Industry-specific impact assessment program: mushroom

Impact assessment report for project *Mushroom industry communication plan* (MU08010)

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Contents

Tables

Figures

Executive Summary

What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *MU08010: Mushroom industry communication plan.* The project was funded by Hort Innovation over the period May 2009 to August 2013.

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 2017/18 dollar terms and were discounted to the year 2018/19 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

The investment has facilitated the flow of up-to-date research findings to industry and consumers. Consequently MU08010 is likely to contribute to lower mushroom production costs and increased mushroom sales. Positive social impacts are also anticipated. These will include improved health outcomes as a result of increased mushroom consumption and additional industry and service provider IT capacity.

Investment Criteria

Total funding from all sources for the project was $1.03 million (present value terms). All project funding was provided by Hort Innovation. The investment produced estimated total expected benefits of $1.37 million (present value terms). This gave a net present value of $0.34 million, an estimated benefit-cost ratio of 1.3 to 1, an internal rate of return of 247% and a MIRR of 19%.

Conclusions

One economic benefit (a more favourable government policy environment) and a number of social impacts were not valued. When inability to value all impacts is combined with conservative assumptions for the principal economic impacts valued, it is reasonable to conclude that the valuation may be an underestimate of the actual performance of the investment.

Keywords

Impact assessment, cost-benefit analysis, MU08010, mushroom, industry, communication, plan, websites, research adoption.

Introduction

All research and development (R&D) and marketing levy investments undertaken by Horticulture Innovation Australia Limited (Hort Innovation) are guided and aligned to specific investment outcomes, defined through a Strategic Investment Plan (SIP). The SIP guides investment of the levy to achieve each industry's vision. The current industry SIPs apply for the financial years 2016/17 – 2020/21.

In accordance with the Organisational Evaluation Framework, Hort innovation has the obligation to evaluate the performance of its investment undertaken on behalf of industry.

This impact assessment program addresses this requirement through conducting a series of industry-specific ex-post independent impact assessments of the apple & pear (AP), avocado (AV), mushroom (MU) and table grape (TG) RD&E investment funds.

Twenty-seven RD&E investments (projects) were selected through a stratified, random sampling process. The industry samples were as follows:

- Nine AP projects were chosen worth $15.46 million (nominal Hort Innovation investment) from an overall population of 19 projects worth an estimated $33.31 million,
- Seven AV projects worth $1.91 million (nominal Hort Innovation investment) from an overall population of 27 projects worth approximately $9.97 million,
- Five MU projects worth $1.75 million (nominal Hort Innovation investment) from a total population of 20 projects worth $7.94 million, and
- Six TG projects worth $2.84 million (nominal Hort Innovation investment) from an overall population of 11 projects worth $5.0 million.

The project population for each industry included projects where a final deliverable had been submitted in the five-year period from 1 July 2013 to 30 June 2018.

The projects for each industry sample were chosen such that the investments represented (1) at least 10% of the total Hort Innovation RD&E investment expenditure for each industry, and (2) the SIP outcomes (proportionally) for each industry.

Project MU08010: *Mushroom industry communication plan* was randomly selected as one of the 22 unique MT18009 investments 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

In 2017/18, the Australian mushroom industry consisted of approximately 44 growers producing 70,463 tonnes of mainly white button mushroom (*Agaricus bisporus*) with a farm-gate value of $456.6 million. Mushrooms are grown close to population centres, especially Adelaide, Melbourne Metro and the Sydney Basin. Most production is destined for the fresh domestic market and a proportion of the crop is sliced (processed) and sold fresh in a value-added form. Mushrooms are produced year-round and grown under cover in controlled environments.

The Australian Mushroom Growers Association (AMGA) Limited was formed in 1961 and has been instrumental in developing the market for fresh Australian mushrooms and delivering research, development and extension (RD&E) projects. The AMGA has members who are growers, wholesalers and farm input suppliers.

