

Serviced Supply Chains: Strawberries

AM21000 Serviced Supply Chains II

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Despite Australia's proximity to key export markets, consistently delivering high quality fruit and vegetables is an ongoing challenge. This has been amplified by recent supply chain disruption associated with the COVID-19 pandemic.

To support exporter decision making, there is a need to identify and quantify the risks of fruit and vegetable quality loss. Monitoring and evaluating cultivar postharvest performance will inform supply chain handling strategies for different modes of transport. Assessing the potential of improved and sustainable cooling, storage and packaging technologies to enhance quality will also be critical to ensure viable export pathways remain for Australian producers.

AM21000 Serviced Supply Chains II (SSCII) is a 3.5-year (2022-2025) investment in providing Australian fruit and vegetable growers with the necessary decision support for managing export and domestic supply chain risks and delivering consistent fresh produce quality.

The project has three key objectives:

- Extend the success of the initial Serviced Supply Chains "Monitoring to Improve" project to additional varieties, commodities and freight modes.
- Develop decision aid tools based on predictive shelf life models via the inclusion of additional parameters such as production district, pre-harvest factors and phytosanitary treatments.
- Improve accessibility of the associated decision aid tools via a specialised digital interface.

The project has a focus on avocado, mango, strawberry, summerfruit and vegetables.



Figure 1. Australian strawberries at retail in Bangkok, Thailand. Photo credit: Queensland Department of Agriculture

Findings from the initial supply chain project

The initial Serviced Supply Chains project (AM15002) was a 4.5-year investment that increased the value and profitability of Australian horticulture exports by improving supply chain handling practices and performance.

The project worked with citrus, mango, summerfruit and table grape exporters to increase their knowledge, skills and confidence to access modern monitoring and decision aid tools to better manage supply chain risks and deliver more consistent quality produce.

Key project activities included:

- Monitoring export handling conditions to identify opportunities for improving practice
- Developing decision aid tools to inform handling strategies for increasing product consistency
- Increasing exporter awareness and adoption of monitoring and decision aid tools and services

The monitoring of more than 200 export shipments identified that poor airfreight temperature management and extended seafreight duration were major supply chain risks to consistently delivering high quality produce.

While new wireless remote monitoring technologies were embraced by exporters for their real-time reporting of consignment temperature and location, data interpretation was a time-consuming process.

The development of customisable, intuitive dashboards that streamed data from multiple logger brands improved the efficiency of data analysis and associated decision making.

Parallel export simulation trials were completed to quantify the impacts of different handling scenarios on fruit quality. This helped the exporters to prioritise interventions to reduce instances of temperature breaches that otherwise compromised quality and reduced returns.

The co-investing mango exporter shared the monitoring data with their chain partners to encourage improved cool-chain practice. As a result, average mango airfreight consignment temperatures to Asia reduced from 17°C to 13°C from year one to year four, which resulted in a 2.4-day increase in shelf life.

Time x temperature storage trials were also conducted to establish the suitability of different cultivars to tolerate seafreight or airfreight supply chains and still arrive with sufficient shelf life. Models for predicting the remaining shelf life of four mango and six stone fruit cultivars were developed. The models were based on monitored conditions from harvest to the importer and were validated in commercial supply chains with an accuracy of $\pm 1-4$ days at a 90 per cent prediction interval. The co-investing stone fruit exporter relied on these decision aid tools to guide the selection of cultivars suited to air and seafreight.

Monitoring of handling procedures prior to export also revealed variation in practice that reduced the consistency of product quality arriving in-market. The co-investing citrus exporter identified the need to standardise and improve lemon degreening and pre-cooling treatments to successfully reduce the risk of chilling injury developing during seafreight. Models for predicting the risk of rot development on table grape berries were also further refined.

The benefits of monitoring have been promoted through case studies and other media, leading to greater awareness and adoption. Through their association with the project team, 33 leading exporters, who account for at least 69 per cent of all mango and more than 10 per cent of total stone fruit export volume, have adopted wireless reporting monitoring technology as a standard practice in the past two to four years. Additional businesses beyond this project have co-invested in several other supply chain improvement projects with a monitoring and predictive tools component.

SSCII Strawberry program

The strawberry component will be delivered to industry in close consultation with a Strawberry Advisory Group (SAG) which includes growers from Queensland, Victoria and Western Australia as well as representation from Berries Australia, Hort Innovation and DAF.

The inaugural meeting of the SAG was held in October 2022 to discuss the scope of the project and the purpose of the SAG.

The key objectives will be to:

- document the current state of industry supply chain practices
- monitor and improve domestic supply chain conditions and fruit quality
- quantify impacts of market access treatments (e.g. methyl bromide fumigation) and postharvest handling practices on cultivar performance
- work with growers to improve retail quality and shelf life
- develop capacity and confidence to export

The expected project outcomes include:

- Greater knowledge of the impacts of postharvest treatment and handling practices on cultivar performance and shelf life
- Confidence to implement improved practices to deliver more predictable quality fruit to domestic and international markets
- Increased market demand and profitability due to consistently meeting market expectations
- Extension of project learnings to other berry crops, such as Rubus species, and alignment with other export development investments (e.g. MT20004)

Expected outputs from the project will include:

- monitoring systems and tools that identify areas for improvement
- updated guidelines on harvest and postharvest practices that increase the consistency of quality, shelf life and value of fruit
- decision aid tools that enable prediction of fruit quality on arrival in domestic and export markets plus remaining shelf life
- analysis of shelf life extension technologies or practices that reduce quality issues, such as packaging or controlled atmospheres

Figure 2. The project methodology model for strawberries.

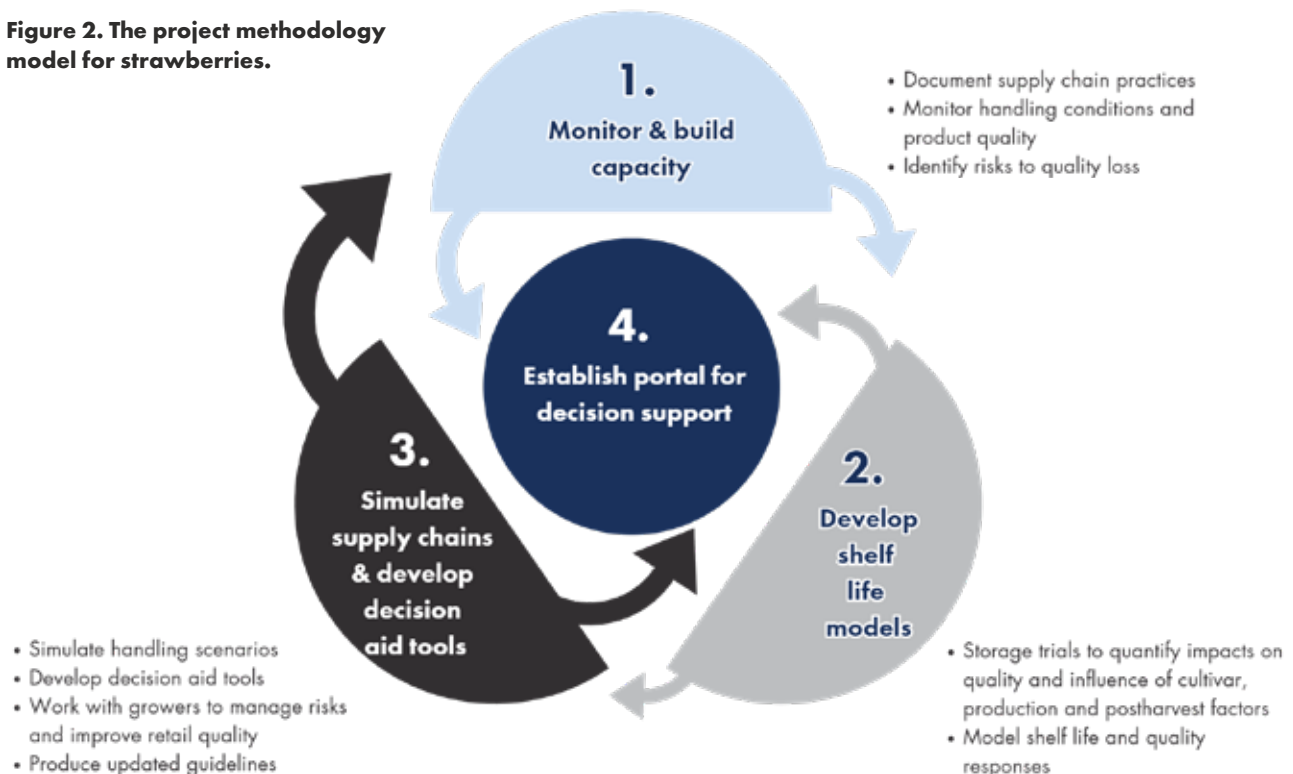




Figure 3. Consignment monitoring from Brisbane to Adelaide with tivo™ data logger.

Progress to date

Some preliminary monitoring activities out of Queensland and Western Australia were conducted in October 2022 with 4 different domestic supply chains mapped. Early monitoring of supply chains has already demonstrated deviations to best practice, with one shipment transported at 10°C for 2 days until arrival in market where it was cooled to 3°C, which impacted on fruit quality and remaining shelf life (Figure 3).

In 2023, further consignments will be monitored for temperature and quality. Consignments will be tracked from the main growing regions around Australia and will focus on the key cultivars for those regions. The information will then be used to conduct simulation studies to identify when and how quality is lost. A confidential report will be generated on each monitored consignment and provided to the collaborating supply chains. The data from these consignments will be compiled and deidentified into recommendations for the wider industry.

Interested to get involved?

This project offers a great opportunity for strawberry growers and their supply chain partners to get involved in monitoring their supply chains to identify areas of risk.

Interested growers are invited to contact Jodie Campbell at jodie.campbell@daf.qld.gov.au or contact your local Berry Industry Development Officer.

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