Hort Innovation

Final Report

Fund Impact Assessment 2020/21 for cherry, vegetables and small tropicals: Evaluation of CY16004

Project leader:

George Revell

Delivery partner:

Ag Econ

Project code:

MT21013

Project:

Fund Impact Assessment 2020/21 for cherry, vegetables and small tropicals (MT21013)

Disclaimer:

Funding statement:

This project has been funded by Hort Innovation, using research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Publishing details:

Published and distributed by: Hort Innovation

Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

Contents

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 *CY16004 Export Readiness and Market Access*. The project was funded by Hort Innovation over the period May 2017 to June 2019.

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 2021-22 dollar terms and were discounted to the year 2021-22 using a real (inflation-adjusted), risk free, pre-tax discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Key findings

CY16004 increased cherry growers' knowledge, skills and available resources relating to export readiness and market access. As a result, CY16004 resulted in an increased level of export volumes into seven lucrative Asian protocol markets through increased grower and packhouse registration, supported by improved adherence to maximum residue limits (MRLs) and lower registration costs.

The impacts valued were:

- [Economic] Increase in Australian cherry exports achieving price premiums by satisfying high value protocol export market requirements.

Not all of the identified impacts could be valued in the assessment, particularly where there was a lack of credible data. These additional economic and social impacts have the potential to provide additional industry impact above what has been identified.

Investment criteria

Total funding from all sources for the project was $1.59 million (2022 equivalent value). The investment produced estimated total expected benefits of $5.53 million (2022 equivalent value). This gave a net present value of $3.94 million, an estimated benefit-cost ratio of 3.48 to 1. The IRR and MIRR could not be calculated as there were no years of net negative cashflows.

Conclusions

The results reflect the benefit of increased industry capability regarding export registration processes for accessing protocol markets. This outcome was assessed to result in an increased level of export volumes to protocol markets where a price premium is achieved, relative to non-protocol or domestic markets where this volume would have otherwise been supplied in the absence of CY16004. The price premium secured through this new export trade has been assessed to result in a private economic benefit for cherry growers and the export supply chain, with additional (unquantified) public benefits for cherry growing communities stimulated by increased prosperity of cherry growers.

The share of export volumes to protocol markets increased over the three seasons that CY16004 was active, rising from 28% in 2016-17 to 52% in 2018-19, while the combined number of registered packhouses and growers increased from 55 in 2016-17 to 63 in 2018-19. This serves to highlight the extent by which the capacity building processes delivered through CY16004 supported more growers and packhouses to achieve export registration, resulting in the higher share of export volumes to protocol markets.

Sensitivity testing was undertaken to account for uncertainty in some of the variables. Sensitivity testing was conducted that showed a BCR ranging from 1.74 to 5.22. The results were particularly sensitive to the extent that the outcome of increased protocol market exports could be attributed to CY16004 rather than other external stakeholders or factors.

Keywords

Impact assessment, cost-benefit analysis, cherry, export, trade, biosecurity, protocol, market access

Introduction

Evaluating the impacts of levy investments is important to demonstrate to levy payers, Government and other industry stakeholders the economic, social and environmental outcomes of investment for industry, as well as being an important step to inform the ongoing investment agenda.

The importance of ex-post evaluation was recognised through the Horticulture Innovation Australia Limited (Hort Innovation) independent review of performance completed in 2017, and was incorporated into the Organisational Evaluation Framework.

Reflecting its commitment to continuous improvement in the delivery of levy funded research, development and extension (RD&E), Hort Innovation required a series of impact assessments to be carried out on a representative sample of investments across a cohort of Funds in its RD&E portfolio. The assessments were required to meet the following Hort Innovation evaluation reporting requirements:

- Reporting against the Hort Innovation's Strategic Plan and the Evaluation Framework associated with Hort Innovation's Statutory Funding Agreement with the Commonwealth Government.
- Reporting against strategic priorities set out in the Strategic Investment Plan for each Hort Innovation industry fund.
- Annual Reporting to Hort Innovation stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

As part of its commitment to meeting these reporting requirements, Ag Econ was commissioned to deliver the *Fund Impact assessment 2020/21: Cherry, Sweetpotato, Vegetables, Small Tropicals (MT21013)*. This program consisted of a once-off impact assessment series of randomly selected Hort Innovation RD&E investments (projects) within each of the nominated Funds.