The mushroom industry levy is only applied to Agaricus mushrooms. It is calculated on a dollar per kilogram of mushroom spawn. The total mushroom statutory levy (marketing and R&D) collected from growers averages approximately $4.8 million per year. The industry invests approximately 80% of the mushroom levy into marketing activities. The remaining 20% is invested into RD&E and attracts contributions from the Australian Government. Communication projects are a high priority for RD&E spend – the industry is relatively small and relies on shared technical information and advice, some of which is sourced overseas.

Rationale

MU08010, the Mushroom Industry Communication Plan, was developed as part of the ongoing process of communication with a range of audiences associated with the mushroom industry. The project was to centre on the development of effective web-based communications infrastructure designed to keep industry, consumers and government informed on the outcomes of industry investments. While information was disseminated through a wide number of communication channels, such as electronic newsletters, direct mail and the AMGA Journal, the website activities were to provide a strong focus and a centralised point for much of this information.

Project Details

Summary

Project Code: MU08010

Title: *Mushroom industry communication plan*

Research Organisation: AMGA

Principal Investigator: Greg Seymour

Period of Funding: May 2009 to August 2013

Objectives

The objective of this project was to deliver a structured approach to the Australian mushroom industry's communication activities with particular reference to the development of effective web-based infrastructure. Effective websites were required to keep industry, consumers and government informed on the outcomes of industry investments.

Logical Framework

Table 1 provides a description of MU08010 in a logical framework.

Table 1: Logical Framework for Project MU08010

Activities and Outputs	Activities: • Preparation and submission to Horticulture Australia Limited (HAL, now Hort Innovation) of a communication project workplan. • Analysis of channels used to communicate the outcomes of industry investment. • Daily monitoring, maintenance and redesign of relevant industry websites including www.mushrooms.net.au (public website), www.emushrooms.org (for Agora – industry technical information) and www.mushroomlevy.com.au (for levy payers). • Public website development included: review and clarify website objectives, convene a website scoping meeting to review current content and identify missing information, prepare new site map, redesign new website, seek feedback from stakeholders, relaunch website and update website on a regular basis. • Agora website (technical information including mushroom pests and diseases) development included: identify content for website including advice from growers, scientists and government agencies and complete routine site upgrade. • Levy payers website development included: survey of AMGA members to determine what they would like to see on the levy payers website, benchmark mushroom levy payer website content and format against other levy payer websites, prepare site map and circulate to AMGA Board members for comment, prepare a new site map, redesign website, seek feedback from members and launch the new website. • Review current policy of separate topic URLs. As a result individual sites such as 'Mushrooms for Life' have now been incorporated back into a single consumer-based site. Change allows easier update and consumers can easily explore a range of topics. • Website related contract management – management of outsourced functions including website designers, hosting providers and network maintenance personnel. Capacity to easily update content in-house at AMGA retained. • Migration of websites to a new server and service provider to enhance communication capability and reduce communication costs. • Provision of comprehensive information on proposed changes to the mushroom levy on the levy payers' website. Levy increase subsequently achieve for industry. • Tailoring of R&D information to suit various audiences. For example, information on the health properties of mushrooms on the levy payers' site focussed on assessment of benefits to the mushroom growing business. On the consumer site, information targeted health benefits for consumers. • Contracting of Cardinal Horticultural Services (Tony Biggs) to edit and provide a technical review of R&D milestone reports and final reports prior to HAL submission. • Presentation of R&D progress and final reports at the industry annual conference. • Posting of final report summaries onto appropriate industry websites. • Provision of material for the Annual Mushroom Industry Report to levy payers. • Completion of mushroom industry surveys that indicate a high level of satisfaction with website content, functionality, accessibility and reliability. Outputs: • Reliable electronic communications in place providing up-to-date information to industry stakeholders (industry, consumers and government).
Outcomes	• Industry better informed about research findings that lower production costs. • Consumers understand health benefits and make additional mushroom purchases. • Government develops and maintains policies that are advantageous to industry.
Impacts	• Lower costs of production for mushroom growers as a result of research adoption. • Additional profitable sales for mushroom growers with additional awareness of health benefits communicated through industry websites. • Increased health outcomes for the Australian population associated with additional mushroom purchases. • Increased industry capacity and increased service provider IT capacity. • Increased income in mushroom growing areas associated with a more profitable industry with lower production costs and additional sales (spillover impact).

