Hort Innovation

Final Report

Project title:

Horticulture Impact Assessment Program:

Appendix 2: Australian Almond Industry Innovation and Adoption Program (AL16001 Impact Assessment)

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Delivery partner:

AgEconPlus and Agtrans Research

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What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *AL16001: Australian Almond Industry Innovation and Adoption Program.* The project was funded by Hort Innovation over the period February 2017 to March 2020.

Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2019/20 dollar terms and were discounted to the year 2019/20 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Results/key findings

Investment in this research project has encouraged growers and industry stakeholders to innovate and adopt research and other outputs. The result of this liaison and extension effort will be the uptake of new knowledge that will lower the cost of almond production, deliver improved supply conditions and more profitable almond sales.

Investment Criteria

Total funding from all sources for the project was $1.5 million (present value terms). The investment produced estimated total expected benefits of $5.29 million (present value terms). This gave a net present value of $3.78 million, an estimated benefit-cost ratio of 3.51 to 1, an internal rate of return of 21.7% and a MIRR of 9%.

Conclusions

The Hort Innovation investment in Project AL16001 has encouraged growers and industry stakeholders to innovate and adopt. The result of this innovation will be lower production costs, improved market conditions and grower profit. These impacts have been valued. Three social impacts identified were not valued as the impacts were considered uncertain and difficult to value with credible assumptions. Hence, investment criteria provided by the valuation may be underestimates of the actual performance of the investment.

Keywords

Impact assessment, cost-benefit analysis, almond, innovation, industry development, best practice, on-farm adoption, extension.

Introduction

Horticulture Innovation Australia Limited (Hort Innovation) required a series of impact assessments to be carried out annually on a number of investments in the Hort Innovation research, development, and extension (RD&E) portfolio. The assessments were required to meet the following Hort Innovation evaluation reporting requirements:

- Reporting against the Hort Innovation's current Strategic Plan and the Evaluation Framework associated with Hort Innovation's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to Hort Innovation stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

Under the impact assessment program (Project MT18011), three series of impact assessments were conducted in calendar 2019, 2020 and 2021. Each included 15 randomly selected Hort Innovation RD&E investments (projects). The third series of impact assessments (current series) was randomly selected from an overall population of 56 Hort Innovation investments worth an estimated $38.9 million (nominal Hort Innovation investment) where a final deliverable had been submitted in the 2019/20 financial year.

The 15 investments were selected through a stratified, random sampling process such that investments chosen represented at least 10% of the total Hort Innovation RD&E investment in the overall population (in nominal terms) and was representative of the Hort Innovation investment across six, pre-defined project size classes.

Project *AL16001: Australian Almond Industry Innovation and Adoption Program* was randomly selected as one of the 15 investments under MT18011 and was analysed in this report.

General Method

The impact assessment follows general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental, and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background & Rationale

Background

The Australian almond industry is a significant horticultural sector with a five-year average production area of 40,922 ha, a production volume of 91,627 tonnes (kernel weight equivalent), and a Farmgate Value of $712.5 million – Table 1.

Table 1: Almond Industry Performance 2016-2020

Year Ended 30 June	Area of Production (ha)	Production (t)	Gross Value of Production ($m)	Farmgate Value ($m)
2016	30,981	82,333	854.1	811.4
2017	35,866	80,800	553.6	525.9
2018	39,662	79,901	553.1	525.4
2019	45,089	104,000	835.1	793.3
2020	53,014	111,100	954.0	906.3
Average	40,922	91,627	750.0	712.5

Source: Australian Horticulture Statistics Handbook and Almond Insights, various years. Tonnes is kernel weight equivalent.

Almonds are grown in the south of Australia, with the majority of production occurring along the Murray River. Key production areas include the North Adelaide Plains (South Australia), Riverland (South Australia), Sunraysia (Victoria) and the Riverina (NSW). Together these four areas account for 97% of production.

Australia's almond growing season commences with the almond blossom in July and August each year. Harvest takes place in February and March, with produce ready for the market in April and May. Newly planted almond trees take three years to bear a crop and seven years to reach mature production levels. Over 90% of almonds consumed in Australia are grown by Australian farmers. In 2020, the industry exported more than half of its total production.