Project *CY16004 Export Readiness and Market Access* was randomly selected as one of the 3 investments in the 2020-21 sample for the Cherry Fund. This report presents the analysis and findings of the project impact assessment.

General method

The 2020-21 population for the Cherry Fund was defined as an RD&E investment where a final deliverable had been submitted in the five year period from 1 July 2016 to 30 June 2021. This generated an initial population of 61 Hort Innovation investments, worth an estimated $3.9 million (nominal Hort Innovation investment). Projects in the Frontiers Fund, those of less than $80,000 Hort Innovation investment, multi industry projects where the Cherry Fund was less than 50% of total Hort Innovation investment, enabler projects that didn't directly support a 2017-2021 Cherry Strategic Investment Plan (SIP) Outcomes, and projects that have had a previous impact assessment completed were removed from the sample. A total of 7 projects with a combined value of $2.44 million satisfied these criteria and formed the eligible population. The eligible population was then stratified according to the 2017-2021 Cherry SIP outcomes and three project value clusters ($80,000-$180,000; $180,000-$280,000; $280,000-$850,000), based on the distribution of projects by value within the eligible population. A random sample of 3 projects was selected worth a total of $1.35 million (nominal Hort Innovation investment), equal to 55% of the eligible RD&E population (in nominal terms).

The impact assessment followed 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 included both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved reviewing project contracts, milestones, and other documents; interviewing relevant Hort Innovation staff, project delivery partners, growers and other industry stakeholders where appropriate (see *Acknowledgements)*; and collating additional industry and economic data where necessary. Through this process, the project activities, outputs, outcomes, and impacts were identified and briefly described; and the principal economic, environmental, and social impacts were summarised in a triple bottom line framework.

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. As not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background and rationale

Industry background

The Australian cherry industry included approximately 346 growing businesses in 2020-21 (Hort Innovation 2022a). The cherry industry recorded a five year average production of 16,321 tonnes (to year ending June 2021) increasing by a trend average 11% per year, although annual volumes have varied through these years due to seasonal weather impacts (Hort Innovation 2022). The industry recorded a nominal production value of $231 million in 2020-21 which had increased at a trend average 16% per year from 2016-17 (Hort Innovation 2022b). In 2020-21, New South Wales, Victoria and Tasmania accounted for approximately 81% of cherry production. Approximately 62% of production went to the domestic fresh market, 30% to exports, and 8% to processing (Hort Innovation 2022b).

Cherry growers pay levies to the Department of Agriculture, Fisheries and Forestry (DAFF), which is responsible for the collection, administration and disbursement of levies and charges on behalf of Australian agricultural industries. Levy is payable on cherries that are produced in Australia and either sold by the producer or used by the producer in the production of other goods. Hort Innovation manages the cherry levy funds which are collected for both R&D and marketing purposes.

Rationale

Growing export markets has been a consistent priority for the cherry industry, driven by potential high returns, expanding production volume and changes to market access protocols. The cherry industry had invested in several legacy projects that collectively supported export development and capability. The most recent iteration of investment, *Export development for Australian cherries* (CY12007) was delivered from 2013 to 2016 and supported cherry industry participants to identify and align practices to capitalise on export opportunities. The project provided capability building activities including grower export registration training, input into export protocol development, maintained a Cherry Export Manual and supported market access initiatives. A Cherry Industry Export Plan and Biosecurity Management Program were also delivered, consolidating much of the knowledge gathered through previous projects and served as an important foundation to support ongoing development and capability building initiatives through CY16004.

Based on the ongoing importance of growing cherry export volumes identified through the 2017-2021 Cherry SIP (Hort Innovation 2022), project CY16004 was intended to continue to developing an export culture in the cherry industry. The overall objective of CY16004 was to support the export readiness of the Australian cherry industry by equipping growers with skills and resources to capitalize on evolving market access opportunities.