Project Investment

Nominal Investment

Table 2 shows the annual investment (cash and in-kind) in project MU08010 by Hort Innovation. There were no 'other' investors in this project.

Table 2: Annual Investment in the Project MU08010 (nominal $)

Year ended 30 June	Hort Innovation ($)	Other ($)	Total ($)
2009	88,000	0	88,000
2010	110,000	0	110,000
2011	117,970	0	117,970
2012	115,000	0	115,000
2013	110,000	0	110,000
2014	5,964	0	5,964
Totals	**546,934**	**0**	**546,934**

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 2.

Real Investment and Extension Costs

For the purposes of the investment analysis, investment costs of all parties were expressed in 2017/18 dollar terms using the GDP deflator index. There were no additional costs associated with project extension. Every element of the project was focussed on technology transfer.

Impacts

Table 3 provides a summary of the principal types of impacts delivered by the project. Impacts have been categorised into economic, environmental and social impacts.

Table 3: Triple Bottom Line Categories of Principal Impacts from Project MU08010

Economic	• Lower costs of production for mushroom growers as a result of research adoption. • Additional profitable sales for mushroom growers with additional consumer awareness of health benefits communicated through industry websites.
Environmental	• Nil.
Social	• Increased health outcomes for the Australian population associated with increased mushroom consumption. • Increased industry capacity and increased service provider IT capacity. • Increased income in mushroom growing areas associated with lower production costs and additional sales (spillover impact).

Public versus Private Impacts

Impacts identified in this evaluation are both public and private in nature. Private benefits will be realised by mushroom growers with lower costs of production and additional profitable sales. Public benefits will include increased health outcomes (additional mushroom purchase and consumption), capacity (industry and IT service provider) as well as increased income in mushroom growing areas associated with a more profitable industry.

Distribution of Private Impacts

The impacts on the mushroom industry from investment in this project will be shared along the supply chain with input suppliers, growers, processors, transporters, wholesalers, retailers and consumers all sharing impacts produced by the project. The share of total impacts retained by each link in the supply chain will be dependent on a combination of both short and long term supply and demand elasticities.

Impacts on Other Australian Industries

Impacts on industries other than the mushroom industry may include potential gains in other industries via any future spillovers from the increase in IT capacity.

Impacts Overseas

No impacts overseas identified.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 4. The project findings and related impacts will contribute to Rural RD&E priority 4 and to Science and Research Priorities 1 and 8.

Table 4: 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 Mushroom Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the mushroom industry are outlined in the Mushroom Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2016). Project MU08010 addressed SIP Outcome 2, Strategy 2.3.

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 of the project were valued. The first impact was lower costs of production for mushroom growers. The second impact was additional profitable sales for mushroom growers.

Impacts Not Valued

Not all of the impacts identified in Table 3 could be valued in the assessment. Social impacts were hard to value

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

due to lack of evidence/data, difficulty in quantifying the causal relationship and pathway between MU08010 and the impact and the complexity of assigning monetary values to the impact.

The social impacts identified but not valued were:

- Increased health outcomes for the Australian population (additional mushroom consumption).
- Increased industry capacity and increased service provider IT capacity.
- Increased income in mushroom growing areas associated with a more profitable industry (spillover impact).

Valuation of Impact 1: Lower Costs of Production for Mushroom Growers

MU08010, the mushroom industry communication plan, provided packaged information on the outcomes from research and development projects in a grower friendly format via the www.mushrooms.net.au website. Ready availability of this information is expected to contribute to increased adoption of a range of best practices by mushroom growers. Communication of R&D outcomes via the revamped website included reporting on historic R&D projects as well as a small number or recent projects. Recent projects successfully communicated via the website included MU13014 (Industry risk management systems and capacity), MU16001 (Mushroom industry crisis management review), MU16002 (Mushroom minor use permits 2017-18) and MU16005 (Food safety for the Australian mushroom industry). Each project will have a range of impacts e.g. improved crisis management will reduce the cost to growers of a food safety event while minor use permits will decrease the cost of pest and disease control.

The average cost of production (including packing, marketing and transport) of Australian mushrooms was estimated from IBIS World data (IBIS World, 2018) at $5.06/kg and this is broadly consistent with the Chudleigh (2011) estimate of $4.34/kg when adjusted for CPI to $5.00/kg. It is assumed that website communication of research findings will, on average, decrease this cost of production by 0.5% or $0.025/kg.

This cost reduction is assumed to apply to 16.6% of average annual mushroom production (70,463 tonnes – Hort Innovation, 2018). This is the equivalent of one large grower adopting research outcomes. Three large Australian mushroom growers produce approximately 50% of total output while the remaining 41 growers produce the balance of Australia's mushrooms (Mushroom Industry SIP 2017-2021).

Attribution

A 30% attribution factor has been assumed for MU08010's contribution to lower costs of production – a website requiring upgrade was already in place and the industry has other extension/communication channels available to it (e.g. direct communication between researchers and growers).

Counterfactual

It is assumed that in the absence of Hort Innovation investment in MU08010, AMGA websites would not have been upgraded.

Valuation of Impact 2: Additional Profitable Sales for Mushroom Growers

The MU08010 investment resulted in improved access by current and potential mushroom consumers to information on the health benefits of mushrooms via www.mushrooms.net.au. As a result of this additional information it is likely that there will be an increase in consumption and additional profitable sales for mushroom growers.

Upon commencement of MU08010 in 2009, per capita mushroom consumption stood at 2.7 kg per capita (AMGA – 2010/11 statistics). By 2018 when the project was complete and the website www.mushrooms.net.au was in use, consumption had increased to 2.9 kg per capita (Hort Innovation, 2018).

Attribution

Improved community understanding of the health benefits of consuming mushrooms during the period 2009 to 2018 was realised as a result of a package of industry and government supported R&D, industry marketing and general health trends apparent in the Australian community. It is estimated that 5% of the increase in consumption 2009 to 2018 was attributable to an improved www.mushrooms.net.au website funded as part of MU08010.

Counterfactual

It is assumed that in the absence of Hort Innovation investment in MU08010, AMGA websites would not have been upgraded.

Summary of Assumptions

A summary of the key assumptions made for valuation of the impacts is shown in Table 5.

Table 5: Summary of Assumptions

Variable	Assumption	Source/Comment
Impact 1: Lower Costs of Production for Mushroom Growers		
Average cost of production without MU08010.	$5.06/kg	Estimated from IBIS World 2018 and cross checked with Chudleigh 2011.
Saving in cost of production due to MU08010.	0.5%	A total saving of 2% is assumed by the analyst. However 1.5% of this gain is attributable to the research rather than its communication via a revamped website.
Total annual production of mushrooms.	70,463 tonnes	Hort Innovation, 2018
Proportion of production achieving cost reduction.	16.6%	Equivalent of one large grower adopting research outcomes. Three large Australian mushroom growers produce approximately 50% of total output and there are approximately 44 mushroom growers (Mushroom Industry SIP 2017-2021).
Year of first impact.	2016/17	Three years after MU08010 completed and website upgrades are in place. Lag in impact due to the need to allow for time for implementation of changes on farm.
Number of years to maximum impact is reached.	10 years	Analyst assumption.
Number of years of maximum impact.	5 years	Analyst assumption.
Number of years over which impact declines to zero.	10 years	Analyst assumption.
Attribution of impacts to MU08010.	30%	See above text.
Probability of achieving cost reduction.	50%	Analyst assumption.
Impact 2: Additional Profitable Sales for Mushroom Growers		
Mushroom consumption in 2018.	2.9kg per capita	Hort Innovation, 2018.
Mushroom consumption prior to MU08010 commencement in 2009.	2.7 kg per capita	AMGA – 2010/11 statistics.
Increase in mushroom consumption.	4,600 tonne/year	Increase in mushroom consumption 2009 to 2018 of 0.2kg per capita multiplied by an average Australian population over that time period of 23 million.
Attribution of increased consumption to MU08010.	5%	Analyst assumption.
Year of first impact.	2013/14	Project complete and the website www.mushrooms.net.au was in use by end of project in August 2013.
Year in last impact.	2028/29	Fifteen years after first year of impact when other influences determine mushroom per capita consumption.

Results

All costs and benefits were discounted to 2018/19 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 (2013/14) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

Tables 6 shows the investment criteria estimated for different periods of benefit for the total investment. Hort Innovation was the only contributor to this project so there is no second set of analyses showing results for Hort Innovation.

Table 6: Investment Criteria for Total Investment in Project MU08010

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits ($m)	0.01	0.37	0.95	1.25	1.34	1.37	1.37
Present Value of Costs ($m)	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Net Present Value ($m)	-1.02	-0.65	-0.08	0.22	0.33	0.34	0.34
Benefit-Cost Ratio	0.01	0.36	0.92	1.21	1.31	1.33	1.33
Internal Rate of Return (%)	negative	negative	246.7	246.7	246.7	246.7	246.7
MIRR (%)	negative	negative	57.9	36.9	27.2	21.9	18.6

The annual undiscounted benefit and cost cash flows for the total investment for the duration of MU08010 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

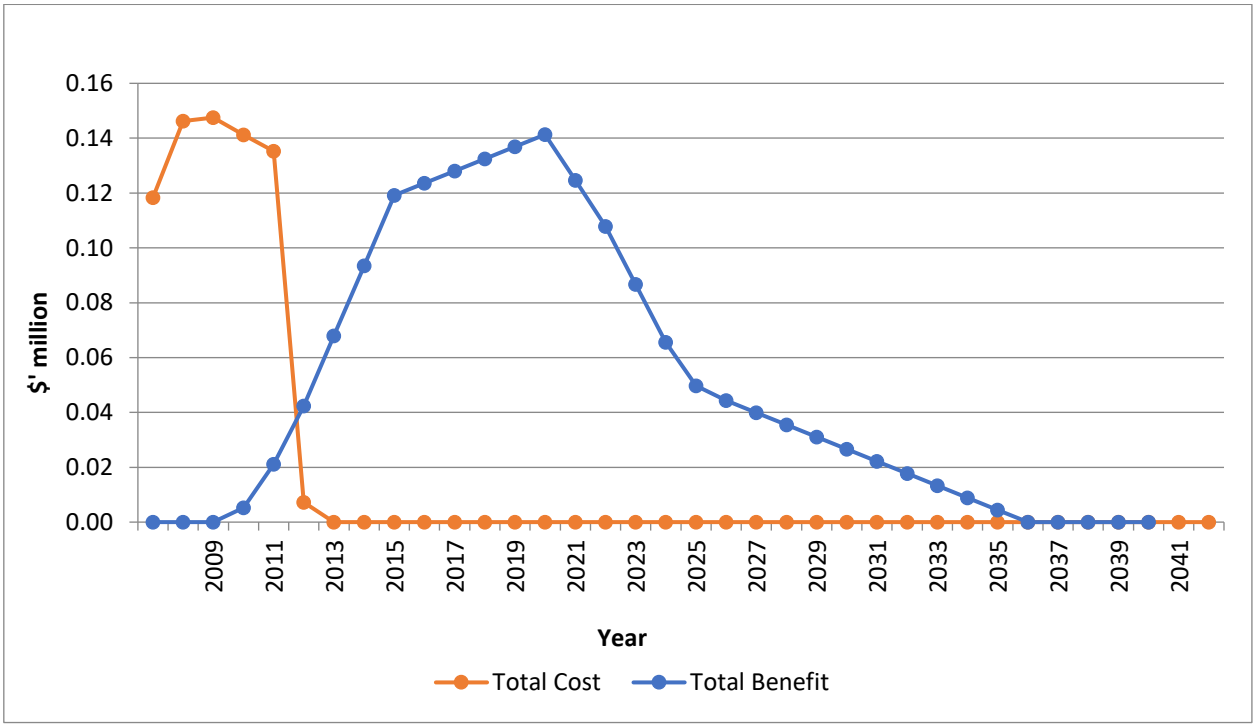

Table 7 shows the contribution of each impact to the total PVB.

Table 7: Contribution of Benefits

Impact	PVB ($M)	% of Total PVB
Impact 1: lower costs of production for mushroom growers	0.41	30.1%
Impact 2: additional profitable sales for mushroom growers	0.96	69.9%
Total	1.37	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 8 present the results. The results are sensitive to the discount rate and at the higher discount rate of 10% project costs exceed project benefits.

Table 8: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5%	10%
Present Value of Benefits ($m)	1.69	1.37	1.18
Present Value of Costs ($m)	0.70	1.03	1.49
Net Present Value ($m)	0.99	0.34	-0.32
Benefit-cost ratio	2.43	1.33	0.79

A sensitivity analysis was then undertaken for the assumed proportion of mushroom production achieving a cost reduction. Even with a halving of the assumed proportion of production achieving a cost reduction, the project produces a positive return on investment – Table 9.

Table 9: Sensitivity to Share of Mushroom Production Achieving Cost Reduction
(Total investment, 30 years)

Investment Criteria	Proportion of Mushroom Production Achieving Cost Reduction		
	8.4%	16.6% (base)	33.2%
Present Value of Benefits ($m)	1.16	1.37	1.78
Present Value of Costs ($m)	1.03	1.03	1.03
Net Present Value ($m)	0.13	0.34	0.75