Almond research and development (R&D) activity is guided by the Almond industry's Strategic Investment Plan (SIP). The activities are funded by levies payable on almonds produced in Australia; and the R&D levy funds are managed by Hort Innovation.

The current SIP has been developed with levy payers and addresses the Australian Almond industry's needs from 2017 to 2021. Strategies and priorities in the Plan have been driven by a set of five desired outcomes (Hort Innovation, 2017):

1. Pest and disease damage to almonds has been reduced through enhanced integrated pest management and integrated disease management.
2. A major productivity gain in almond pollination by 2022 through a 25% reduction in honey bee stocking rate with no loss in pollination efficiency (nut set).
3. Improvements in the crop production system have lifted average industry kernel yield from 3 to 4 t/ha, 4ML of irrigation water generates a tonne of almond kernel yield and proven 'shake and catch' harvesting / processing technology is in place.
4. Australian almonds are an informed industry that adopts R&D outcomes and has the capacity to support current and future industry needs.
5. Increased domestic almond consumption up from 16,000 t in 2016 to 27,500 t in 2022. Increased export sales up from 61,000 t in 2016 to 110,000 t in 2022.

The Almond Board of Australia (ABA) is the peak industry body. It provides a platform for members to collectively respond to industry-wide issues, invest in research and market development, share knowledge, and interact with the broader community. The ABA is custodian of the overarching industry strategic plan and is responsible for its delivery.

Rationale

For the decade prior to this project (AL16001), the ABA managed the Australian almond industry innovation and adoption program. Past projects have included AL07008, AL09021 and AL12000. This project dovetailed with contemporary industry projects:

- AL16000 Australian Almond Industry Communications Program.
- AL16003 Almond Industry Statistics and Data Collection 2017-2019.
- ST16000 Advanced Production Systems for Temperate Nut Crops.

AL16001 was also relevant to the Australian Almond Industry Conference and AL16701 Almond Study Tour.

As the industry grows, it is important to support growers, processors and researchers with knowledge and linkages and the ABA is well placed to meet this need. The ABA has strong working relationships with the Californian almond industry which produces 80% of the world's almonds. The ABA assists in accessing the Californian Almond Board's research and expertise. The ABA also coordinates Australian industry in-kind contributions to research, marketing, and other pertinent projects.

ABA industry subcommittees relevant to delivery of a successful innovation and adoption program are: Plant Improvement; Production; Pollination; Processing: Conference; and the Almond Centre of Excellence. These subcommittees are populated by 37 industry members who provide a strong support network for ABA staff, industry researchers and Hort Innovation. The ABA employs development staff to facilitate innovation and adoption including the Chief Executive Officer, an Industry Development (ID) Manager, a Senior ID Officer, and an ID Officer.

Project Details

Summary

Project Code: AL16001

Title: *Australian Almond Industry Innovation and Adoption Program*

Research Organisation: ABA

Project Leader: Ross Skinner

Period of Funding: February 2017 to March 2020

Objectives

The objective of the project was to contribute to the implementation of the industry strategic plan and facilitate the provision of information generated within the Hort Innovation almond research program and international research communities. The project was to draw on expertise within the Australian almond industry to establish best practice and enable better business decisions. The target audience for innovation and adoption activities was almond levy payers, industry stakeholders and value chain members.

Logical Framework

Table 2 provides a detailed description of the project in a logical framework.

Table 2: Logical Framework for Project AL16001

Activities	Formation of an industry reference group (IRG) to guide the innovation and adoption project: • IRG membership included representation from all production regions and major levy payers (Olam, Select, Bright Light Almonds, Lacton, Omega, Nutwood, NPA, Almondco). Information relevant to growers was sourced and communicated by project funded ID staff via: • Industry committees and events. • Government and employer forums. • Monitoring overseas communiques to recognise emerging issues. • Review of research reports. • Reporting updates from industry and overseas breeding programs. • Understanding developments in new technology. • Identification and reporting best on-farm practices. • Reporting trade requirements. • Providing synopsises of biosecurity, climate change and environmental issues. • Reporting changes in chemical regulation. • Understanding labour issues and government policy changes. Extension and training activities included: • 13 field days attracting a total of 487 participants. • Two R&D forums - 446 participants, and one Australian conference – 480 participants. • Four regional meetings in each of the growing regions – 301 participants. • Eight workshops with international guest speakers attended by 168 stakeholders. • Eleven ABA hosted domestic tours showcasing growing regions and processing facilities.