Alignment with the Cherry Strategic Investment Plan 2017-2021

With a focus on developing an export culture in the cherry industry, CY16004 was closely aligned with the Cherry SIP Outcome 2: Grow export markets to leverage the forecast increase in production over the next five years. This outcome was supported by several strategies including “Gain industry agreement on the workable market access protocols into priority markets and complete required business cases (airfreight protocols is a priority)”; “Build export readiness and capability”; and “Introduce electronic export registration system”.

Alignment with national priorities

The Australian Government’s National RD&E priorities (2015a) and Science and Research Priorities (2015b) are reproduced in Table 1. The CY16004 project outcomes and related impacts will contribute to RD&E Priority 4, and to Science and Research Priority 1.

Table 1. National Agricultural Innovation Priorities and Science and Research Priorities

Australian Government	
National RD&E Priorities (2015a)	**Science and Research Priorities (2015b)**
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.

Project details

Summary

Table 2. Project details

Project code	CY16004
Title	Export Readiness and Market Access
Research organization	Cherry Growers' Australia (CGA)
Project leader	Tom Eastlake
Funding period	May 2017 to June 2019

Logical framework

A logical framework is shown in Table 3 to highlight the connection between the project activities, outputs, outcomes, and impact.

Table 3. Project logical framework

Activities	• Develop and delivery of three national export workshops.
	• Annual export manual updates.
	• Develop members' only "export portal".
	• Facilitate export registration, development of audit checklists and export help desk services.
	• Collaborate with complimentary projects including Systems Approaches (CSIRO), Coolchain and Quality in Vietnam (Agriculture Victoria) and Food Safety Review (Agriculture Victoria).
	• Develop pre and post season reports, website, email, newsletter communications for export and general grower base audience.
	• Develop a stakeholder engagement plan and meeting records for the CGA and cherry export working group (CEWG) boards.
	• Export development activities including:
	  ○ export strategy development and refinement
	  ○ Trade Advisory Panel business case studies
	  ○ engagement with the Strategic Investment Advisory Panel
	  ○ identification of export pathway opportunities
	  ○ in market visits and provision of export intelligence
	  ○ import inquiries.
	• Promote of crop monitoring and biosecurity awareness and preparedness with support from Plant Health Australia through:
	  ○ maintenance of the industry Biosecurity Management Program
	  ○ endemic and exotic pest mapping and graphing
	  ○ pest and disease status reporting, surveillance reporting
	  ○ monitoring industry practice versus export compliance, packhouse receival
	  ○ supporting crop monitoring improvements.
	• Annual surveys to growers to support monitoring and evaluation of project.

Outputs	• Annual export workshops (x3). • Export manual. • Registration assistance, audit support, industry helpdesk. • Pest and disease database to support market access negotiations. • Standard operating procedures to support compliance requirements. • Initiated cherry industry involvement with the National Residue Survey (NRS) Maximum Residue Level (MRL) program. • Implemented updates to the TOCAL training program to support new market access conditions – e.g. China. • Assisted DAFF Plant Exports with the development of new export workplans in line with changing market access arrangements. • Identified R&D needs to support current market access needs and future market maintenance.

	• Relationships developed with key government members to support market access arrangements and negotiations. • Review and response to Pest Risk Analyses to ensure phytosanitary measures and pest lists were reasonable and commercially appropriate. • Business cases representing industry for access to China, Vietnam, USA, Thailand and Korea. • Represented industry in the face of pest and disease threats such as Varroa, BMSB, etc. • Represented and promoted industry's needs at forums. • Conducted season launches in Guangzhou and Shanghai. • In-market representation – trade visits to Vietnam, China, Macau, Hong Kong. • Ensured industry market access priorities were represented.
Outcomes	• Enhanced levels of export readiness, supporting growers and packers to take advantage of export market improvements. • Improved decision making capability and strategic market understanding. • Maintained relationships with key export markets through engagements and market visits. • Expanded export opportunities for growers who hadn't previously exported (due to decreased export barriers and increased information / tools), increasing overall export participation. • Increased share of trade into lucrative protocol markets supported through training and extension enabling exports to satisfy trade requirements. • Streamlined grower training registration through orchard and packhouse registration process. • Maintenance of market access conditions through biosecurity management program. • Improvements to MRLs available to export and testing requirements.
Impacts	• [Economic] Increase in Australian cherry exports achieving price premiums by satisfying high value protocol export market requirements. • [Economic] Reduced grower cost of export registration. • [Economic] Increased confidence in the cherry industry's future, supporting sustainable long term growth in plantings and production. • [Social] Increased contribution to regional community wellbeing from more profitable cherry growers. • [Social] Increased capacity and understanding of export markets and trade negotiations underpinning industry development