Benefit-cost ratio	1.13	1.33	1.74

A final sensitivity test examined the assumed increase in mushroom sales attributable to MU08010. Halving the assumed increase in mushroom sales attributable to MU08010, results in project costs exceeding project benefits – Table 10.

Table 10: Sensitivity to Increase in Mushroom Sales Attributable to MU08010
(Total investment, 30 years)

Investment Criteria	Increase in Mushroom Sales Attributable to MU08010		
	2.5%	5% (base)	10%
Present Value of Benefits ($m)	0.89	1.37	2.33
Present Value of Costs ($m)	1.03	1.03	1.03
Net Present Value ($m)	-0.14	0.34	1.30
Benefit-cost ratio	0.87	1.33	2.27

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 11). 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 11: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
Medium-high	Medium-low

Coverage of benefits was assessed as medium-high. The main benefits of the research project were lower costs of production and additional profitable sales, and these were quantified.

Confidence in assumptions was rated as medium-low. Data were mostly drawn from Hort Innovation and AMGA sources. However, percentage based estimates were required and these data were estimates.

Conclusion

The investment has facilitated the flow of up-to-date research findings to industry, consumers and government. Consequently MU08010 is likely to contribute to lower mushroom production costs and increased mushroom sales. Positive social impacts are also anticipated. These will include improved health outcomes as a result of increased mushroom consumption and additional industry and service provider IT capacity.

Three social impacts were not valued. When inability to value all impacts is combined with conservative assumptions for the principal economic impacts valued, it is reasonable to conclude that the valuation may be an underestimate 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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Abbreviations

AMGA	Australian Mushroom Growers Association Limited
CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
GDP	Gross Domestic Product
GVP	Gross Value of Production
HAL	Horticulture Australia Limited
IRR	Internal Rate of Return
IT	Information Technology
MIRR	Modified Internal Rate of Return
OCS	Office of Chief Scientist Queensland
PVB	Present Value of Benefits
R&D	Research and Development
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan