2004 to 13% in 2005; and
- In 2005, more GPs were telling their obese and overweight patients to increase their consumption of milk – up from 17% in 2004 to 41% in 2005.

Dairy Australia is continuing its investment in Health and Nutrition research, and from 2008 will run the sub-program as an organisation wide initiative to better reflect the cross functional linkages between research, communications and technical issue management. In recognition of the growing importance of health and nutrition issues surrounding the consumption of dairy products, Dairy Australia has increased the investment in scientific research to just under \$1m in recent years and strengthened the communication of this research to health professionals and the wider community.

6.1 INVESTMENT DETAILS

Over the 2003/04 to 2005/06 evaluation period Dairy Australia invested in 16 different health and nutrition research projects. These projects were typically undertaken by internationally recognised scientific research organisations and the results were published in peer-reviewed scientific journals. Research projects tend to be undertaken on a rolling basis through time with research findings used to inform project selection in future years. Research findings are also taken up by dairy manufacturers in Australia to support their own marketing campaigns. Dairy Australia also uses research findings to underpin its communication investment aimed at health professionals, policy makers and the wider community. A breakdown of annual Dairy Australia costs is provided in TABLE 12. It has been assumed that there is a one year lag between the publication of research findings and the integration of such findings in communication material.

TABLE 12: DAIRY AUSTRALIA HEALTH AND NUTRITION INVESTMENT: \$'000

Party	2004	2005	2006	2007
Levy Payers				
Scientific Research	\$252	\$225	\$250	
Communication		\$2,000	\$2,000	\$2,000
Matching Funds	\$252	\$225	\$250	
Total	\$504	\$2,450	\$2,500	\$2,000

Many of the 16 projects supported by Dairy Australia over the evaluation period are still on-going with periodic release of relevant research findings. Such projects include, for example DU12370 – an examination of *trans* fatty acids in Australian milk, CUT11913 – an assessment of the role of whey protein isolates on body weight regulation and cardiovascular risk factors in overweight and obese Australians and CHRI11626 – the identification of healthy diets for families.

The following two projects, as examples, are projects that have been completed and have demonstrated health benefits from dairy consumption²⁶:

1. BHRI11276 “Do cheese and butter at equivalent fat intake affect cardiovascular risk similarity”

This project was undertaken by P.J. Nestel, A. Chronopulos & M. Cehun of the Baker Heart Institute in Melbourne. The objective was to determine whether or not dairy fat in cheese raises low density lipoprotein cholesterol (LDL-C) as much as butter. Twenty middle aged healthy but overweight men and women were given regulated volumes of dairy fat as either cheese or butter over a four week period. It was found that LDL-C did not increase as much with cheese intake as it did with butter. This result demonstrated that the assumption that cheese and butter consumption raised LDL-C by the same amount was incorrect.

2. CSHN10003 “Health benefits of dairy products in weight loss”

This project was completed under the direction of Dr. M. Noakes from the CSIRO Division of Health Sciences & Nutrition. The study investigated if the replacement of carbohydrates in the diet with dairy protein would help in weight loss and maintain bone mass and bone health. Studies were undertaken using dietary intervention across a number of people. It was found that a high protein diet with 50% from dairy products was efficient in promoting weight loss and that there may be additional advantages in improving bone health.

Alone, research findings serve only to increase scientific knowledge in the area of dairy product consumption and human health. In the interests of the Australian dairy industry, Dairy Australia actively promotes research findings (including findings from non-Dairy Australia sponsored research) through various national marketing initiatives. These include:

- Health communications – aimed at mass and one-on-one interaction with GPs to raise awareness of scientific research that demonstrates the positive contribution of dairy products to human health and nutrition.

²⁶ Final project reports submitted to Dairy Australia project completion reports prepared by Dairy Australia staff.

- Nutrition media – aimed at the media at large with the purpose of conveying the health benefits from consumption of dairy products and to minimise the impact of dairy negative nutrition research.
- Health policy – aimed at fostering a positive health regulatory and policy environment for dairy food in Australia and overseas.

6.2 INDUSTRY IMPACT

Maintaining a positive consumer attitude towards dairy products is an important component of long term demand for Australian dairy products. Nearly 5 billion litres of milk produced in Australia is consumed domestically each year as either fluid milk or manufactured milk products. As consumers become increasingly aware of the health and nutrition value of the foods they eat, they are demanding more information on the role of different food types in their diets. Much of this information forms part of dietary advice provided by health professionals. If information on the health and nutrition benefits of dairy products were not available to health professionals and the community more broadly then it is likely that the demand for dairy products would, through time, decline.

The counterfactual considered in this study is not, however, based on differential demand impacts through time. It is recognised that maintaining a positive image of the health value of dairy products across consumers is necessary to protect long term milk demand, and it is likely that without Dairy Australia's support that dairy manufacturers in Australia would increase their investment in this area. Such investment would possibly be higher than Dairy Australia's investment and the effectiveness of the investment might be to some extent compromised. This is because of the potential for duplication across individual dairy manufacturers and less of an incentive for individual manufacturers to invest in generic type research and communication activities.

Through the Dairy Australia investment cost savings are likely to be realised across dairy manufacturers as a whole. This saving has been estimated at around \$6m a year.²⁷ This estimated was based on a consideration of the additional costs that Australian dairy processors would incur in identifying and promoting the health impacts of dairy products. Such costs would tend to be higher than Dairy Australia's investment because manufacturers have limited incentive for the generic promotion of dairy products (efficiency loss) and there would most likely be some duplication of effort across individual manufactures.

The area where effectiveness is likely to be compromised is in the dairy industry response to dairy negative research and beliefs raised through the general media from time to time. While Dairy Australia has a proactive program of promoting the latest research findings through the media, it also uses this capacity to respond quickly to any negative dairy stories that contain misleading information or have been over sensationalised. It is unlikely that a similar investment would be made by manufacturers collectively given their focus on brand specific

²⁷ Cost savings have been estimated by Dairy Australia as part of their annual strategic planning process for the Health Communications and Health Policy sub-programs.

activities. However, it would be reasonable to assume that the industry would mount some response in the medium to longer term. Therefore, the impact of Dairy Australia's investment would be to limit the potential short term loss in consumer demand.

6.3 TRIPLE BOTTOM LINE BENEFITS

In this section economic and social benefits are quantified. It is unlikely that any significant environmental benefits would have been realised.

Economic

The first and main economic benefit included here is the cost saving realised by dairy manufacturers. This saving would only be generated in those years that Dairy Australia made its investment in health and nutrition communications. The saving has been estimated at \$6m a year over 2004/05 and 2006/07.

The second economic benefit is realised as a result of the short term loss in demand that is avoided each year from consumer response to adverse publicity on the health impacts of dairy foods. This potential loss in demand has not been quantified, but it is likely to be much less than the cost saving captured by dairy manufacturers. For example, if there had been a 5% loss in the demand for milk and milk products over a period of 8 weeks every year without the Dairy Australia investment then total annual demand would fall by some 40 ML. This would translate as a loss to dairy farmers of \$1.5m²⁸. Because of the uncertainty surrounding the magnitude of this benefit it was not included in the evaluation.

Social

A social benefit from Dairy Australia's investment will be the increased well being of those Australians who are able to improve their health through better diets recommended by health professionals. There would also be potential for some health cost savings if the improved health of people resulted in a lower demand for health services. No attempt has been made to quantify such benefits as it would be difficult to isolate possible health impacts that could be attributed to Dairy Australia's investment in isolation of other changes that people might have made to their diets and way of life.

Social gains will include consumer benefits from a more competitive dairy sector as well as flow on impacts from increased production across regional areas of Australia. It was estimated²⁸ that 90% of the economic benefits would be captured by dairy farmers and the remainder largely captured by Australian consumers.

²⁸ Based on CRA and BDA Group Economic models as discussed in the 2007 Hero study report.

Benefits to regional economies can be described in terms of flow on impacts to regional economies as a result of increased dairy production. Dairy production will increase as a result of greater profitability realised through Dairy Australia's investment. For every dollar of economic benefit captured by Australian dairy farmers, production, as measured by milk revenue, will expand by an estimated \$1.13. The increased profit earned on this extra production is included in the farm level benefits estimated earlier. However, this increased production will generate additional demand for dairy inputs, including employed labour. The additional economic activity was estimated²⁹ at 54 cents of every dollar of economic benefit captured by dairy farmers.

6.4 FINANCIAL SUSTAINABILITY MEASURES

Financial sustainability measures were estimated across different sectors of the Australia community, including dairy farmers and the Australian community more broadly. In TABLE 13 below the distribution of benefits across different sectors is provided.

TABLE 13: ESTIMATED INVESTMENT BENEFITS: BY SECTOR: \$MILLIONS

Year	Dairy Farmers	Australia		
		Dairy Consumers	Economic Activity	TOTAL
2005	\$5.4	\$0.6	\$2.9	\$3.5
2006	\$5.4	\$0.6	\$2.9	\$3.5
2007	\$5.4	\$0.6	\$2.9	\$3.5

Levy Payers

Financial sustainability measures were derived first for levy payers. Relevant costs include all Dairy Australia costs less matching funds and relevant benefits include only those gains to dairy farmers. Financial sustainability measures are reported in the table below. As all benefits have been realised to date only one time period is reported.

The payoff to levy payers achieved to date from investment between 2003/04 and 2006/07 was estimated at \$7.9m in net present value terms or a return of \$2.30 for every dollar invested through the farm levy. The high IRR reflects the short time period between the time Dairy Australia makes the investment and when benefits are realised.

²⁹ Derived from ABS Input-Output Tables for Dairy – Cat. 5209.0.55.001

**TABLE 14: FINANCIAL SUSTAINABILITY MEASURES:
RETURNS TO LEVY PAYERS**

Measure	To date
PVB	\$14.0m
PVC	\$6.1m
NPV	\$7.9m
BCR	2.3
IRR	1,252%

Note: PVB is the present value of benefits and PVC is the present value of costs

Australia

The final segment for which financial sustainability measures were derived was the Australian community at large, based on matching funds provided by the federal government and invested by Dairy Australia in health and nutrition research and communication activities. Benefits include those that have been realised by Australian consumers of dairy products and regional economies. Financial sustainability measures are reported in the table below and provide an indication of the estimated return to matching funds provided.

**TABLE 15: FINANCIAL SUSTAINABILITY MEASURES:
RETURNS TO AUSTRALIA**

Measure	To date
PVB	\$9.5m
PVC	\$0.7m
NPV	\$8.8m
BCR	13.6
IRR	1,305%

Note: PVB is the present value of benefits and PVC is the present value of costs

The payoff to Australia to date from matching funds provided between 2003/04 and 2005/06 was estimated at \$8.8m in net present value terms or a return of \$13.60 for every dollar contributed by the federal government.

6.5 CONCLUSIONS

Investment by Dairy Australia in the Health & Nutrition sub-program was estimated to have delivered a positive return to both Australian dairy farmers and the federal government. Included in the evaluation was the considerable investment made by Dairy Australia in communicating research findings. This investment does not attract matching funds from the federal government, but without the investment it is unlikely that the research alone would add as much value to dairy farmers or the Australian community.

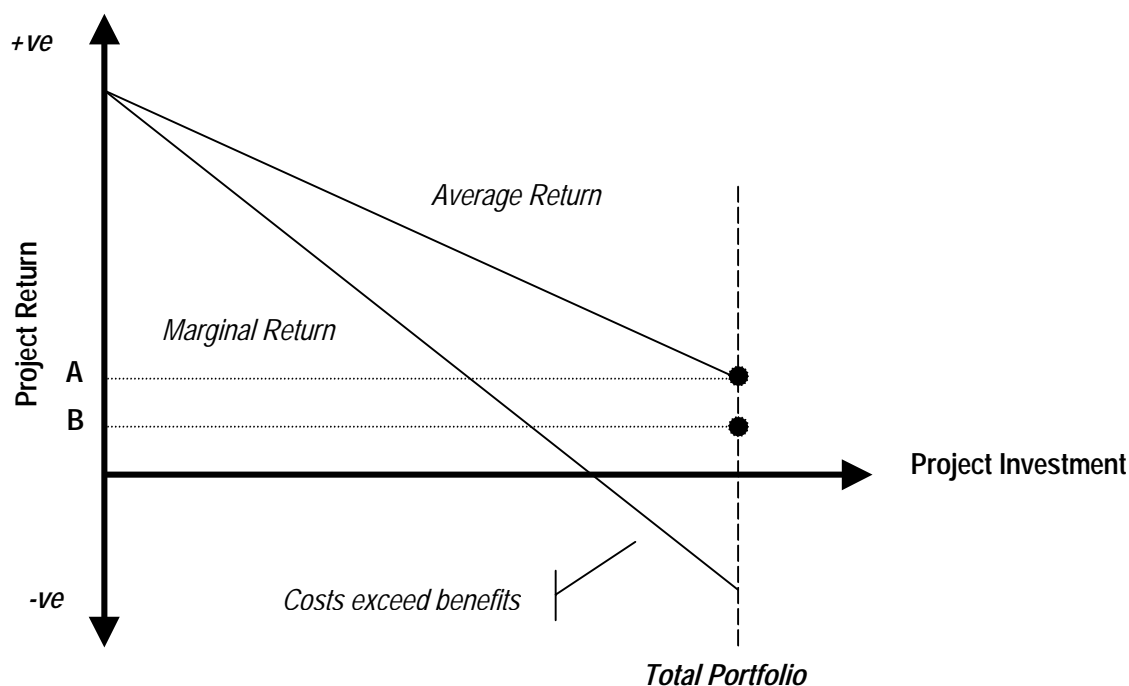
APPENDIX – INTERPRETING FINANCIAL MEASURES

The purpose of the evaluation of randomly selected projects was to demonstrate the range of returns generated on the Dairy Australia investment portfolio and to show the marginal returns that are possible and to address the question of additionality (that government funding has added to the research and development undertaken³⁰). These two issues are discussed below and BDA Group suggests that caution should be exercised in interpreting the evaluation results.

Marginal Returns

The expectation that the analysis of randomly selected projects will provide a measure of the marginal return from investment in R&D may not be satisfied. This issue is examined here with reference to Figure 1.

Figure 1: Marginal and Average Returns from RDC Portfolio.



In Figure 1 an illustrative R&D portfolio is shown. Projects are ranked from the highest return to the lowest return and total expenditure would equal the entire portfolio investment. An average return for the entire portfolio could be calculated, given by point A, simply as the total return divided by the total investment. In the Hero study a minimum return was estimated, such as that corresponding to point B, where only the returns from the top few projects were considered. Three observations can be made regarding the estimation of returns from a number of randomly selected projects.

³⁰ CRRDCC 2007, Guidelines for Evaluation, May.

- The CRRDCC requires a statistically significant estimate of the sample mean with reference to the population mean. Ignoring the degree of robustness in the estimate, as this would be based on ACIL Tasman's sampling method, the mean can only refer to the average return for the population (or in the case here the portfolio). Consequently, if the estimation of the minimum average return provides enough information for the examination of the RDC model then the contribution of the estimated return from the randomly selected sample will be minimal.
- Second, while the randomly selected projects will help show the range of returns from investment in R&D, it will not be on a statistically robust basis as the sampling method is based around an estimation of the population mean (a single value). Further, the range can be more simply appreciated by looking at the top projects (the Hero Study returns) and a number of projects that did not deliver any triple bottom line outcome – and hence costs exceed benefits. This latter type of return is not uncommon in an R&D portfolio, because there are considerable project risks. No appreciation of project risk or risk-reward tradeoffs at the portfolio level is gained in the suggested CRRDCC method.
- Focus on marginal returns is limited in the assessment of portfolio performance. Apart from the need for average returns (not marginal), it would only be relevant if the interested party had discretion on how funds were invested. This would be the same case as a shareholder in a super fund deciding how the super fund should manage its various investments. Issues of concern include:
 - It is the portfolio return that is critical to the investor, not the marginal return on each investment made.
 - Focusing on marginal returns by external parties pays no credit to the skills and experience required to manage a fund.
 - Historical returns are useful in demonstrating performance; they do not guarantee what returns will be earned in the future. This requires a comprehensive process for the ex-ante (forward looking) evaluation of investment opportunities.

Additionality

Additionality is concerned with the justification of government intervention in the market for rural R&D in Australia. Extreme caution should be exercised when using marginal or average portfolio returns to address the issue of whether or not government intervention is justified.

First, there are two conditions for government support:

1. The necessary condition is that there is market failure – that is, without government support there would be under investment in R&D; and

2. the sufficient condition, is that benefits from the intervention exceeds the cost of the intervention.

It does not follow that If benefits exceed the costs then there is no market failure and hence no justification for government intervention. Nor does it follow that If costs exceed benefits then there is market failure and hence justification for government intervention. The extent that benefits exceed costs from rural R&D should influence how much government intervention is provided. The case or otherwise for government intervention must initially be assessed in terms of the market failure. While it is not the intention here to undertake such an assessment it is recognised that the key factors that would need to be assessed do not include marginal or average returns, but rather factors such as, for example, the existence of externalities, public good characteristics of R&D, information failure, market power or regulatory failure.

The second area where caution is advised is the method used by the CRRDCC to factor in the opportunity cost of government funds. That is, the investment in rural R&D needs to consider the opportunities forgone by governments in investing in rural R&D. Such opportunities can be described in terms of the efficiency and equity objectives of government. If such costs are excluded then intervention cost will be understated. On a more pragmatic level, the government needs to assess the returns it can achieve from other areas of investment (where market failure occurs) to decide the level of funding support that should be provided through investment in rural R&D. Looking at rural R&D alone to make a judgement on funding levels makes little sense.

Third, the Australian dairy industry is part of the Australian economy and excluding benefits to this sector when looking at returns on government (matching) funds makes little sense. Government investment is aimed at the social good, which includes the economic welfare of levy payers.

The final area where caution is advised (notwithstanding the concerns above) is in using historical estimates of average returns as a measure of what returns might be in the future without government intervention. The key point here is that a reduction or removal of government intervention might change the level of fixed capital invested in rural R&D by the many R&D providers that service the needs of the RDCs. If R&D infrastructure were to change as a result of reduced government intervention then returns that have been achieved in the past might be a poor indicator of future returns as the scope to achieve cost economies would become more limited.

In summary, the examination of returns from randomly selected projects from Dairy Australia's R&D portfolio will not enable the CRRDCC to address the question of government support for Rural R&D as it had intended. However, evaluation of these projects does provide some indication of the range of returns that are generated on rural R&D and the nature of these returns in terms of delivering economic, environmental and social benefits for Australia more broadly .