	• Three economic analyses of orchard hygiene, new varieties and irrigation scheduling tools • A decision support tool for internal benchmarking of new technology and best practice. • Three best practice management tools. • 29 "In a Nutshell" magazine editions. • 11 fact sheets "All About Almonds". • 12 best practice videos.
Outputs	Innovation and adoption outputs addressed: • Orchard hygiene to control pests and disease. • Maintaining healthy honey bee hives and pollination efficiency. • Developing nursery tree standards and maintaining disease tree planting material. • Evaluating new varieties and rootstocks. • Improving on-farm water use efficiency and soil health. • Food safety and quality. • Biosecurity. • Maintaining industry capacity.
Outcomes	The outcomes driven by the project included: • Growers better informed about research findings that lower production costs (e.g., pests/diseases, pollination, quality planting material, irrigation efficiency, biosecurity). • Growers with better supply conditions that deliver additional profitable sales (e.g., food safety, Maximum Residue Limits, up-to-date information on trade requirements).
Impacts (potential)	• Economic – lower costs of production for almond growers as a result of industry innovation and research adoption. • Economic – more profitable sales for almond growers with improved market conditions. • Capacity – ABA staff, almond growers, and the supply chain with additional skills in liaison, extension, innovation, and production. • Social – direct employment of 7.5 FTE persons in regional Australia. • Social - contribution to improved regional community wellbeing from spill-over benefits as a result of a sustainable, profitable almond industry.

Project Investment

Nominal Investment

Table 3 shows the annual investment made in Project AL16001 by Hort Innovation. There were no other investors in the project.

Table 3: Annual Investment in Project AL16001 (nominal $)

Year ended 30 June	HORT INNOVATION ($)	TOTAL ($)
2017	190,029	190,029
2018	362,766	362,766
2019	401,810	401,810
2020	239,876	239,876
Total	**1,194,481**	**1,194,481**

Source: AL16001 Executed Research Agreement

Program Management Costs

For the Hort Innovation investment the cost of managing the Hort Innovation funding was added to the Hort Innovation contribution for the project via a management cost multiplier (1.162). This multiplier was estimated based on the share of 'payments to suppliers and employees' in total Hort Innovation expenditure (3-year average) reported in the Hort Innovation's Statement of Cash Flows (Hort Innovation Annual Report, various years). This multiplier was then applied to the nominal investment by Hort Innovation shown in Table 3.

Real Investment and Extension Costs

For the purposes of the investment analysis, the investment costs of all parties were expressed in 2019/20 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2020). No additional extension costs were incurred.

Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project, based on the logical framework. Impacts have been categorised into economic, environmental, and social impacts.

Table 4: Triple Bottom Line Categories of Principal Impacts from Project AL16001

Economic	• Lower costs of production for almond growers as a result of industry innovation and research adoption. • More profitable sales for almond growers with improved market conditions.
Environmental	• Nil.
Social	• ABA staff, almond growers, and the supply chain with additional skills in liaison, extension, innovation, and production. • Direct employment of 7.5 FTE persons in regional Australia. • Contribution to improved regional community wellbeing from spill-over benefits as a result of a sustainable, profitable almond industry.

Public versus Private Impacts

The impacts identified from the investment are predominantly private impacts accruing to almond growers (lower costs of production and more profitable almond sales). However, public benefits have also been produced and these include the development of capacity (ABA staff, growers, and the supply chain), employment in regional areas and spill-overs to regional communities from a sustainable and profitable almond industry.

Distribution of Private Impacts

Private impacts will be distributed between tree nurseries, growers, processors, packers, wholesalers, exporters, and retailers depending on both short- and long-term supply and demand elasticities in the almond market.

Impacts on Other Australian Industries

Impacts on other industries may include benefits to beekeepers from a more efficiently managed almond pollination process and, over time, the transfer of capacity built through this project into other agricultural sectors.

Impacts Overseas

The exchange of research findings with the Californian almond industry will benefit growers in both Australia and California. A more innovative and efficient industry will deliver an additional supply of value for money Australian almonds to consumers in overseas markets.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project outcomes and related impacts will contribute to all Rural RD&E priorities especially Priority 1, as well as Science and Research Priorities 1 and 2.

Table 5: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	**Science and Research Priorities (est. 2015)**
1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D	1. Food 2. Soil and Water 3. Transport 4. Cybersecurity 5. Energy and Resources 6. Manufacturing 7. Environmental Change 8. Health

Sources: (DAWR, 2015) and (OCS, 2015)

Alignment with the Almond Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the almond industry are outlined in the Almond Industry's Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2017). Project AL16001 addressed all five desired outcomes especially outcome four ('Australian almonds are an informed industry that adopts R&D outcomes and has the capacity to support current and future industry needs').

[1] For further information, see: https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/

Valuation of Impacts

Impacts Valued

Analyses were undertaken for total benefits that included future expected benefits. A degree of conservatism was used when finalising assumptions, particularly when some uncertainty was involved. Sensitivity analyses were undertaken for those variables where there was greatest uncertainty or for those that were identified as key drivers of the investment criteria.

Two impacts were valued they were:

- Lower costs of production for almond growers as a result of industry innovation and research adoption.
- More profitable sales for almond growers with improved market conditions.

Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Those not valued included:

- ABA staff, almond growers, and the supply chain with additional skills in liaison, extension, innovation, and production.
- Direct employment of 7.5 FTE persons in regional Australia.
- Contribution to improved regional community wellbeing from spill-over benefits as a result of a sustainable, profitable almond industry.

These impacts were not valued due to lack of data to support credible assumptions.

Valuation of Impact 1: Lower costs of production with industry innovation and research adoption

One outcome of AL16001, the almond industry innovation and adoption project, was growers better informed about research findings that lower production costs e.g., reduction in the cost of pests/disease management, pollination efficiencies, access to and information on quality planting material, irrigation best practice, and biosecurity management.

Valuation of Impact 2: More profitable almond sales with improved market conditions

AL16001 also provided almond growers with better supply conditions that deliver additional profitable sales e.g., food safety, Maximum Residue Limits, and up-to-date information on trade requirements.

Attribution

Some of the cost savings and additional profitable sales described will be attributable to past liaison and extension projects i.e., AL07008, AL09021 and AL12000. Consequently, an attribution factor of 60% has been used in this analysis.

Counterfactual

In the absence of this project some liaison and extension would have been undertaken by other parties e.g., ABA, state DPIs, and other researchers as part of their engagement with the almond industry. The proportion of benefits estimated that would have been delivered without Project AL16001 is 70%.

Summary of Assumptions

A summary of the key assumptions is provided in Table 6.

Table 6: Summary of Assumptions for Impact Valuation

Variable	Assumption	Source/Comment
Impact 1: Lower costs of production with industry innovation and research adoption		
Average cost of production without AL16001.	$13,640/ha.	Adapted from Waycott, 2011.
Saving in cost of production due to AL16001.	1%.	A total saving of 2% is assumed by the analyst. However, 1% of this gain is attributable to the research rather than its adoption.
Impact 2: More profitable almond sales with improved market conditions		
Profit on almond production.	$11,360/ha.	Gross receipts of $25,000/ha (Australian Nut Industry Council, undated) less production costs of $13,640 (adapted from Waycott, 2011).
Increase in profit due to AL16001 facilitated improvements in market conditions.	0.5%.	Analyst assumption.
Assumptions common to valuation of both impacts		
Annual production of almonds.	40,922 ha.	See Table 1 above.
Proportion of production benefiting from AL16001.	80%.	Industry is dominated by corporate growers, processors and marketers who work closely with ABA and on AL16001 initiatives.
Year of first impact.	2020/21.	Benefits of liaison and extension are manifest on farm and in the market place one year after project completion.
Number of years to maximum impact is reached.	3 years.	Analyst assumption.
Number of years of maximum impact.	10 years.	Analyst assumption.
Number of years over which impact declines to zero.	3 years.	Analyst assumption.
Probability of the project generating useful outputs that reduce almond cost of production and deliver more profitable sales.	100%	Analyst assumption – outputs have been communicated to growers.
Probability of valuable outcomes.	75%	There is some, relatively minor risk that AL16001 outputs do not translate into outcomes.
Probability of impact (assuming successful outcome)	75%	Analyst assumption – there is some probability that growers will not successfully implement recommendations.