Project costs

Nominal investment

Table 4. Project nominal investment

Year end 30 June	Hort Innovation ($)	NSW DPI($)	Total ($)
2017	144,219	55,600	199,819
2018	329,590	55,600	385,190
2019	374,165	55,600	429,765
Total	847,974	166,800	1,014,774

In-kind costs

Annual in-kind costs were recognised in the project as an annual contribution of $55,600 to recognise collaboration support provided with NSW DPI, office supplies and travel costs.

Program management costs

R&D costs should also include the administrative and overhead costs associated with managing and supporting the project. The Hort Innovation overhead and administrative costs were calculated for each project funding year based on the data presented in the *Statement of Comprehensive Income* in the *Hort Innovation Annual Report* for the relevant year. Where the overhead and administrative costs were equal to the total expenses, less the research and development and marketing expenses. The overhead and administrative costs were then calculated as a proportion of combined project expenses (RD&E and marketing), averaging 16.0% for the CY16004 funding period (2017-2019). This figure was then applied to the nominal Hort Innovation investment shown in Table 4.

Real Investment costs

For purposes of the investment analysis, the investment costs of all parties were expressed in 2021-22 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2022b).

Extension costs

Communication and extension were activities conducted within the project, so the project expenditure is assumed to be inclusive of extension costs.

Project impacts

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.

Impacts valued

The following impacts were quantified:

- [Economic] Increase in Australian cherry exports achieving price premiums by satisfying high value protocol export market requirements.

In the absence of high value protocol markets, cherry exporters would be forced to sell produce into the lower value non-protocol markets, or into the smaller domestic market (likely putting downward pressure on prices). CY16004 facilitated and enabled that access in collaboration with other stakeholders. As such, the impacts were valued by calculating the price premium for protocol export markets compared to non-protocol markets, and applying this premium to export volumes into protocol markets. This benefit was reduced by the registration cost for access to protocol markets. Because CY16004 was part of a continuum of export facilitation (preceded by CY12007 and followed by CY18002) the benefits were assumed to be mostly confined to the project period of 2016-17 to 2018-19 but with some cross-over of attribution in 2016-17 and 2019-20. The attributable benefits were also adjusted down for the contribution of other stakeholders external to the project (outcome attribution), and also for the potential for the project/outcomes to have been funded in the absence of Hort Innovation levy funding (R&D counterfactual).

Impacts not valued

Not all of the impacts identified in Table 4 could be valued in the assessment, particularly where there was a lack of data making it difficult to quantify the causal relationship and impact pathway. Other impacts identified but not valued were:

- [Economic] Reduced grower cost of export registration.
- [Economic] Increased confidence in the cherry industry's future, supporting sustainable long term growth in plantings and production.
- [Social] Increased contribution to regional community wellbeing from more profitable cherry growers.
- [Social] Increased capacity and understanding of export markets and trade negotiations underpinning industry development.

Public versus private impacts

The impacts identified from the investment are predominantly private impacts accruing to cherry growers and supply chain participants. However, some public benefits have also been produced in the form of capacity built and spill-overs to regional communities from enhanced grower income and industry capability.

Distribution of private impacts

The identified potential private impacts of CY16004 would include direct and flow-on (spillover) impacts. Spillover impacts would include:

- Production-induced effects, which reflect the flow-on changes to the supply chain (upstream and downstream) that result from farm level changes in inputs (packaging, transport, marketing) associated with practice change.
- Consumption induced effects, which reflect the flow-on changes generated through the payments of wages and salaries to households and the subsequent expenditure of those incomes of purchasing household goods and services.

Furthermore, the true impact would also be influenced by the equilibrium (price) effect, which reflects changes in prices

(of inputs and outputs) as a result in changes in supply and demand of those inputs and outputs. The price effect, essentially shifts benefits along the supply chain and between producers to consumers. The extent to which this would occur would depend on the slope of the short and long term supply and demand curves.

Impacts on other Australian industries

The project activities were explicit to the Australian cherry industry.

Impacts overseas

Increased market engagement has supported increased export trade of cherries into these markets. This could have an impact on the supply and demand profile for cherries and other substitutes within these markets or other connected markets.

Data and assumptions

A summary of the key assumptions made in the assessment is provided in Table 5.

Table 5. Summary of assumptions for impact valuation

Variable	Assumption	Source / comment
Discount rate	5% (± 50%)	CRRDC Guidelines (2018).
Adoption start	2016-17	The project activities first supported export registration for the 2016-17 season.
Cherry export volume to protocol markets (t)	2016-17=693t 2017-18=1581t 2018-19=2662t 2019-20=2492t	Trade volume into the following protocol markets: China, South Korea, Philippines, Taiwan, Thailand, Japan, Vietnam. Trade Map (2022)
Average price premium of protocol market trade compared to non protocol market trade ($/kg)	2016-17=2.98 2017-18=3.11 2018-19=2.55 2019-20=1.02	FOB export value into protocol markets compared to non-protocol markets, equivalent to a five year average of $2.28/kg. Without CY16004, there is a high chance that this product would be traded in non-protocol markets or domestically, such that this price premium would be foregone.
Grower and packhouse registration (#)	2016-17=55 2017-18=50 2018-19=63 2019-20=56 (av.)	Project reporting for 2017-2019. Three year average applied for 2019-20.
Real adoption cost ($/grower and exporter)	$235	Average costs of export registration were $200 in 2017 for each cherry grower and packing shed (FGT 2017). Adjusted to real (2022 equivalent) terms using ABS (2022). No additional adoption costs are assumed as existing on-farm activities are already satisfactory to meet registration requirements (Pers. Comm researcher).
Outcome (protocol market access) attribution (%)	2016-17= 25% 2017-18= 50% 2018-19= 50% 2019-20= 25% All (±50%)	Stakeholder consultation indicated that without CY16004, the industry would find it difficult to maintain exports to protocol markets. At the same time, while the coordination and support function provided through CY16004 was responsible for the majority of the outcome, services provided by DAFF for formalising and securing the registration process also contributed, such that not all impacts are possible to attribute to CY16004. A maximum attribution of 50% was assumed with half attribution in 2016-17 and 2019-20 to reflect the attribution crossover with previous (CY12007) and subsequent (CY18002) export development projects. All tested plus and minus 50%.
R&D counterfactual	75% (±33%)	Exports remain a priority for commercial entities, industry organisations, and Government; however, the key outcome of CY16004 involved the engagement of growers and packers nationally which was considered more likely to be achieved with levy funding through Hort Innovation.

Results

All costs and benefits were discounted to 2021-22 using a real 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 (2018-19) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment criteria

Table 6 shows the impact metrics estimated for different periods of benefit for the total investment.

Table 6. Impact metrics for the total investment in project CY16004

Impact metric	Years after last year of investment						
	0	5	10	15	20	25	30
PVC ($m)	1.6	1.6	1.6	1.6	1.6	1.6	1.6
PVB ($m)	5.1	5.5	5.5	5.5	5.5	5.5	5.5
NPV ($m)	3.5	3.9	3.9	3.9	3.9	3.9	3.9
BCR	3.19	3.48	3.48	3.48	3.48	3.48	3.48
IRR	NA	NA	NA	NA	NA	NA	NA
MIRR	NA	NA	NA	NA	NA	NA	NA

NB. The IRR and MIRR could not be calculated as there were no years of net negative cashflows.

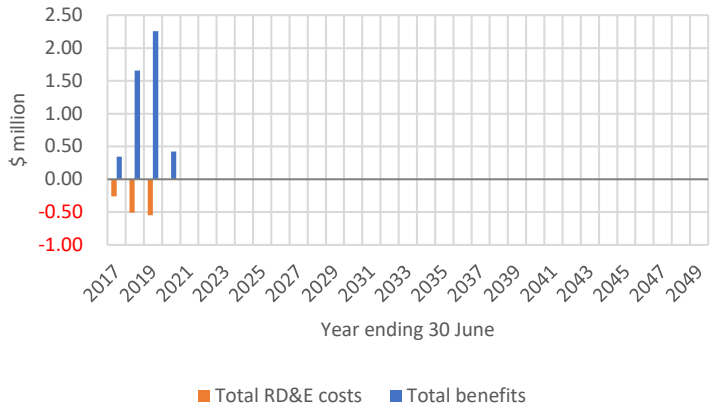
Table 7 shows the impact metrics estimated for different periods of benefit for the Hort Innovation investment. The benefits attributable to Hort Innovation were based on a total funding share (including admin costs) of 86%.

Table 7. Impact metrics for the Hort Innovation investment in project CY16004

Impact metric	Years after last year of investment						
	0	5	10	15	20	25	30
PVC ($m)	1.4	1.4	1.4	1.4	1.4	1.4	1.4
PVB ($m)	4.3	4.7	4.7	4.7	4.7	4.7	4.7
NPV ($m)	3.0	3.4	3.4	3.4	3.4	3.4	3.4
BCR	3.19	3.48	3.48	3.48	3.48	3.48	3.48
IRR	NA	NA	NA	NA	NA	NA	NA
MIRR	NA	NA	NA	NA	NA	NA	NA

Figure 1 shows the annual undiscounted benefit and cost cash flows for the total investment of CY16004. Cash flows are shown for the duration of the investment plus 30 years from the last year of investment.

Figure 1. Annual cash flow of undiscounted total benefits and total investment costs



Sensitivity analysis

A sensitivity analysis was carried out on key variables identified in the analysis where a data range was identified, or there was a level of uncertainty around the data (Table 8). Data ranges and sources are described in Table 5.

Table 8. Sensitivity of impact (total investment BCR) to changes in key underlying variables

Variable		Low	Baseline	High
Discount rate	Variable range	2.5%	5.0%	7.5%
	BCR range	3.51	3.48	3.45
Outcome (protocol market access) attribution	Variable range	0.25	0.50	0.75
	BCR range	1.74	3.48	5.22
R&D counterfactual	Variable range	0.65	0.75	0.85
	BCR range	3.02	3.48	3.95

Conclusions

The analysis showed that the quantified benefits were greater than the investment costs for CY16004, with a BCR 3.48:1. The results reflect the benefit of increased industry capability regarding export registration processes for protocol markets. This outcome was assessed to result in an increased level of export volumes to protocol markets. As a result exporters were able to achieve a price premium above non-protocol or domestic markets where this volume would have otherwise been supplied in the absence of CY16004. The price premium secured through this export trade was assessed to result in a private economic benefit for cherry growers and the export supply chain, with additional public benefits for cherry growing communities stimulated by increased prosperity of cherry growers.

The share of export volumes to protocol markets increased over the three seasons that CY16004 was active, rising from 28% in 2016-17 to 52% in 2018-19 (Trademap 2022), while the combined number of registered packhouses and growers increased from 55 in 2016-17 to 63 in 2018-19 (CY16004 Final Report). This serves to highlight the extent by which the capacity building processes delivered through CY16004 supported more growers and packhouses to achieve export registration, resulting in the higher share of export volumes to protocol markets. The growth in registration was also commented by stakeholders as being supported by industry capacity to supply high quality product and efforts to seek opportunities to expand into new markets.

To account for the variability in the underlying data, sensitivity testing was conducted that showed a BCR ranging from 1.74 to 5.22. The results were most sensitive to the tested ranges of four inputs:

- Outcome attribution. A range of external influences were considered to also support cherry grower export registration and protocol market access. The most significant influence was the role of DAFF, who supplied additional representation and consolidation of the efforts for registration – serving as a 'clearinghouse' to enable exports through official government pathways. The precise extent of this influence over attribution was unclear and sensitivity testing indicated a high level of responsiveness to the level of impact.
- R&D counterfactual. While exports remain a key priority for the cherry industry, the supply chain and government, the key outcome of CY16004 involved the engagement of growers and packers nationally and this was considered more likely to be achieved with levy funding through Hort Innovation. The precise extent of this counterfactual was uncertain and sensitivity testing indicated a high level of responsiveness to the level of impact.

A lack of underlying data meant that there were economic and social impacts identified but not quantified which had the potential to provide additional impact to the cherry industry. For example, the increased export profitability through protocol market access supports increased confidence in the cherry industry's future. This in turn supports a sustainable long term growth in plantings and production. However, this would depend on short-medium term supply constraints (e.g. land) and other market factors, and would also not be realised for several years given production timelines for new plantings.

The analysis quantified private benefits accruing to cherry growers. Some spillover impacts would be generated in the wider economy, primarily through the increased income generated for cherry growers stimulating the supply of goods and services throughout the communities with which they interact.

Acknowledgements

Ag Econ would like to acknowledge the input from the following:

Sarah Cumpston, Hort Innovation; Mimi Doan, Hort Innovation; Andréa Magiafoglou and Tom Eastlake, Cherry Growers Australia.

References

Australian Bureau of Statistics (ABS) (2022b). 5206.0 – *Australian National Accounts: National Income, Expenditure and Product, Dec 2021*. Table 5. Expenditure on Gross Domestic Product (GDP), Implicit price deflators. Retrieved from Australian Bureau of Statistics: https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release#data-download

Cherry Growers Australia (2019). *Export Readiness and Market Access (CY16004)*. Final report, funded by Hort Innovation using the cherry research and development levy and contributions from the Australian Government. Retrieved from https://www.horticulture.com.au/globalassets/laserfiche/assets/project-reports/cy16004/cy16004---final-report-complete.pdf. Accessed October 2022.

Commonwealth of Australia (2015a). *Agricultural Competitiveness White Paper*. Retrieved from https://www.awe.gov.au/agriculture-land/farm-food-drought/agriculture-white-paper. Accessed October 2022.

Commonwealth of Australia (2015b). *Strategic Science and Research Priorities*. Canberra: Commonwealth of Australia. Retrieved from https://www.industry.gov.au/data-and-publications/science-and-research-priorities#:~:text=Australia%20depends%20on%20science%20and,and%20improve%20national%20well%2Dbeing. Accessed October 2022.

Council of Rural Research and Development Corporations (CRRDC) (2018). *Cross-RDC Impact Assessment Program: Guidelines*. Canberra: Council of Rural Research and Development Corporations. Retrieved from http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf

Hort Innovation (2017). *Cherry Strategic Investment Plan 2017-2021*. Retrieved from https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/sip-pdfs-new/hortinnovation-sip-cherry-2017-2021.pdf. Accessed October 2022.

Hort Innovation (2022a). *Cherry Strategic Investment Plan 2022-2026*. Retrieved from https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/sip-2022-2026-pdfs/hort-innovation-sip-2022-26-cherry-r.pdf. Accessed June 2022.

Hort Innovation (2022b). *Horticulture Statistics Handbook 2012-13 to 2020-21*. Received from Hort Innovation pers comm. Data available https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/grower-resources/ha18002-assets/australian-horticulture-statistics-handbook/

Trade Map (2022). International Trade Centre. Retrieved from https://www.trademap.org/. Accessed October 2022

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.
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.

Abbreviations

CRRDC Council of Rural Research and Development Corporations

CEWG Cherry Export Working Group

CGA Cherry Growers Australia

DAFF Department of Agriculture, Fisheries and Forestry (Australian Government)

GDP Gross Domestic Product

GVP Gross Value of Production

IRR Internal Rate of Return

MIRR Modified Internal Rate of Return

MRL Maximum Residue Level

NRS National Residue Survey

PVB Present Value of Benefits

PVC Present Value of Costs

RD&E Research, Development and Extension

SIP Strategic Investment Plan

Ends.