Results

All costs and benefits were discounted to 2019/20 using a discount rate of 5%. A reinvestment rate of 5% was used for estimating the Modified Internal Rate of Return (MIRR). The base analysis used the best available estimates for each variable, notwithstanding a level of uncertainty for many of the estimates. All analyses ran for the length of the project investment period plus 30 years from the last year of investment (2019/20) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

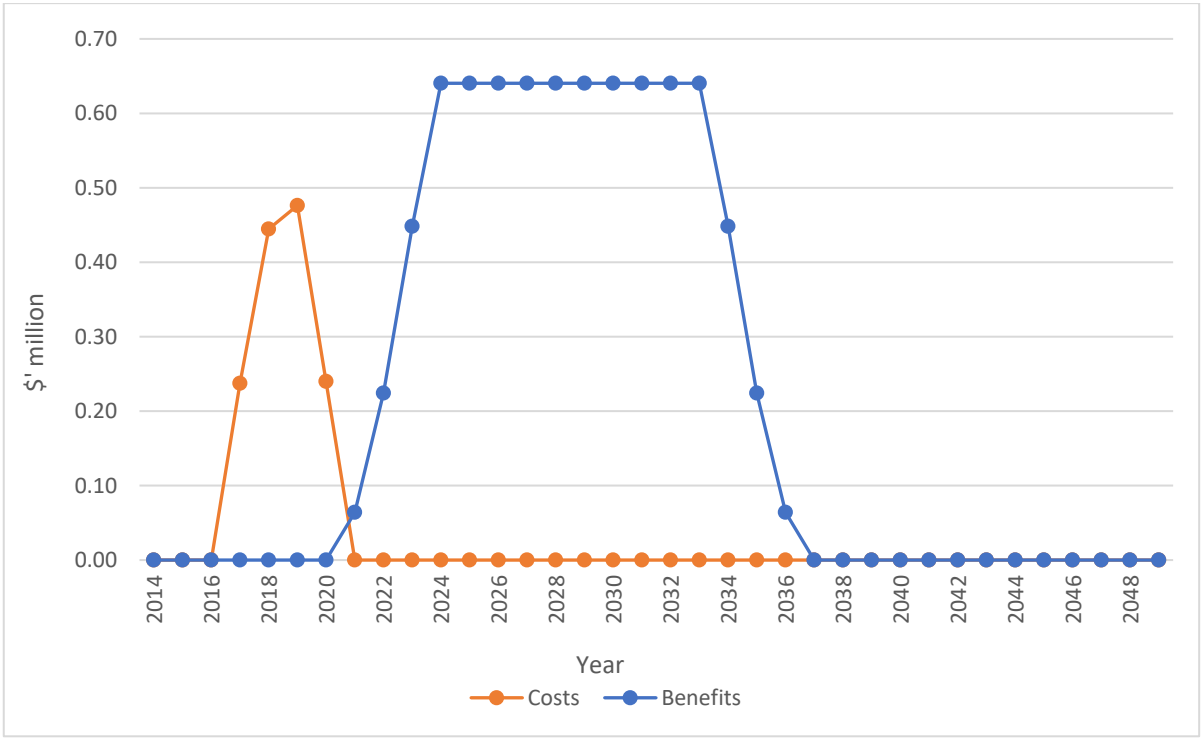
Table 7 shows the investment criteria estimated for different periods of benefits for the total investment. Hort Innovation was the only investor in the project.

Table 7: Investment Criteria for Total/Hort Innovation Investment in Project AL16001

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits ($m)	0.00	1.68	3.85	5.26	5.29	5.29	5.29
Present Value of Costs ($m)	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Net Present Value ($m)	-1.50	0.18	2.35	3.75	3.78	3.78	3.78
Benefit-Cost Ratio	0.00	1.12	2.56	3.49	3.51	3.51	3.51
Internal Rate of Return (%)	negative	7.2	19.5	21.7	21.7	21.7	21.7
MIRR (%)	negative	6.3	12.3	12.1	10.6	9.6	9.0

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the AL16004 investment plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Investment Costs



Source of Benefits

Estimates of the relative contribution of each benefit valued, given the assumptions made, are shown in Table 8.

Table 8: Contribution to Total Benefits from Each Source

Impact Valued	Contribution to PVB ($m)	Share of Benefits (%)
Lower costs of production for almond growers as a result of industry innovation and research adoption	3.73	70.6
More profitable sales for almond growers with improved market conditions	1.55	29.4
Total	5.29	100.0

Sensitivity Analyses

A sensitivity analysis was carried out on the discount rate. The analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year of investment. All other parameters were held at their base values. Table 9 presents the results. The results are moderately sensitive to the discount rate.

Table 9: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits ($m)	7.88	5.29	3.72
Present Value of Costs ($m)	1.40	1.50	1.62
Net Present Value ($m)	6.48	3.78	2.10
Benefit-cost ratio	5.63	3.51	2.30

A sensitivity analysis was then undertaken on the reduction in the cost of almond production attributable to AL16001. Results are provided in Table 10. Even when cost reduction is 0.5%, and given all other assumptions remaining unchanged, the project continues to show a favourable return on investment.

Table 10: Sensitivity to Reduction in Cost of Almond Production Attributable to AL16001
(Total investment, 30 years)

Investment Criteria	Reduction in Cost of Almond Production		
	0.5%	1% (base)	1.5%
Present Value of Benefits ($m)	3.42	5.29	7.15
Present Value of Costs ($m)	1.50	1.50	1.50
Net Present Value ($m)	1.92	3.78	5.65
Benefit-cost ratio	2.27	3.51	4.75

A final sensitivity analysis tested the sensitivity of the investment criteria to the increase in almond growing profit attributable to AL16001. The results (Table 11) show that even if the assumed increase in profit is halved to 0.25%, project benefits continue to exceed project costs.

Table 11: Sensitivity to Increase in Almond Growing Profit Attributable to AL16001
(Total investment, 30 years)

Investment Criteria	Increase in Almond Growing Profit		
	0.25%	0.5% (base)	1%
Present Value of Benefits ($m)	4.51	5.29	6.84
Present Value of Costs ($m)	1.50	1.50	1.50
Net Present Value ($m)	3.00	3.78	5.34
Benefit-cost ratio	3.00	3.51	4.55

Confidence Rating

The results produced are highly dependent on the assumptions made, some 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 12). 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 uncertainties in assumptions made
Low:	denotes a poor coverage of benefits or many uncertainties in assumptions made

Table 12: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
Medium-High	Low

Coverage of benefits valued was assessed as Medium-High – while two key economic impacts were valued, three social impacts were not valued. Confidence in assumptions was rated as Low, there is limited supporting evidence and assumptions have been made by the analyst.

Conclusion

The investment in AL16001 has resulted in growers and other industry stakeholders being encouraged to innovate and adopt research outputs. The result of this liaison and extension effort is the uptake of research findings that will lower the cost of almond production, deliver improved supply conditions and more profitable almond sales.

Total funding from all sources for the project was $1.5 million (present value terms). The investment produced estimated total expected benefits of $5.29 million (present value terms). This gave a net present value of $3.78 million, an estimated benefit-cost ratio of 3.51 to 1, an internal rate of return of 21.7% and a modified internal rate of return of 9%.

As three of the identified impacts were not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment.

Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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Ross Skinner, CEO, ABA

Abbreviations

ABA	Almond Board of Australia
CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GVP	Gross Value of Production
ID	Industry Development
IRG	Industry Reference Group
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
OCS	Office of Chief Scientist Queensland
PVB	Present Value of Benefits
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan