fermentasmania

SIPP Grant 2023

Polyphenolic Fruit Waste Valorisation Study

Stage 3 Report

New Ecosystem Report

CONSULTATION DRAFT

SUPPORTED BY

Tasmanian Government

PROJECT PARTNERS

Fruit Growers Tasmania

Startupbootcamp FoodTech

Clever intelligent fermentation

UNIVERSITY of TASMANIA

TIA

Tasmanian Institute of Agriculture

TIA is a joint venture of the University of Tasmania and the Tasmanian Government

the forager food co.

redefining the food experience

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Executive Summary

The "Polyphenolic Fruit Waste Valorisation Study", funded by the SIPP Grant 2023, conducted by Project Partners and led by fermentasmania, explores innovative methods to transform fruit waste into products that increase growers' revenue. In addition, and more broadly, to increase state GDP as Tasmania consolidates its position as a leader and provider of high-quality food and beverage products.

This Report assesses the viability of a new ecosystem designed to process and monetise fruit waste and fruit by-products, specifically from apples, cherries, and grapes ("**Focus Fruit Waste**").

The Food Waste Hierarchy proposes prioritising repurposing and upcycling Focus Fruit Waste into new food products over composting or animal feed, aligning with Australia's National Food Waste Strategy.

Potential New Products

The study identifies several categories of value-added products that can be derived from Focus Fruit Waste, including:

- **Frozen and Dried Products**: dried fruits, freeze-dried powders and frozen fruits;
- **Shelf-Stable Products**: juice, flours, jam, chutneys and sauces;
- **Alcohol and Vinegar Products**: cider, spirits, ethanol and various vinegars, utilising fermentation and distillation processes;
- **Functional Drinks**: fruit 'plus' drinks, low / no alcohol drinks and health drink 'shots', leveraging Tasmania's brewing and carbonation capacity; and
- **Biochemical and Fermented Products**: polyphenol concentrates, pigments, and biochar, which add significant value through advanced biochemical processes.

Case Studies and Success Stories:

- The report highlights successful initiatives including Rowella Cherry Farm's zero-waste strategy and Eden Orchards' pasteurised cherry juice production in New Zealand, demonstrating practical applications of fruit waste valorisation;
- Salvage Drinks Co. innovative approaches to converting fruit waste into high-quality alcoholic beverages; and
- Swinging Gate's commitment to use grape marc as an input to a secondary ferment demonstrates that existing infrastructure can be utilised to create more products and increase vineyard profitability.

Ecosystem and Infrastructure Capacity:

Tasmania's robust storage, transport, and processing infrastructure supports the proposed valorisation efforts, as shown below in Table 1.

Additional infrastructure, particularly extra capacity for fast freezing (especially IQF) at peak cherry harvest times will increase the viable range of products made from Cherry fruit waste and by-products, especially in relation to shelf-stable products.

The Fermentation Hub, set to open in 2025, will further enhance fermentation, distillation, and bioprocessing capabilities within Tasmania.

Table 1 – Most Viable Products from Focus Fruit Waste

Fruit	Product	Partners Needed	Markets	Product Value
	Functional Drinks	Growers, Processors	Cellar Door, Farmers' Markets, Supermarkets, Online Sales	$ - $$
	Apple Baby Food (fermented)	Growers, Processors	Supermarkets, Health Shops	$$
	Apple Cider Vinegar (high quality)	Growers, Processors	Cider Manufacturers, Cellar Door, Farmers' Markets	$$ - $$$
	Apple Spirits	Growers, Processors,	Growers, Distillers	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$
	Cherry Functional Drinks	Growers, Processors	Farmers' Markets, Supermarkets, Online Sales	$$
	Cherry Shelf Stable Products	Growers, Processors,	Growers, Farmers' Markets, Supermarkets, Online Sales	$$
	Cherry Spirits	Growers, Processors,	Growers, Bottle Shops	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$
	Grape Marc Powder	Wine Makers, Processors	Wine Makers	$ - $$
	Pét nat wines	Growers, Wine Makers	Cellar Door, Bottle Shops, Online Sales	$$
	Grape Spirits	Wine Makers, Brewers	Cellar Door, Bottle Shops, Online Sales, Grower use	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$

Market Potential and Economic Impact:

- New products derived from fruit waste are positioned to capture niche markets domestically and internationally, leveraging Tasmania's reputation for high-quality produce;
- Higher-value products are especially worthy of attention because of the relatively high transport costs to access national and international markets and the need to create new markets and reinforce Tasmania as the home of high-quality products; and
- The potential economic benefits for Tasmanian fruit growers from increased valorisation of fruit waste range from $1.2 million to $10.2 million, with a significant increase of up to $275 million if value-adding processes are adopted.

Conclusions and Recommendations:

- It is recommended that the current Project be continued with the delivery of Stages 4-6;
- To realise the maximum potential value from Focus Fruit Waste valorisation:
    - Participants need to focus on:
        - industry collaboration,
        - market development,
        - infrastructure investment, and
    - Resources need to be directed to:
        - promoting Tasmania's brand in new markets,
        - fostering innovation, and
        - enhancing existing facilities to support new product development.

"As we get closer to the opening of our World-Class fermentation and bio-processing facility, we look forward to working with Tasmanian farmers to create new income streams. We are equally proud to be diverting waste away from carbon emissions and into products that advance Tasmania's economy and global health"

Kim Seagram, fermentasmania Chair

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About fermentasmania

Fermentation is the delicious alchemy that transforms our food - grains into bread, cabbage into kraut, milk into cheese, grapes into wine.



At fermentasmania, we believe in the power of fermentation to transform our produce, our people, and our place. By connecting industry, educators, government, and consumers, we are cultivating a community of creative food lovers & innovators.

The word fermentation comes from the Latin verb "fervere" which means to boil. We believe fermentation can turn the heat up on Tasmania, creating new jobs and new businesses on our island and helping Tasmanian food reach new markets. Through fermentation, we can craft innovative, value-added food & drinks that take a taste of Tasmania to the world.

Human history is replete with examples of resourceful use of food ‘waste’ and also of making ‘hay’ (fermented food products) while the ‘sun’ shines (before foods are spoiled). Fermented foods formed part or the core of staple diets across global cultures; from kim chi in Korea, to Sauerkraut in Germany, to food produced by indigenous Australian cultures.

Fermentation is culture and in Tasmania our culture is alive. Join us on our journey, as we put Tasmania on the map as a unique global centre for excellence in fermentation.

The Fermentas Trade Network is your one-stop-shop for our island's premium fermentation businesses. Let us put you in touch with small and large producers alike to bring a taste of Tasmania to you.

Ask us if you want to know more about the value of fermented foods.

1. Defined Terms

Abbreviation	Term
1st Grade Fruits[1]	Unblemished fruit that meets direct-to-consumer expectations on size, colour and quality
2nd Grade Fruits	Minor blemished fruit that otherwise meets direct-to-consumer expectations on size, colour and quality
3rd Grade Fruits	Fruits not meeting direct-to-consumer expectations on size, colour, or under/over-ripeness
CRC	Cooperative Research Centre
CAS	Controlled Atmosphere Storage
GNA	Grape Neutral Alcohol – distilled grape marc that is very high in alcohol content (90%+)
Focus Fruits	Apples, cherries and grapes
Focus Fruit Waste	Fruit and fruit by-products from the Focus Fruits that are diverted into landfill, compost or animal feed
Functional Drinks	A segment of the pre-packaged drinks market that includes non-alcoholic beverages that claim health benefits due to the inclusion of bioactive, biotic[2] or other compounds; includes energy/mood drinks, fermented drinks (kombucha, kefir and others), protein drinks and healthy 'shots' (Yakult, as one example)
HACCP	Hazard Analysis Critical Control Point, a food safety and risk planning tool
IQF	Individual Quick Freeze, a freezing technology to freezes individual fruits and vegetables
Pét nat	Short for Pétillant Naturel, which means naturally bubbling, a type of wine produced from a secondary ferment of grape marc
Polyphenol Concentrate	A concentrated product high in polyphenol for use by the nutraceutical industry (may also be high in anthocyanins and antioxidants)
SCE	Spinning Cone Extractor
Shelf Stable Products	Products that have a shelf life of at least several months; usually in cans or jars and include cider, vinegar, jam, syrups, relishes, etc.
Target Fruits	Apples, blackcurrants, cherries, elderberries, grapes
TFES	Tasmania Freight Equalisation Scheme
UTas	University of Tasmania

[1] There is no Australian standard that governs classification of fruits in Australia. The categorisation of fruits as 1st, 2nd and 3rd grade is largely driven by market behaviours. The classifications listed here are the usual conventions encountered among growers in Tasmania.
[2] Including prebiotic, probiotic and postbiotic

2. Introduction

Fermentasmania received funds from the Tasmanian State Government through the SIPP Grant to research current uses of fruit seconds and by-products in Tasmania, and to investigate the viability of increasing the economic value derived by growers (and others).

This project follows other successful projects related to valorisation of food waste in Tasmania[3].

2.1 Project Stage

This is Stage 3 of a possible 6 stages in this Project and is a vital building block for the remaining stages (for more details see Appendix A).

Stage 1	Existing Ecosystem Report (complete)
Stage 2	Polyphenolic Fruit Byproduct / Waste Report
Stage 3	***New Ecosystem Viability Report (this Report)***
Stage 4	Ecosystem Trial Report
Stage 5	Funding Report
Stage 6	Fruit Waste Ecosystem Report

2.2 Further Project Stages

The future focus for the Project is on creating and testing new processes, grower relationships, business models and ecosystems that will utilise Focus Fruit Waste and monetise / valorise opportunities for growers. That will necessarily involve identifying:

- Opportunities for growers;
- Opportunities for non-growers, including food processing businesses and entrepreneurs; and
- Parts of the existing ecosystem that need to be supplemented with additional resources and general ecosystem developments that help all stakeholders increase Tasmania's GDP.

2.3 Opportunities for Tasmanian Fruit Growers

Several main opportunities exist for Tasmanian fruit growers, as identified in Stage 2 of the Project, and the economic opportunity for growers from increased valorisation for Fruit Waste from Focus Fruits is in the conservative range of $1.2 million to $10.2 million. That number rises to $54 million to $275 million if growers participate in value-adding processes.

[3] Hort Innovation, 2008, *Innovative approaches to adding value to vegetable waste – Phase 2*, https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt06053/

3. Prioritising Fruit Waste Opportunities

The primary focus of this Project is to maximise valorisation of Focus Fruit Waste by identifying ways to make viable products from Focus Fruit Waste through:

- Utilising already existing and currently under construction infrastructures[4]; and
- Identifying additional infrastructure needed to support new products.

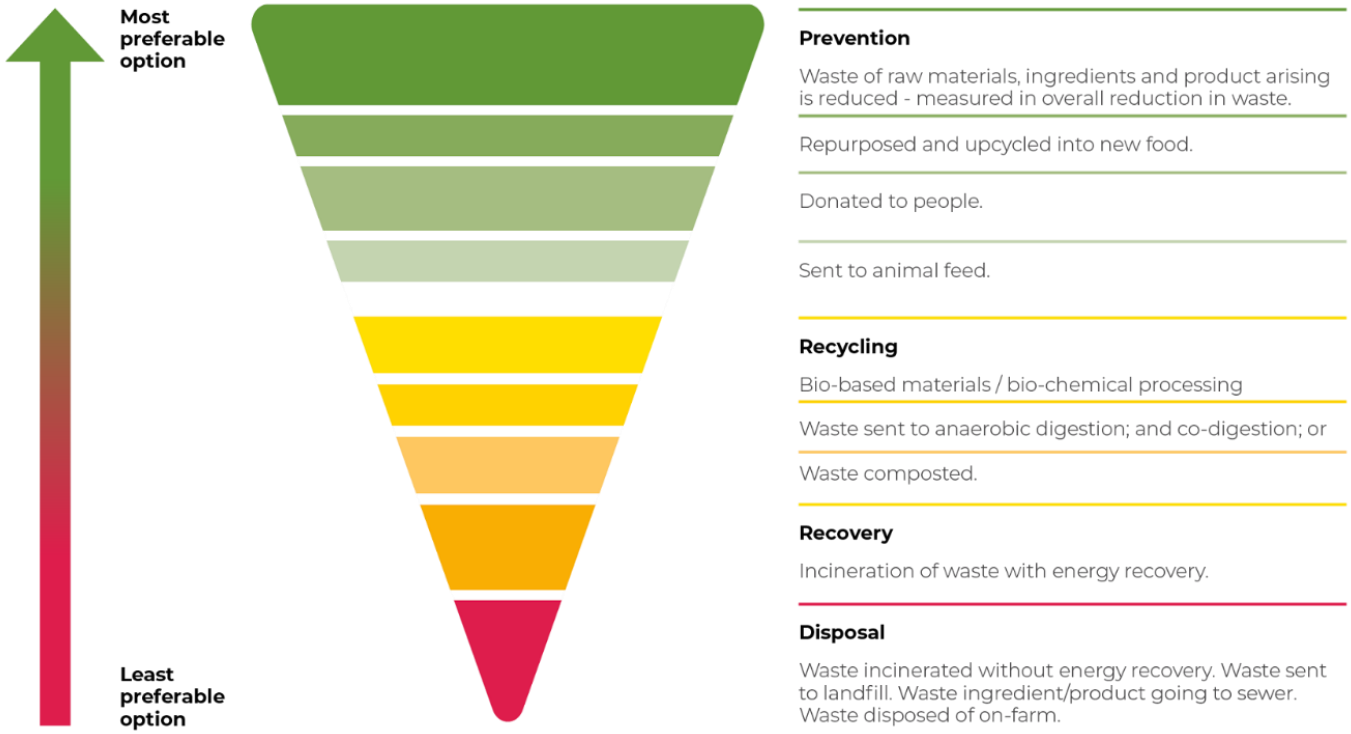
It will identify ways to reduce Australia's food waste in accordance with Federal and Tasmanian Government targets.

3.1 fermentasmania's Food Waste Hierarchy

In 2017, Australia published a National Food Waste Strategy[5] that included a working draft of an Australian Food Waste Hierarchy. Various industry groups have added value to the Australian Food Waste Hierarchy by more clearly identifying how waste fits into multiple ecosystems, including fruit waste. The Fight Food Waste CRC has also established a food waste hierarchy[6] (Fig. 1). Figure 1 is compelling for ongoing use because it clearly identifies how repurposing and upcycling food waste into new food is one of the highest uses, including using a variety of processing techniques.

The Project Partners agree that repurposing fruit by-products and converting waste into new foods should be considered better uses of waste than composting or using it as animal feed.

Figure 1 – Preferable options for use of Food Waste (© Fight Food Waste Limited 2023)



[4] Including fermentasmania's world class fermentation, distillation and bioprocessing hub due to be completed in early 2025.

[5] https://www.agriculture.gov.au/sites/default/files/documents/national-food-waste-strategy.pdf

[6] Fight Food Waste CRC (2023) 2023-2028 Investment Framework Update. Fight Food Waste Cooperative Research Centre, Adelaide, Australia, https://endfoodwaste.com.au/wp-content/uploads/2023/11/Investment-Framework-Update-2023-final.pdf

4. Focus Fruits

Data from the Survey in Stage 2 of the Project found that there was no substantial Fruit Waste from blackcurrants and elderberries in Tasmania, primarily due to extensive efforts by growers to utilise virtually every part of the fruits, including byproducts considered to be waste for other fruits. That was achieved partly by investing in processing infrastructure, such as fast freezing facilities, to allow the processing of fruits outside harvest times.

The remainder of the Project will only investigate valorisation opportunities for apples, cherries and grapes ("**Focus Fruits**").

4.1 Focus Fruit Waste

Focus Fruit Waste is fruit and fruit by-products from the Focus Fruits that are currently disposed in landfills, or supplied to lowest value uses such as composting or animal feeds. Annual Fruit Waste streams from apples (2,450-4,350 tonnes), cherries (750-2,000t.) and grapes (2,150-4,750t.), as shown in Table 2, are high enough to explore viable alternative uses.

Table 2 – Focus Fruit Waste Estimates

Fruit Waste Identified	Low Estimate	High Estimate	Confidence Level
Apples	2,450 tpa	4,350 tpa	Moderate
Cherries	750 tpa	2,000 tpa	Low - Moderate
Grapes	2,150 tpa	4,750 tpa	High

4.2 Focus Fruit Waste Locations

Focus Fruits are grown in two main clusters in Tasmania, broadly based around Hobart and Launceston, as shown in Figure 2.

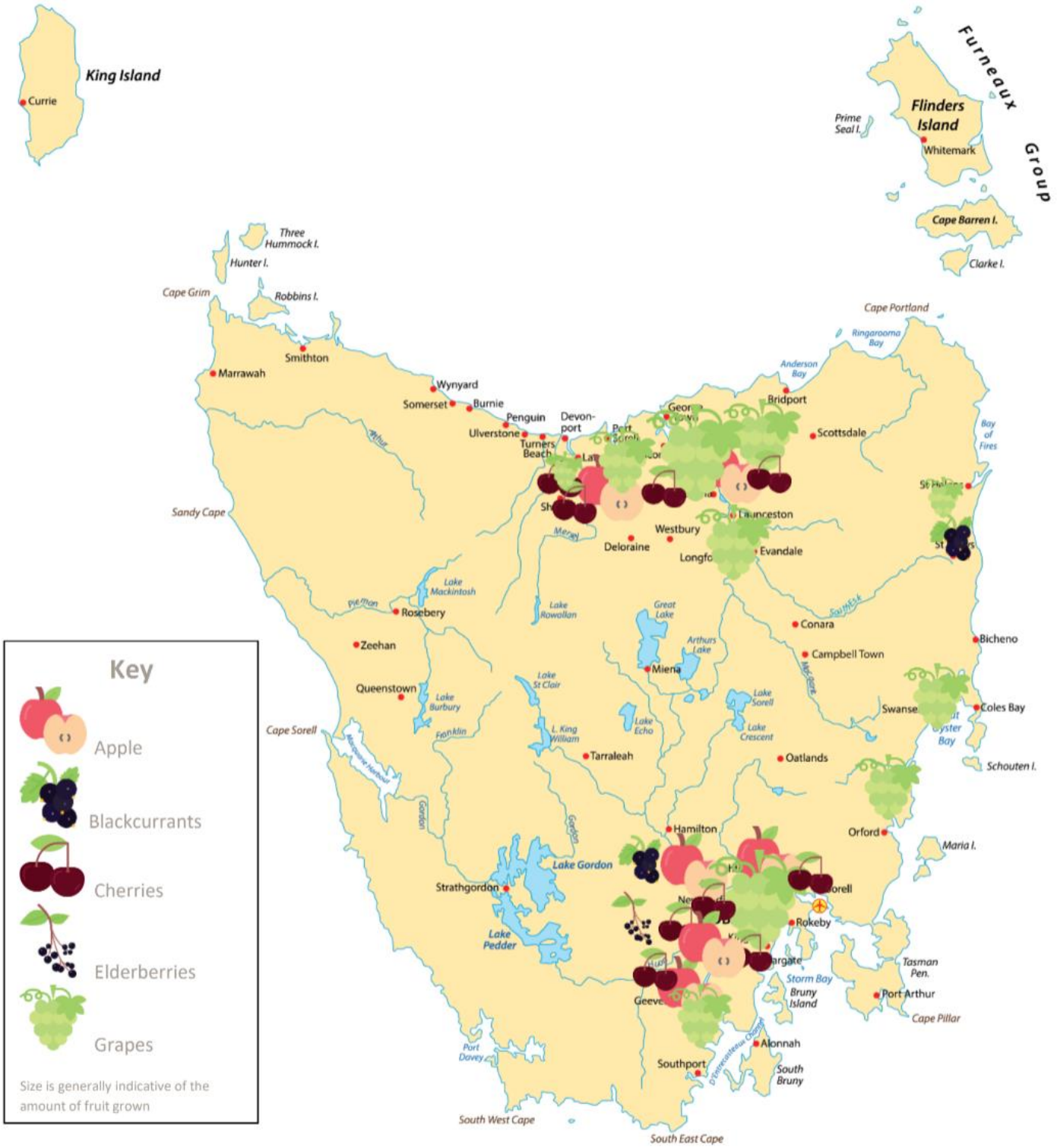


Figure 2 – Focus Fruit Growing Locations

The location of Focus Fruit Waste can be difficult to identify, but it typically varies by fruit use. There is also high levels of variation of on-farm infrastructure because of varying valorisation strategies. Some generalisations can be made for each Focus Fruits, with a caveat that practice varies enormously from farm to farm.

4.2.1 Apples

Apple farms generally have sorting facilities and small amounts of CAS. Significant commercial CAS is also located in all the apple-growing regions. Unsold fruits tend to be within growers' control, either because they remain unpicked or because ownership of 1st and 2nd grade fruits remains with the grower while in CAS.

Only a few apple growers make shelf-stable products and have their own juicing, bottling, fermenting, canning and hot bottling facilities. A few other growers contract with those growers to make shelf-stable products, mostly cider. Waste from such products typically remains with the owners of processing infrastructure.

Generally speaking, apple Fruit Waste is located at:

- facilities that press apples in the form of apple pomace;
- on farms in the form of unpicked and unsold apples; and
- at CAS facilities in the form of unsold apples.

4.2.2 Cherries

Cherry farms generally have sorting and packing facilities and small amounts of cold storage. It is unusual for cherry growers to have any significant other processing infrastructure.

Unsold fruits tend to be within the control of growers, either because they remain unpicked or because growers have not been able to sell 2nd or 3rd grade fruits.

There are a few growers in Tasmania that process cherries into shelf-stable products, most commonly done by growers as use of their own cherries, although at least one purchases additional cherries from other growers. Resulting cherry waste stays with the producer.

Most of the Fruit Waste from cherries is within the control of growers.

4.2.3 Grapes

Almost every grape grown in Tasmania is pressed for wine production, usually on-farm or nearby using another vineyard's pressing infrastructure. Pressing facility locations are broadly identical to the grape-growing regions, as shown in Figure 2. As a result, at times of harvest, there is little excess processing capacity and such hyper-local processing facilities are not shown in Figure 3.

Fermentation facilities are often co-located with pressing facilities, and most of the larger producers ship pressed grapes to the mainland for fermentation into wine.

Some grape growers are currently investigating the viability of using existing infrastructure to process Piquette wines, with some success as shown in the Swinging Gate Case Study (below).

4.3 Processing Infrastructure Locations

While Focus Fruits are grown in large volumes in Tasmania's North and South, infrastructure for processing, freezing and storage is disproportionately located in Tasmania's North, as shown in Figure 3.

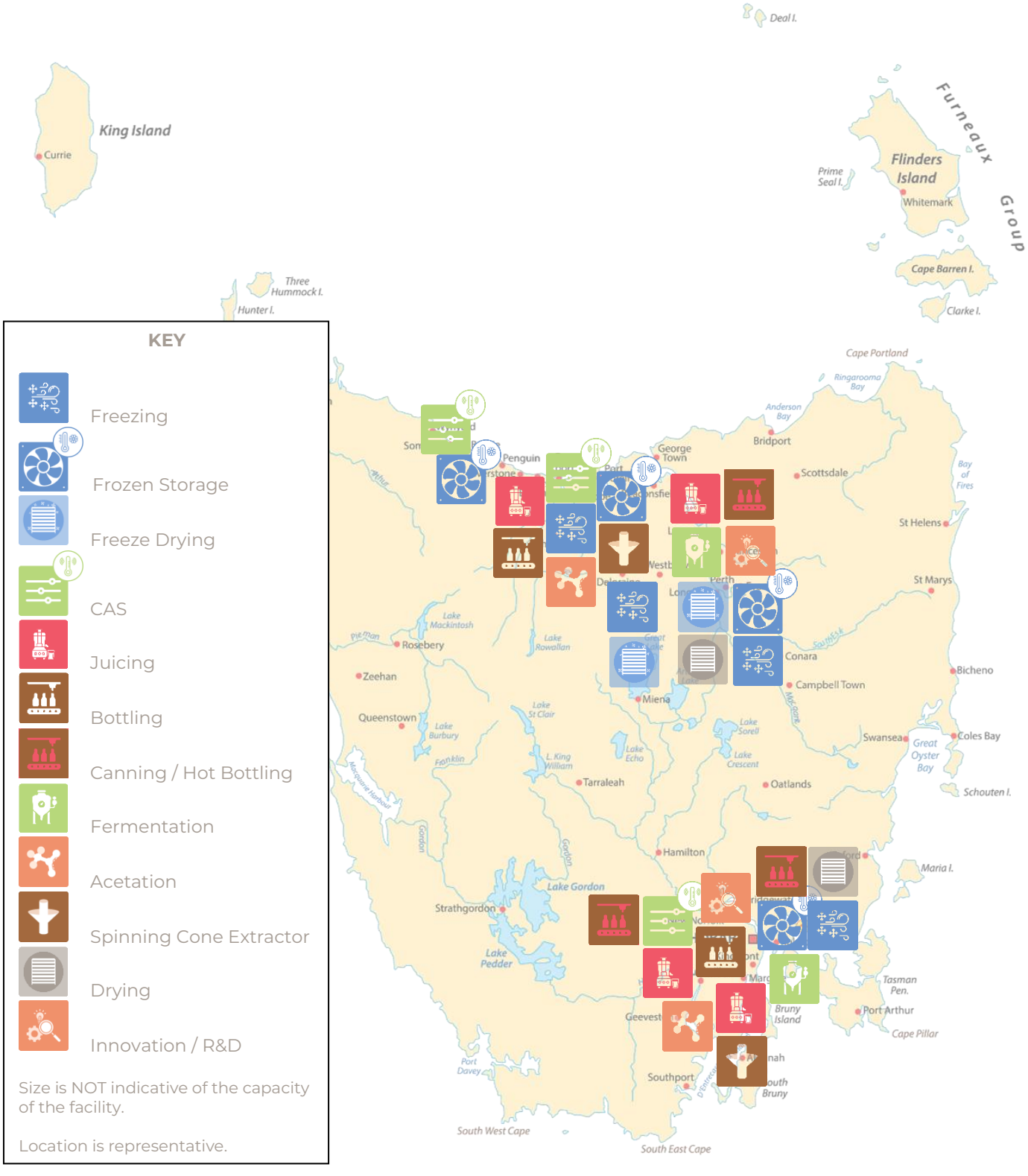


Figure 3 – Location of Commercial Processing Infrastructure

5. Existing Ecosystem Capacity

Tasmania's current food processing capabilities, including the skills and associated infrastructure, are essential to enable increased valorisation of Focus Fruit Waste through the creation of products. Identifying new or innovative products will also need to be mapped to capability/ capacity and identify where new processing skills/ training centres and infrastructure will need to be developed to help realise increased valorisation.

Currently, there is some identified excess capacity in food and beverage production facilities across Tasmania, and several operators offer contracting services, thus reducing barriers to the use of existing facilities. However, other operators' capacity is not reported or was reported on a confidential basis.

Tasmania has self-reported surplus capacity for the construction of food and beverage processing infrastructure, with several commercial operators offering services. Thus, there are no significant barriers to the construction of additional processing infrastructure in Tasmania.

It is also worth recognising that sending fruits or fruit waste to the mainland for processing will often not be viable due to relatively high shipping costs. Moreso, if the resulting processed goods then need to be shipped back to Tasmania. As an exception to that general conclusion, grape juice is often sent for processing on the mainland, mainly because Tasmanian grapes command a significant price premium over most grapes grown there. Certain other high-value products may also be viable for shipping to the mainland, such as shelf stable products from apples and cherries. Frozen cherries or cherry puree may also be viable, although markets are currently not identified and there is lack of capacity in existing infrastructure.

5.1 Tasmanian Capacity

A high-level analysis of Tasmania's capacity in relation to Storage, Transport, Processing, Markets and Information will precede analysis of the viability of making new products from Focus Fruit Waste using existing infrastructure.

In addition to the capacities identified below, fermentasmania has a clear interest in creating entrepreneurial culture for producing high-quality products through fermentation, distillation and bioprocessing. Its Fermentation Hub will add some capacity and capability alongside commercially focussed research and development capacity that will be available when the building is completed in 2025. Potential producers will also benefit from high-quality and indigenous cultures in the form of locally produced or discovered yeasts, bacteria and fungi that are likely to arise from demand and supply created through the Fermentation Hub.

Tasmania's capacity for Research and Development and Innovation will also be analysed from corporate and higher education perspectives.

5.1.1 Tasmanian Infrastructure Summary

A summary of Tasmanian Storage, Transport and Processing Infrastructure is included in Table 3, below, and broadly shows:

- **Capacity** in relation to harvest times, non-harvest times and non-traditional shift times (i.e. outside usual business hours of operation);
- **Basis of Engagement,** whether commercial contracting or by private arrangement / partnership agreement;
- **Support Labour** pool available to increase infrastructure usage; and
- **Notes** to provide further context.

Further details about each Infrastructure Type are provided below.

Table 3 – Tasmanian Infrastructure Summary

Infrastructure Type		Capacity			Basis of Engagement		Support Labour	Notes
		Harvest Time	Non-Harvest Times	Non-traditional shift times	Contracting	Private / Partnership		
Storage	CAS	MODERATE	HIGH	Not Applicable	HIGH	LOW	HIGH	
	Chilled / Frozen	HIGH	HIGH	Not Applicable	HIGH	LOW	HIGH	
Transport	Intra-State Chilled	LOW	HIGH	HIGH	HIGH	LOW	HIGH	
	Intra-State Frozen	MODERATE	HIGH	HIGH	HIGH	LOW	HIGH	
Processing	Fast Freezing	MODERATE	HIGH	HIGH	HIGH	LOW	HIGH	
	Freeze Drying	HIGH	HIGH	Not Applicable	HIGH	LOW	MODERATE	
	Juicing	MODERATE	HIGH	HIGH	HIGH	MODERATE	HIGH	
	Pureeing	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	
	Fermentation	LOW	HIGH	HIGH	MODERATE	MODERATE	MODERATE	
	Distillation	HIGH	HIGH	HIGH	HIGH	MODERATE	MODERATE	
	Acetation	HIGH	HIGH	HIGH	HIGH	MODERATE	MODERATE	
	Spinning Cone Extractor	HIGH	HIGH	HIGH	HIGH	LOW	MODERATE	2 x Small are operational 1 x Very Large needs repairs
	Bottling	HIGH	HIGH	HIGH	HIGH	MODERATE	HIGH	
	Canning / Hot Bottling	HIGH	HIGH	HIGH	HIGH	HIGH	MODERATE	
	Seed Pressing	LOW	LOW	LOW	?	?	?	Nil known
	Drying	HIGH	HIGH	HIGH	HIGH	MODERATE	HIGH	
	Pulverising (to Powder)	LOW	LOW	LOW	?	?	?	Nil known
	Dry Packaging	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	
Information	Fruit Data	MODERATE	LOW	Not Applicable	MODERATE	LOW	LOW	
	Weather Data	HIGH	HIGH	Not Applicable	HIGH	HIGH	NA	High quality and usually free

5.1.2 Storage



Growers of Focus Fruits utilise both on-farm and commercial storage facilities to ensure their produce gets to market in the best possible condition.

Focus Fruit growers frequently have small amounts of chilled and ambient storage, only sufficient to allow fast turnaround of 1 or 2 days at harvest times, with little excess capacity that would allow them to engage in longer supply-time shifting.

Growers that participate in the processing of their fruits frequently have much larger capacity for storage.

Very few of the on-farm storage identified in the Stage 2 Fruit Waste Survey were identified as HACCP accredited,, which may be an issue for product safety in relation to processing fruits into shelf -stable and frozen goods. Other standards, such as those from the International Standards Organisation 9001 and the Food Safety System Certification 22000, may also be relevant in certain markets and to certain customers, and no examples of certification under those standards were identified.

5.1.2.1 Controlled Atmosphere Storage (CAS)



Controlled Atmosphere Storage (CAS) is used to store fruits to allow growers to meet year-round demand for 1st grade fruits from key customers including supermarkets.

Anecdotally, there is currently enough CAS capacity in Tasmania to store 1st grade apples for 12 months or more. In addition, 2nd grade apples are also stored in CAS and used for cider production. The high levels of apples in CAS at any time mean that apples can be used for value-adding products year-round.

Many apple growers have some CAS capacity, and CAS suppliers often have capacity that exceeds current needs due in no small part to the downsizing of the apple industry in Tasmania in the last 30 years.

There are no known examples of cherries or grapes effectively utilising CAS facilities due to the limitation of using CAS to preserve cherries and grapes to a usable standard.

5.1.2.2 Chilled and Frozen Storage



According to discussions with storage facilities, Tasmania generally has an excess of chilled storage at all times of the year. However, chilled storage nears capacity at peak harvesting times, especially during the cherry harvesting season.

In addition, Tasmania's commercial frozen storage facilities generally operate below capacity, although utilisation rates are highly variable and affected by harvesting times in fresh-grown produce (including Tasmania's vegetable crops) and seasonal variations.

5.1.3 Transport



Tasmania generally has significant excess transport capacity, with chilled storage periodically operating at total capacity at peak harvest periods, especially in peak cherry harvesting times.

Evidence of Tasmania's transport capacity is supported only by off-the-record conversations with two of Tasmania's major Transport companies. Specific, targeted enquiries that identify particular products and production times will provide a more accurate assessment of the viability of better valorising of produce in Tasmania.

5.1.3.1 Intra-Tasmania

Tasmania generally has a significant excess of ambient transport capacity for shipping goods intra-state.

Chilled transport, at peak periods, including the cherry growing season, operates at notionally greater than 100% capacity, meaning that lower-priority chilled goods are held in storage while shipping chilled cherries within Tasmania. Other than peak cherry harvesting time, Chilled transport has significant excess capacity.

Tasmania also has an excess of frozen transport capacity virtually year round.

5.1.3.2 Mainland Australia

There are few capacity barriers to shipping goods to the mainland, although some restrictions apply for chilled and frozen goods at peak harvest times, especially at peak cherry harvesting times.

Many growers noted that costs to move freight across Bass Straight remain relatively high compared to moving freight across similar distances in Tasmania and on the mainland. The Tasmanian Freight Equalisation Scheme (TFES) has not met the stated goal of equalising freight costs for Tasmanian agri-producers in that transport costs have continued to increase while TFES subsidies have not kept pace. For example, one food processor noted that freight per standard sized palette from Hobart to Deloraine, a road distance of about 230 km, is "about $60". Freight per standard sized palette from Devonport to Geelong with the TFES subsidy, a distance of about 500 km, is "about $200" which is a premium of more than 50% per km.

Some growers also reported that it costs less per weight unit to ship to some Asian markets than to mainland Australia. While Tasmania is not unique in having lower export shipping costs than mainland shipping costs, it is a constant challenge, especially for lower-value produce, such as raw fruits and fruit waste.

5.1.3.3 Internationally

Tasmania relies on international shipping and air freight to export goods, and capacity barriers have yet to be identified for those export channels.

5.1.4 Processing

Tasmania's commercial processing infrastructure is biased to Northern Tasmania, as shown in Figure 3.



Much of Tasmania's commercial processing capacity only utilises 8-12 hours of production per day or less. While it would be a cultural shift for some commercial operators, recognition of the capacity of 24-hour production would significantly increase Tasmania's available capacity, in line with what is currently achieved in sectors such as beer production and vegetable processing. This may present other challenges, such as the availability of skilled labour.

5.1.4.1 Fast Freezing



Anecdotally, commercial fast-freezing capacity in Tasmania runs at greater than 75% capacity for much of the year and at near 100% capacity at certain times of the growing season. Pressure on commercial freezing facilities is particularly high during the cherry season (Mid December to late February) which has overlap with peak freezing of salmon from the commercial salmon industry (December to March).

All usable fast-freezing in Tasmania is blast chill, bulk freezing, which freezes fruits in containers.

There are no commercially usable Individual Quick Freeze ("**IQF**") facilities in Tasmania that would allow for production-line level freezing of individual fruits and vegetables. There is capacity at certain freezing facilities in Tasmania for installation of IQF processing facilities that would relieve some fast-freezing pressure at peak harvesting times.

Preparing cherries and apples before fast freezing can create a bottleneck because different machinery and preparation techniques are necessary, and it takes considerable time (up to 1 day) to change production facilities to accommodate de-seeding cherries and coring apples.

Greater automated capacity exists for processing apples for fast-freezing than cherries because there is supply and demand for apples year-round and there are automated apple processing lines leading into the freezer, including washing and grading.

Any additional automated cherry capacity may remain unused outside peak harvesting times and, therefore, may represent a sub-optimal investment in the existing ecosystem.

There are currently no commercially available Individual Quick Freezing (IQF) facilities in Tasmania. Such facilities can be most effectively used on automated production lines.

5.1.4.2 Freeze drying



Freeze-drying is labour intensive for preparing fruits, and fruits occupy the freeze-drying equipment for significantly longer than their preparation time and changeover times can be lengthy.

For example, for production facilities to change from freeze-dried strawberries to freeze-dried cherries, many production processes need to be changed, both in terms of personnel and

production equipment and processes. After strawberries are queued for processing for freeze drying, it will be almost 48 hours before cherries can be queued for freeze drying.

Due to infrastructure investment by Tasmania's commercial freeze-drying operators, there is spare capacity for freeze-drying, especially outside peak harvest times. For example, Forager Foods in the State's north, recently became the largest freeze-drying facility in Australia and operates below peak capacity.

Freeze-dried products can also be easily ground into powders, and Tasmania has a large excess of such grinding capacity, including at Forager Foods in the North.

5.1.4.3 Processing – Juicing / Pureeing



There is currently excess annual capacity for juicing in Tasmania. However, capacity currently relies on storing fruits at harvest time and juicing throughout the year, as with apples. Owners of the most extensive apple pressing facilities in Tasmania don't promote their capacity to commercially contract their facilities, although have indicated capacity and desire to do so. Apple pressing facilities can also be used for pressing cherries.

Pureeing capacity is much lower than juicing capacity. However, there is excess annual capacity outside high utilisation periods such as peak harvest times.

There is a significant excess of grape juicing facilities in Tasmania at times other than harvest. Even during harvest, presses are dormant for many hours each and could possibly be utilised for secondary pressing in relation to secondary production such as Pét-nats.

5.1.4.4 Fermentation



Tasmania has a high capacity for fermenting grapes into wine, and fermentation equipment is generally underutilised for periods outside harvesting/peak production times.

Based on conversations with alcohol makers, appetite to make low-alcohol fermented products in Tasmania is currently low, although that may be because knowledge of no-alcohol fermentation and the expanding market for no-alcohol products is low. Based on the significant market growth in low and no alcohol products, fermentasmania, will target existing knowledge barriers to improve knowledge and awareness of the relevant market opportunities.

A large processing facility in the North has significant excess capacity to brew and carbonate no-alcohol drinks.

The North is also home to Tasmania's only solid-state fermentation facility, and its owners are open to commercial contracting.

The fermentasmania Fermentation Hub at Legana will also add commercial fermentation capacity.

5.1.4.5 Distillation



Tasmania anecdotally has a glut of stills that operate only during usual business hours and many stills only for a few months of the year. With minimal planning, Tasmania has enough excess capacity to process all of the Focus Fruit Waste into alcohol if the supply can be shifted from peak harvesting times.

Three organisations have administrative and/or legal oversight of distilleries in Tasmania that are legally used to produce distilled alcohol.

The Australian Taxation Office ("ATO") licenses producers of distilled alcohol throughout Australia. Various categories of licenses relate directly to the capacity of stills. The ATO has repeatedly refused to provide data on the number of licensed producers and the capacity of their stills, even when requests were for anonymised data.

The Tasmanian Department of Treasury and Finance ("DTF"), through its Liquor and Gaming Branch, is responsible for issuing liquor sale licenses to breweries and distilleries in Tasmania and liquor permits to small producers in Tasmania. The DTF historically provides data about the number of licenses and permits issued, does not deliberately track the volume of stills in relation to liquor licenses and permits, and is reluctant to provide aggregated data about the number of licenses and permits issued.

The Tasmanian Department of Justice ("DoJ"), via its Worksafe Tasmania program ("Worksafe"), has obligations to review the safety of workplaces in Tasmania. Worksafe has taken an increased role in ensuring safe work practices at distilleries in Tasmania following a high profile accidental fire near Launceston.

While Worksafe and DoJ recognise their role in recommending safe work practices in Tasmania's distilleries, the role does not include collating data about capacity.

The fermentasmania facility at Legana will ultimately have distillation capabilities, with limited capacity, though not at opening.

5.1.4.6 Processing – Acetation (Vinegar)



Vinegars produced using a secondary acetic fermentation are often produced in vessels distinct from primary fermentation to avoid cross-contamination issues.

Tasmania has some large-scale commercial capacity for the production of generic cider vinegar, particularly in the South, and some capacity in small-scale facilities for high-grade and artisanal vinegar in the South and North. The infrastructure owners have divergent appetites for:

- Commercial processing for generic vinegars;
- Very large-scale contracting for bespoke vinegars;
- Small contracting arrangements for bespoke vinegars; and
- Partnerships with new producers of artisanal, small-run products.

5.1.4.7 Processing – Spinning Cone Extractor



Spinning Cone Extractors ("**SCEs**") are used to remove undesirable compounds from liquids and purees. For example, eliminating alcohol from alcoholic beverages and removing bitter compounds from fruit juices. The capacity of SCEs in Tasmania remains unclear outside the Utas Fermentation and Separation course. However, growers and Project Partners suggested that at least three were present in Tasmania.

Tasmania's largest SCE, by processing capacity, is in the South and would require a sizeable commercial investment and matching arrangement to be a viable offering by its owner.

Two other SCEs, assuming they are available for commercial processing, would only be suitable for small-run or artisanal products.

5.1.4.8 Processing – Bottling



There are no bottlers in Tasmania that commercially advertise their services. However, existing manufacturers in Spreyton and the Huon Valley have indicated a high capacity to perform year-round, contract bottling of juices and carbonated products.

Spirit manufacturers often have small-scale bottling facilities, and there is more than enough capacity in those locations to accommodate any spirit products from Focus Fruit Waste, although storage of fruits pending processing remains an issue.

5.1.4.9 Processing – Canning / Hot Bottling



Production of jams, chutneys, sauces and syrups require hot bottling facilities. Hot bottling facilities invariably have cooking facilities to get products up to hot bottling temperatures.

There is a slight excess of commercial hot bottling facilities in southern Tasmania, but expansion plans in the next 12 months in the south of the State will result in significant additional capacity. There is virtually no capacity in northern Tasmania.

Other facilities in the Huon Valley have excess capacity for production only in partnership with the owners.

5.1.4.10 Processing – Seed Pressing

There is some capacity to press seeds in Tasmania, but only in generic pressing facilities, not facilities designed specifically for pressing grape seed oil, for example.

5.1.4.11 Processing - Drying



Several commercial drying facilities exist, the largest of which is in the North, and none of which operate near capacity.

5.1.4.12 Processing – Pulverising to Powder

Innovative milling machines have recently become available that can take whole fruits and pulverise them into powders of less than 30 microns, and although no such machines are available in Tasmania, one manufacturer has indicated willingness to work with growers on product trials for polyphenol concentrates and powdered fruit products.

5.1.4.13 Processing - Dry Packaging



There are several commercial contract packers of dry products, including flour mills that also pack other dry goods and bulk nutrients, and any dry / dried goods from Focus Fruit Waste could easily be accommodated by existing packers.

5.1.5 Markets



Analysis of possible paths for valorisation of Focus Fruit Waste relies on quality data for markets in Tasmania, the mainland and internationally. The level of market analysis is beyond the scope of this Project. However, some observations can be made about the kinds of products that may be most viable in a new ecosystem.

New products derived from current Focus Fruit Waste will need to anticipate the costs of developing markets for end users and B2B buyers where relevant, including traditional marketing and building relationships. Higher-value products are more likely to overcome market development and marketing costs to remain profitable.

5.1.5.1 High Quality Tasmanian Produce

Tasmanian producers benefit from its reputation for making high-quality products. Recognising that Tasmania can only produce relatively low volumes of products compared to mainland producers, new markets will need to value high-quality or 'boutique' products.

5.1.5.2 Reduced Waste Products

One large Tasmanian manufacturer reported observations by some of its largest customers that products using former waste or by-products can achieve a price premium and increase consumer loyalty. That evidence is supported by the success of brands like Salvage Drinks Co., see Case Study below.

Case Study – Salvage Drinks Co

Stuart Addison will probably never be described as a traditional alcohol maker. As founder of Salvage Drinks Co, he describes his journey as "… a twisted cocktail of grapes, diapers, and moonlit distillation, [birthing] concoctions that redefine spirits. Each sip tells a tale of chaos and redemption, a trip that'll make Hunter S. Thompson nod in approval." Stuart's years as a sommelier and foodie stand him in good stead to walk the balance of his products' flavours.

His passion is taking fruit seconds and fruit waste that will otherwise go to waste, and turning them into high-quality alcohols driven primarily by the characteristics of the salvaged fruits (and in some cases wines) to create unique flavours. As Stuart would say, "I'm trying to showcase the *terroir* of Tasmanian fruits. I mean, not *terroir*, coz that's French @#!$%# but putting forward the unique characteristics of Tasmanian fruits."

Forget the Rescue Dog, This is Rescue Booze

Salvaged sources include over-ripe apricots, quinces from neighbour's trees, fining lees (mostly dead yeast) left over from the wine production process, wines that were going to be tipped 'down the drain'.

Case Study – Salvage Drinks Co ... continued

Salvage Drinks Co started by making alcohols in Stuart's shed and selling products at farmers' markets and festivals. As a result of his fruit-forward approach, customers grew to trust that his products would take them on a journey into flavour.

Stuart has found that fruits grown specifically for supermarkets are frequently sub-optimal for use in making fruit-forward alcohols. "Smaller and not-to-spec fruits give us better opportunity to bring all the compounds present into our alcohol. One of the things I love about Tasmanian produce is that because it is slower growing, and sometimes smaller, all the beneficial antioxidants and flavour compounds are more concentrated, which means a better product. Tassie alcohols just taste better!"

While bespoke products, and sampling experiences with someone who can guide consumers through the flavours they are tasting, will remain a core part of the brand distinctiveness of Salvage Drinks Co, and limited runs will continue to command a price premium, the company is now interested in adding some core drinks that are scalable to achieve bottle shop penetration.

Salvage Drinks Co have recently established a permanent facility in Hobart and are looking for growers to provide stable supply as the company scales up.

"My addiction to get people to drink betting tasting alcohol can be costly, and to make sure I'm putting food on the table, instead of alcohol, *the kids just don't love that yet*, I need to have some high-volume products. That means having regular supplies of fruit seconds or fruit waste, including knowing when and how much fruit is available so I can schedule my midnight distilling sessions!"



5.1.5.3 Market Innovation

Innovative products frequently command a price premium, especially if they offer health benefits. Some of Tasmania's most highly profitable new exports are to non-traditional markets that exploit existing produce. An example provided by one of the Project Partners is freeze-dried beef liver powder, which takes a waste product and exports it to markets where the waste is highly valued.

Eden Orchards in New Zealand have taken inspiration from their heritage to find new markets for its 2nd and 3rd class cherries that would otherwise go to waste. Their story is all about finding markets for new products as detailed in the Case Study, below[7].

Case Study – Eden Orchards (NZ)

Gary Bignell has been growing and selling cherries in New Zealand since he was a teenager. Then with the support of Steph, three children, and a few more decades of experience, Gary began to look at the ways in which he could improve on the fruit growing industry he loved.

He noticed that much of New Zealand's incredible fruit was being disposed of due to blemishes or imperfections, perfectly good fruit that didn't have a home! So, in typical Gary fashion, he started inventing... and in 2017 the first batch of 100% pure cherry juice was made.

Harnessing the rich, smooth flavour of dark New Zealand cherries, coupled with their natural high antioxidant and melatonin levels, the juice tasted amazing and had the family sleeping and feeling their best.

By engaging in research and testing and promoting the bio-compounds present in its cherries (https://edenorchards.co.nz/pages/benefits), Eden Orchards were able to identify a market that were happy to pay much more for their cherries than their traditional path selling to supermarkets.



[7] The Case Study extracts information from their website, https://edenorchards.co.nz/pages/about-eden-orchard

Case Study – Eden Orchards (NZ)



We are very proud of the fact that our product is genuinely good for our customers, the industry and the planet.

Eden Orchards states that it is fundamentally driven by sustainability, with a focus on minimizing waste in the fruit industry. The brand, which is deeply entrenched with the farm, sought to address the disposal of cosmetically damaged fruit, particularly processing-grade cherries from the orchard, and transforms otherwise discarded fruits into high-quality, primary products.

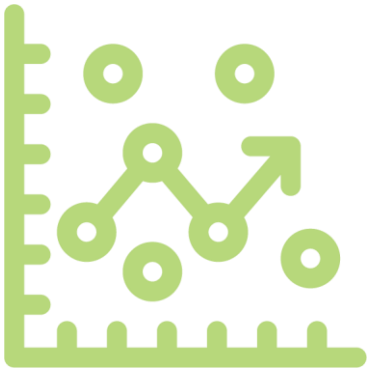
As at 2024, and since the products were established in 2017, it has processed 2,000 tonnes of cherries that would have remained unpicked or been diverted to animal feed. That includes operating a juice factory supplied by 17 major cherry producers in New Zealand, while expanding production by over 50% annually (year-on-year?) to continually reduce fruit waste in the industry.

As they say, “We are very proud of the fact that our product is genuinely good for our customers, the industry and the planet.” Eden Orchards is continuing to scale up its operations including investigating expanding outside New Zealand.

5.1.5.4 Market Creation

Tasmania may have an opportunity to identify possible products from Focus Fruit Waste and find international markets that value products beyond current domestic uses. Tasmania may benefit from funding expertise in market development, as for previously funded roles in agriculture and manufacturing.

5.1.6 Information



Access to high-quality data about fruits as they grow allows producers and entrepreneurs to make decisions about product pipelines and better utilising fruit waste. For example, the tonnes of cherries that go to waste each year frequently remain unknown until after harvest, and even then, the best data relies heavily on estimates of variable quality. If live and projected data about fruits grown were available before harvest it would enable better decision-making, including the opportunity to forward contract 2nd grade fruits and other fruit waste. Similar data shortfalls apply to apples and grapes.

For example, Tasmanian startup Bitwise Agronomy has technology that is helping berry and grape growers better predict their yields throughout the growing season, including at harvest.

5.1.6.1 Fruit Data

Focus Fruit data, such as this Project's Stage 2 – Fruit Waste Report[8], provides a data set that allows industry to make projections about better valorising Focus Fruit Waste. In addition, if the timing and tonnage of cherries were known ahead of harvest time, processing facilities (including packing, freezing, and freeze -drying) could be managed to meet demand more efficiently.

5.1.6.2 Weather Conditions

Higher-quality projections about likely Focus Fruit tonnage and peak harvest periods would also maximise existing weather modelling that identifies weather conditions likely to shorten harvest times and / or adverse weather events that damage fruits, turning 1st grade fruits into 2nd grade fruits. Growers could use such information to make decisions about clear-picking fruits ahead of adverse weather events. It could also be used by processing facilities to make decisions about maximising processing capacity in response to changing conditions.

5.1.7 Finance

Access to finance can be a barrier to creating new products and ecosystems. No unique barriers to finance were identified in our research; however, Tasmania's high transport cost

[8] https://fermentasmania.com/article/16802-a/rethinking-fruit-waste

base and smaller produce amounts compared to the mainland make any financing proposition more of a challenge.

5.2 Tasmanian Innovation / Research and Development

Tasmania's capacity to commit to developing new products and new markets for Focus Fruits waste is relevant to the success of a new ecosystem and non-traditional products.

Opportunities exist for growers to participate in the creation of processed foods, drinks and other products. There are also many examples of growers that have diversified from mere fruit growing into deriving much of their profit from shelf-stable and other products. That is especially true, for example, among large apple growers who own nationally recognised juice and cider brands, although just as accurate for smaller growers who have diversified into product creation and sale at niche outlets such as Farmers' Markets.

5.2.1 Research and Development

Tasmania's agriculture sector has traditionally focussed on excellence in growing, not necessarily on value-adding, innovation, and research and development. In recent years, the Federal Government, the Tasmania Government and industry have put more resources into innovation and research and development in the agriculture sector, including the creation of the world-class incubator, the fermentasmania innovation hub. Ongoing commitment to research and development may result in a significant competitive advantage for Tasmania.

5.2.1.1 University of Tasmania

The University of Tasmania (UTas) has invested in recent years in solid state and market-leading fermentation technologies, analytical chemistry and separation science. It actively targets supporting and collaborating with industry through commercial projects, including through:

- the Tasmanian Institute of Agriculture (TIA), a specialist institute at UTas with a mandate to deliver research, industry development and education for the agri-food industry of Tasmania; and
- HyTECH, a centre for cutting-edge research and post-graduate training in the field of separation science

5.2.1.2 Cooperative Research Centres[9]

The Cooperative Research Centres ("**CRC**") Program is an Australian Government initiative established in 1990 and funds industry-led collaborations between industry, researchers and end-users. The CRC Program links researchers with industry and government with a focus towards research application and offers support through two elements:

- Cooperative Research Centre (CRC) grants – supporting medium to long-term industry-led collaborations, up to 10 years; and

[9] Information from https://www.cooperativeresearch.org.au/resources/about-the-crc-program-/ and

- Cooperative Research Centres Projects (CRC-P) grants – supporting short-term, industry-led collaborative research, up to 3 years.

Research by ACIL Allen into the effectiveness of CRC grants and programs concludes that investment in CRCs by the Government returns approximately $8-15 for every dollar invested[10]Several universities are actively targeting industry relationships to enable CRC grant funding. UTas is not currently part of a Cooperative Research Centre and is, therefore, unable to use its research capacity to support applied research and industry development using the CRC mechanism. However, there is nothing to prevent Tasmanian businesses from participating in relevant CRCs as industry partners.

For example, the Food Waste CRC (End Food Waste Australia) has a specific research and development track dedicated to transforming food waste into value. Several projects under the 'reduce' program are tackling grape marc, wine waste and better use of strawberries. (https://endfoodwaste.com.au/transform/). This project will identify potential areas where this CRC, and others could provide support in creating a new ecosystem.

5.2.1.3 Biochemical Composition and Health Benefits of Tasmanian Fruits

The biochemical content of Tasmanian-grown fruits remains under-identified. While the Project Partners surmise that Tasmanian-grown fruits are higher quality due to slower growing conditions, and likely to be similar to New Zealand grown fruits, that supposition remains untested. It may be of benefit to provably identify that Tasmania produce is among the best in the world, especially in relation to chemical composition.

In addition, claims made by manufacturers of various products, especially in relation to antioxidants, polyphenols and anthocyanins, may need to be reliably proven in relation to Tasmanian-grown Focus Fruits. It may therefore be beneficial to maintain a record of the levels of active compounds present in Tasmanian fruits, and the recognised health claims arising from those compounds.

Understanding composition of Tasmanian fruits will allow for accurate modelling for infrastructure capacity needed to maximise valorisation. UTas has some capacity to assist with such testing.

5.2.1.4 Federal Tax Incentives for R&D

The Federal Government's R&D Tax Incentive program provides startups with less than $20M in aggregated annual turnover with a 43.5 percent refundable tax offset on eligible expenditure which can be fully cashed out if the company has sufficient tax losses. As a self-assessment program, registration of eligible research and development activities with the Department of Industry, Science and Resources is required before claiming the offset in your annual income tax return with the Australian Taxation Office.

The R&D Tax Incentive provides financial support and can be an opportunity to collaborate with registered Research Service Providers. Specific record-keeping requirements apply to the Incentive.

[10] https://www.industry.gov.au/sites/default/files/2023-01/cooperative-research-centres-program-impact-evaluation.pdf

For more information, see the Australian Government Business Portal[11]

5.2.2 Culture of Innovation

Tasmania has a long history of innovation in many areas and has recently invested in Innovation in the food industry through programs such as the Tasmania Government supported Startupbootcamp FoodTech Tasmania Program. That program, for example, has increased entrepreneurial presence in Tasmania, bringing international startups to the state, several of which have innovative solutions relating to the valorisation of agriculture and food waste.

5.2.3 Co-Investment Models

Other regions in Australia and globally have utilised collaborative investment models to further infrastructure development, product development, innovation and research. Without being comprehensive it is worth mentioning some of the mechanisms available.

5.2.3.1 Growers Collectives

Grower's collectives can pool resources and allow for investment in infrastructure required to increase revenue from fruits and fruit waste. For example, it may not be viable for any one cherry grower to invest in fast freezing facilities but, as a collective, they may be able to combine their resources to create an additional path to market for current cherry Fruit Waste. Moreover, other growers that have different growing seasons can also utilise the extra infrastructure. In addition, Growers' collectives are also more likely to be able to sensibly make use of the Australian tax concessions and incentives available in relation for research and development: see above – 5.2.1.4 Federal Tax Incentives for R&D.

The Growers' Group Alliance in Western Australia[12] has gathered more than 65 grower groups, including more than 4,000 growers, to act as a collective to pitch for (and win) State and Federal Government funding, engage in tax-deductible R&D, and invest in capacity building, including collaboration forums for Western Australian growers.

5.2.3.2 JV's

Joint Ventures between growers and manufacturers can result in increased profit sharing from new products from Fruit Waste, either directly through specific profit-sharing arrangements or through agreed minimum pricing.

5.2.3.3 Forward contracting

Forward contracting can be used to drive down prices paid to growers because they often include minimum pricing clauses and opt-outs for produce that do not meet minimum standards, such as those for first-class fruits. The recent Senate enquiry and independent ABC

[11] https://business.gov.au/grants-and-programs/research-and-development-tax-incentive/overview-of-rd-tax-incentive
[12] https://www.gga.org.au/

investigations [13] show that current forward contracting practices can lead to increased fruit waste.

However, forward contracting can also be used in collaborative ventures between buyers / producers and growers, and allow for increased valorisation of fruit waste. Tesco, one of the UK's largest Supermarket chains, uses forward contracting (including Whole Crop clauses) to buy 2nd grade fruits and fruit waste and creates markets for second-grade fruits or creates Tesco branded products[14]. Such forward contracting has the potential to change on-farm grower behaviour in relation to Focus Fruit Waste and increase revenue for growers. As one example, fermentasmania is aware of at least one distiller that has a handshake agreement to buy all of a cherry farm's second-grade fruits for use in making base alcohol and flavours for gin, brandy and schnapps products.

[13] https://www.abc.net.au/news/2024-03-13/does-a-supermarket-duopoly-mean-more-food-waste/103559734
[14] https://www.theconsumergoodsforum.com/wp-content/uploads/ECR-Report-2020-v4.pdf

6. Potential New Products and Infrastructure

The Stage 2 Fruit Waste Report[15] identified existing valorisation opportunities for Focus Fruit Waste. Additional Input from Project Partners, consultation with entrepreneurs, and research by fermentasmania into international valorisation of Focus Fruit Waste, including at a stakeholder Forum in May 2024, has identified several additional valorisation opportunities, listed below under each of the Focus Fruits[16].

In this Report, we have summarised findings by fruit quality, processing infrastructure required and estimates of Tasmania's capacity. Please contact us if you would like further details on our analysis of the raw data.

6.1 Products and Infrastructure Key

For each of the Focus Fruits, and for each of the possible products for each of the Focus Fruits, certain opportunities exist. The information summarised is presented in a table by each Product type, and in accordance with Table 4, below.

The "**Product**" column, lists the type of product.

"**Fruit Quality**" indicates the viability of using each of 1st, 2nd and 3rd grade fruits and Fruit Waste.

The "**Infrastructure Required**" column uses the following abbreviations to indicate parts of the ecosystem required, as follows.

A	Acetation (Vinegar)
B	Bottling
CAS	Controlled Atmosphere Storage
CS	Cold Storage
DI	Distillation
DRY	Drying
DP	Dry Packaging
FD	Freeze Drying
FER	Fermentation
FS	Frozen Storage
FF	Fast Freezing
HB	Hot Bottling / Jarring
J	Juicing
P	Pureeing
SP	Seed Pressing
OTH	Other processing Method
?	indicates an optional process.

Product Value is indicative and relative only. More "$" represents higher product value.

[15] https://fermentasmania.com/article/16802-a/rethinking-fruit-waste

[16] It is possible that the list is not comprehensive.

Table 4 – Sample Product Table showing Tasmania's Capacity

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Product	✓	✓			CAS?, DRY, DP	HIGH	$	✓	✓			Food Manufacturers, Supermarkets

Tasmania's Capacity column estimates Tasmania's current capacity to accommodate the amounts of Focus Fruit Waste to create each proposed Product, based on this Project's research and analysis, as follows. It usually only takes into consideration current hours of operation of existing infrastructure.

HIGH	good available capacity all year round
MODERATE	generally moderate available capacity all year round or good available capacity outside harvesting times
LOW	generally low capacity all year round or moderate available capacity outside harvest times

Partners indicates the possible partners for producing the Product.



6.2 Apples

"In addition to ***increase valorisation of apple pomace***, Tasmanian farmers may need ***alternative markets*** for 1st and 2nd grade apples that risk becoming waste."

Commodification of apples, and Tasmania's increasing vulnerability to changing consumer preferences and competition from mainland-grown apples continues to put downward pricing pressure on Tasmania's apple growers, including throughout the year.

Australia generally grows more apples than it needs for domestic consumer consumption, with slightly larger export tonnes than import tonnes[17]. While Tasmania has a slight competitive advantage in terms of the cost of storing apples in CAS due to its lower temperatures, it also has higher transport costs to access mainland markets.

Adverse weather events that decrease viable apples grown in all of Australia increase the relative attractiveness of Tasmanian apples, but if mainland growers do not experience losses due to mainland weather events, Tasmanian grown apples are generally less attractive to supermarket buyers because of transport costs.

Settlement prices from the 2022/23 growing season set record lows for some growers, with little reason to anticipate increased prices for the 2023/24 growing season.

In addition to the opportunity to increase valorisation of apple pomace, Tasmanian growers may need alternative markets for 1st and 2nd grade apples that risk becoming waste.

[17] https://www.horticulture.com.au/contentassets/a36fdfa2427d4ad284c426663b06f15c/hort-stats-fruit-22-23.pdf

6.2.1 Frozen / Dried Products

Due to the high availability of CAS storage and freezing facilities, Frozen and Dried Products are an easily accessible use of 1st, 2nd and 3rd grade fruits along with limited use of Waste products.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Dried Apples / Apple Chips	✓	✓			CAS, DRY, DP	HIGH	$ - $$	✓	✓			Food Manufacturers, Supermarkets
Freeze Dried Apple Powder	✓	✓	✓	✓	CAS, P?, FD, DP	MODERATE	$ - $$		✓	✓		Food Manufacturers, Supermarkets
Frozen Diced Apple	✓	✓			CAS, FF	HIGH	$ - $$	✓	✓			Food Manufacturers, Supermarkets

6.2.2 Shelf Stable Products

Due to the high availability of CAS storage, Shelf Stable Products are an easily accessible use of apple Fruit Waste throughout the year.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Apple Juice	✓	✓			CAS, J, B	HIGH	$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Apple Flour	✓	✓	✓	✓	CAS, DRY/FD, DP	MODERATE	$$	✓		✓		Supermarkets, Farmers' Markets, Online Sales
Apple Jam	✓	✓			CAS, HB	HIGH	$$	✓		✓		Supermarkets, Farmers' Markets, Online Sales
Apple Jelly	✓	✓			CAS, HB	HIGH	$$	✓		✓		Supermarkets, Farmers' Markets, Online Sales
Apple Sauce	✓	✓			CAS, HB	HIGH	$$	✓		✓		Supermarkets, Farmers' Markets, Online Sales
Baby Food	✓	✓			CAS, HB	HIGH	$$ - $$$			✓		Supermarkets, Farmers' Markets, Online Sales
Sangria	✓	✓			CAS, FER, B	HIGH	$$			✓	✓	Supermarkets, Farmers' Markets, Online Sales

6.2.3 Alcohol and Vinegar Products

Due to the high availability of CAS storage, Alcohol and Vinegar products are an easily accessible use of apple Fruit Waste throughout the year.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Apple Cider	✓	✓			CAS, J, FER, B	HIGH	$$	✓	✓	✓		Bars, Bottle Shops, Farmers' Markets
Apple Cider Vinegar [18]	✓	✓	✓	✓	CAS, J, FER, A, B	HIGH	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets
Apple Spirit (ethanol)	✓	✓			CAS, J, DI	HIGH	$$	✓				Growers
Apple Spirit (Gin, Brandy, Liqueur)	✓	✓			CAS, J, DI, B	HIGH	$$ - $$$	✓	✓	✓	✓	Bars, Bottle Shops, Farmers' Markets

[18] Artisanal, small batch, distinctively flavoured cider vinegars; distinct from low-value, generic flavoured cider vinegar.

6.2.4 Functional Drinks

Due to the high availability of CAS storage, Functional Drinks are likely to be viable in Tasmania.

Fruit 'Plus' drinks require adding powdered concentrates back into juice, including several additional steps. Provided the timing of production of concentrates is done outside peak growing seasons, capacity is relatively high.

There is some commercial capacity in Tasmania to brew Alcohol Free drinks, such as alcohol-free cider, from fruit, without a de-alcoholisation process.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Fruit 'Plus' Drinks	✓	✓		✓	CAS, J, FD, B	HIGH	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (from alcohol)	✓	✓	✓	✓	CAS, J, FER, A, B	HIGH	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (brewed as AF)	✓	✓			CAS, FER, B	HIGH	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Drink 'Shots' / Biotics	✓	✓		✓	CAS, J, FD, B	HIGH	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online

6.2.5 Biochemical and Other Fermented Products

Due to the high availability of CAS storage, Biochemical and Other Fermented Products are an easily accessible use of apple Fruit Waste.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Pectin	✓	✓		✓	CAS, J, B	HIGH	$$		✓	✓		Food Manufacturers
Beer Aromatiser[19] / Flavour Compound	✓	✓	✓	✓	CAS, DRY/FD, DP	HIGH	$$		✓	✓		Alcohol Manufacturers
Pigments	✓	✓		✓	CAS, DRY/FD, DP	HIGH	$$		✓	✓		Food Manufacturers
Biochar	✓	✓	✓	✓	CAS, FER, OTH, B	HIGH	$$	✓	✓	✓		Agriculture
Phenols from seeds				✓	CAS, FER, DRY/FD, DP	MODERATE	$$		✓	✓		Food Manufacturers, Alcohol Manufacturers
Apple cloth / leather				✓	CAS, FER, OTH	LOW	$$$	✓		✓	✓	Fashion Industry
Beauty products		✓	✓	✓	CAS, OTH, DP	LOW	$$$		✓	✓		Beauty Product Manufacturers
Polyphenol/antioxidant concentrates	✓	✓		✓	CAS, J, FER, DRY/FD, DP	MODERATE	$$$$		✓	✓	✓	Beverage Manufacturers, Food Manufacturers

[19] Still under research and first identified in Ricci A, Cirlini M, Guido A, Liberatore CM, Ganino T, Lazzi C, Chiancone B. From Byproduct to Resource: Fermented Apple Pomace as Beer Flavoring, Foods. 2019 Aug 1;8(8):309.



6.3 Cherries

"... there isn't so much a cherry waste problem, as there is a ***cherry markets***, ***processing*** and ***harvesting*** problem."

Freezing of cherries or cherry pulp seems the only viable path to make better use of cherry Fruit Waste, although chilled transport and fast freezing capacity operates at almost full capacity at cherry harvesting times.

Much of the Fruit Waste from cherries results from combinations of very short harvesting seasons, lack of infrastructure to process 2nd and 3rd grade cherries, lack of markets for 2nd and 3rd grade cherries, perceived lack of markets for 2nd and 3rd grade cherries and lack of labour for harvesting at a viable price. Putting that another way, there isn't so much a cherry waste problem, as there is a cherry markets, processing and harvesting problem.

Very little reliable data is gathered through cherry growing seasons, especially projections of likely timing and volume of harvests, meaning that there is currently very little effort put into managing transport, processing and storage facilities to ensure 2nd and 3rd grade cherries are diverted into markets not exiting as cherry Fruit Waste. Forward identification of fruits and likely time of harvesting may be an opportunity to increase valorisation of cherries grown in Tasmania.

Our consultations with growers, processors and entrepreneurs highlighted that there is good reason for optimism about better valorising cherries that currently are diverted as Fruit Waste, subject to identification of markets for cherry products.

6.3.1 Frozen / Dried Products

Any use of cherry Fruit Waste that does not include freezing cherries is very limited in Tasmania.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Frozen Cherries (Export)	✓	✓			CS, FF	MODERATE	$	✓	✓			Asia & North America Food Manufacturers
Frozen Pitted Cherries (Export)	✓	✓			CS, OTH, FF	MODERATE	$	✓	✓			Asia & North America Food Manufacturers
Dried Cherries	✓	✓			CS, DRY, DP	LOW	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Freeze Dried Cherries	✓	✓			CS, FD, DP	MODERATE	$$		✓	✓		Supermarkets, Farmers' Markets, Online Sales
Freeze Dried Cherry Powder	✓	✓		✓	CS, OTH, FD, DP	LOW	$$		✓	✓		Food Manufacturers, Beverage Manufacturers
Frozen Cherry Puree	✓	✓		✓	CS, OTH, FF	MODERATE	$$	✓	✓	✓		Food Manufacturers, Beverage Manufacturers

6.3.2 Shelf Stable Products

Production of shelf stable products from cherries is mostly only viable if harvested cherries can be frozen.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Cherry Jam	✓	✓			CS, FF, HB	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Fruit Strip	✓	✓			CS, FF, OTH, DRY, DP	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Chutney	✓	✓			CS, FF, HB	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Sauce	✓	✓			CS, FF, HB	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Jelly	✓	✓			CS, FF, HB	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Pie	✓	✓			CS, FF, OTH	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Pasteurised Cherry Juice	✓	✓			CS, FF, HB	MODERATE	$$	✓	✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Cola	✓	✓			CS, OTH, B	LOW	$$		✓	✓		Supermarkets, Farmers' Markets, Online Sales
Cherry Juice Concentrate	✓	✓			CS, OTH, FF	MODERATE	$$	✓	✓	✓		Food Manufacturers, Beverage Manufacturers

Case Study – Rowella Cherry Farm

Paul and Regine Thompson have been operating Rowella Cherry Farm since 2013, and for all that time they have been focussed on growing cherries without using hormone growth promotants and on maximising the use of cherries they grow in Northern Tasmania.

They try to use as much as they can of the ripe fruits and are targeting zero waste as a business strategy. While they haven't entirely solved how to use cherry stems and pips, they are working on a solution for those!

One of their key challenges has been finding wasys to scale up the parts of their business that are the most profitable

When Paul and Regine first started, 2nd grade cherries were given to neighbours for animal feed. After they started juicing 2nd grade cherries, they developed markets for cherry juice, thereby reducing waste and increasing revenue. They also use cherry juice in other aspects of production. Much of the success of Rowella Cherry Farm is due to development of new markets for cherry products. In order to create supply at times of demand, it time-shifts cherries at harvest by freezing or juicing cherries.

Rowella sells a small amount of fresh cherries at harvesting season, when prices are highest, but retains most of its fruits in frozen or juiced / pureed form to produce a range of products under their brand All Things Cherry. By focussing on value-add products made on-farm, the farm is significantly more profitable, and they are now considering buying excess and 2nd grade fruits from other growers. Ongoing re-investment in production, including ensuring that the farm is water self-sufficient, means that they are now able to consider opportunities that were far too big for a farm their size when they started.

The All Things Cherry range now has shelf-stable goods including jams, pastes, syrups, vinegars, cordials and chutneys, along with dried and freeze dried cherry products. In addition, their cherry pies, biscuits and cakes are popular at farmers markets throughout Tasmania. The tree-to-customer approach has created a loyal following, especially for their baked goods.

When asked about the things that led to success, Paul said, "We saw the opportunity to make profit from waste. To do that we needed to experiment, be brave and try new products in the marketplace. Of course not every product was successful or profitable, so we needed to be brave and tenacious."





6.3.3 Alcohol and Vinegar Products

Making of alcohol and vinegar products from cherries relies on effective management of cherries and cherry by-products to capacity of fermentation and distilling infrastructure. Fast Freezing is important to allow use of cherries outside peak harvesting times.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Cherry Cider	✓	✓			CS, J, FF, FER, B	MODERATE	$$	✓	✓	✓		Bars, Bottle Shops, Farmers' Markets
Cherry Spirit (ethanol)	✓	✓	✓	✓	CS, J, FF, DI, B	HIGH	$$	✓				Growers
Cherry Vinegar	✓	✓		✓	CS, J, FF, FER, A, B	MODERATE	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets
Cherry Wine	✓	✓		✓	CS, J, FF, FER, B	MODERATE	$$ - $$$	✓	✓	✓		Export Markets
Cherry Spirit (Gin, Brandy / Liqueurs)	✓	✓		✓	CS, J, DI, B	HIGH	$$ - $$$	✓	✓	✓		Bars, Bottle Shops, Farmers' Markets

6.3.4 Functional Drinks

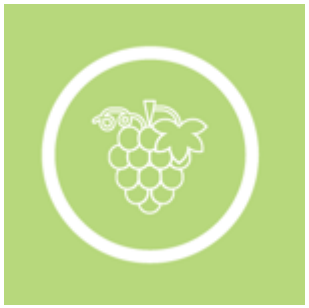
With current cherry harvesting practice and processing, there are limited current options. Fast Freezing will enable additional options for functional drinks – see Case Study – Eden Orchards, above.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Fruit 'Plus' Drinks	✓	✓		✓	CS, J, FD, B	MODERATE	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (from alcohol)	✓	✓	✓	✓	CS, J, FER, A, B	MODERATE	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (brewed as AF)	✓	✓			CS, FER, B	MODERATE	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Drink 'Shots' / Biotics	✓	✓		✓	CS, J, FD, B	MODERATE	$$ - $$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online

6.3.5 Biochemical and Other Fermented Products

There is very little infrastructure to process cherry seeds in Tasmania.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Phenols from seeds	✓	✓			CS, OTH, DP	LOW	$$		✓	✓	✓	Food Manufacturers, Beverage Manufacturers, Alcohol Manufacturers
Cherry Pip biochar	✓	✓			CS, OTH, DP	MODERATE	$$	✓	✓	✓		Growers, Agriculture
Cherry Pip water filtration product	✓	✓			CS, OTH, DP	LOW	$$		✓		✓	Agriculture, Government
Cherry Pip exfoliant		✓	✓	✓	CS, OTH, DP	LOW	$$		✓	✓	✓	Beauty Product Manufacturers
Cherry Pip comforter / ice pack				✓	CS, OTH, DP	LOW	$$	✓	✓	✓		Farmers' Markets, Online Sales
Cherry Pulp / cellulose (for paper)	✓	✓	✓	✓	CS, OTH, DP	MODERATE	$$		✓		✓	Other
Cherry Aromatiser / flavour compound	✓	✓		✓	CS, FF, DRY/FD, DP	MODERATE	$$		✓	✓		Beverage Manufacturers, Alcohol Manufacturers
Beauty Products	✓	✓		✓	CS, OTH, DP	LOW	$$$	✓	✓	✓	✓	Farmers' Markets, Online Sales, Beauty Product Manufacturers
Polyphenol Concentrate	✓	✓		✓	CS, J, FF, FER, FD, DP	MODERATE	$$$$		✓	✓	✓	Beverage Manufacturers, Food Manufacturers



6.4 Grapes

"Convincing growers that grape marc is a viable and significant source of additional revenue is the first step ... along the path to ***reducing waste*** and ***maximising revenue***."

Grape marc is produced when grapes are pressed and includes stems, seeds, skins and some fruit pulp. It is the only grape byproduct from Tasmanian grapes that could viably be used for value-adding processes resulting in increased valorisation of grapes grown in Tasmania.

Convincing growers that grape marc is a viable and significant source of additional revenue is the first step, and the industry will need to undergo some small structural changes to make use of existing grape marc along the path to reducing waste and maximising revenue.

The cost of transport to the mainland remains prohibitive in terms of processing of marc for any products other than very high value products such as concentrated polyphenols and antioxidants. Nonetheless, there are several products that can be derived from grape marc from infrastructure present in Tasmania, as follows.

6.4.1 Frozen / Dried Products

Freeze drying is a viable option for increasing valorisation of grape marc.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Freeze dried grape skin powder (flavour)				✓	FF, FD/OTH, DP	MODERATE	$ - $$	✓	✓	✓		Alcohol Manufacturers
Freeze dried grape skin powder (colorant)				✓	FF, FD/OTH, DP	MODERATE	$ - $$	✓	✓	✓		Alcohol Manufacturers

6.4.2 Shelf Stable Products

There is very little infrastructure to process grape seeds in Tasmania. .

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Grape Seed Oil				✓	OTH, DP	LOW	$$		✓	✓		Supermarkets, Farmers' Markets, Online Sales

6.4.3 Alcohol and Vinegar Products

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Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Grape Spirit (ethanol / GNA)	✓	✓		✓	J, DI	HIGH	$$	✓	✓	✓		
Wine vinegars	✓	✓	✓	✓	J, FER, A, B	HIGH	$$	✓	✓	✓		
Pet Not Wines	✓	✓		✓	J, FER. B	HIGH	$$ - $$$	✓	✓	✓		
Grape Spirit (grappa-like liqueur)	✓	✓	✓	✓	J, DI, B	HIGH	$$ - $$$	✓	✓	✓		

Case Study – Swinging Gate

Doug Cox and his family of winemakers and hospitality specialists are no stranger to innovation. In 2014, they purchased a selection of old vines in the Tamar Valley, and in 2015 for the first time in 15 years, they opened the gate that had been to the public. Hence the name, Swinging Gate Vineyard.

Swinging Gate currently produces one of Tasmania's most diverse range of wines, from Sauvignon Blanc to Reserve Pinot Noir, from Frontignac to Amarone, and a range of Pét-nat varieties. Doug's winemaking history is one of embracing ancient techniques and creating wines that are distinctive to the Tamar Valley and the growing conditions at Swinging Gate.

But perhaps one of their best achievements is taking grape marc and making it into low-alcohol piquette wines, a sparkling wine that is in the range of 5-7% ABV. Having made a few types of piquette wines in 2019, and selling out to very positive reviews from customers, chief winemaker Doug tried again in 2020.

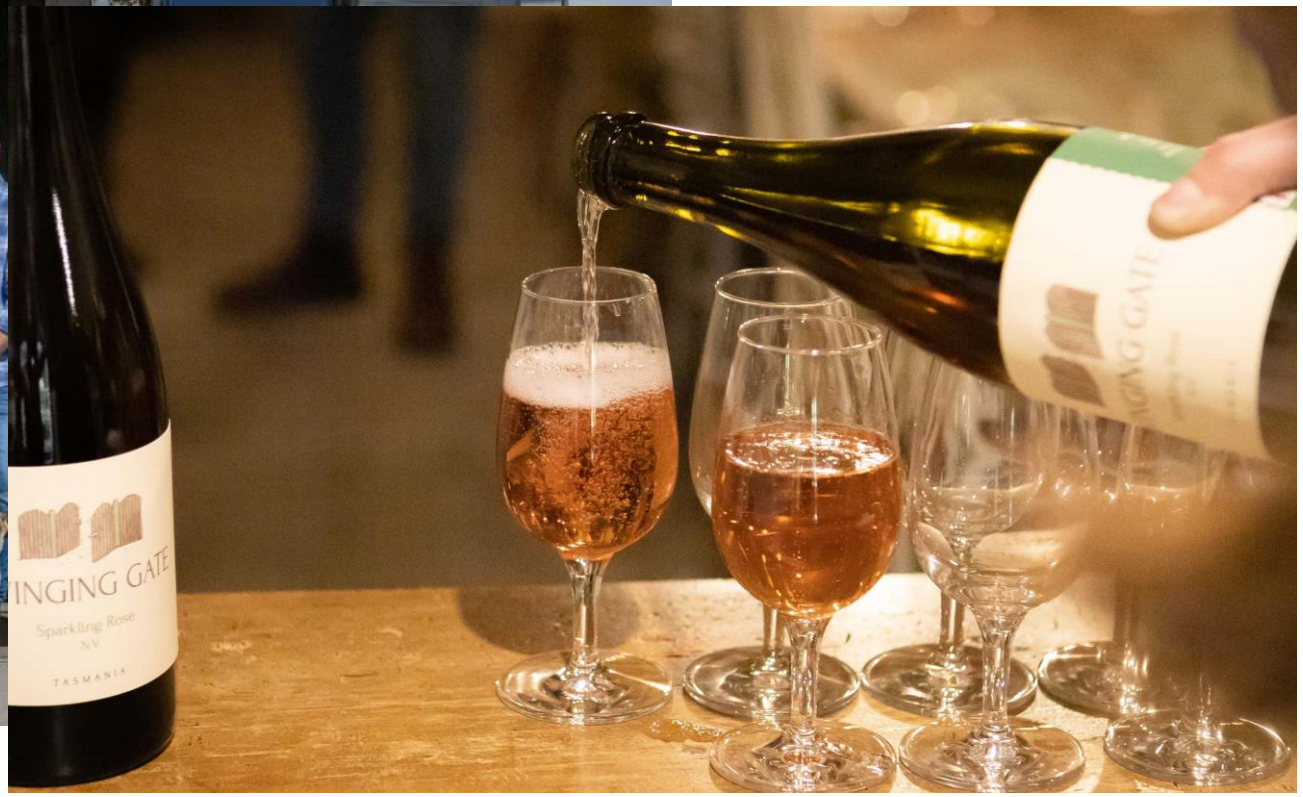
When Doug realised that the 2020 wines weren't of the same standard, he abandoned piquette wines for a few years, until one day he had something of a revelation. He realised that the new grape pressing machine he purchased for the 2020 vintage was much more efficient at extracting liquid from his grapes than the old pressing machine used for the 2019 vintage. As a result, in 2024, he altered the settings for pressing so that 65%-70% of liquid was extracted, down from the 75%-80% that the new machine could extract.

With more pulp left on the grape marc, the Pét-nat variety was back and set to be on the table at the Cellar Door in late 2024. In addition to adding back one of Doug's favourite sparkling wines, the amount of grape marc at the end of the bottling process was reduced by more than 50%. Early indications are also that the remaining grape marc will compost faster than using more traditional pressing and wine production techniques.

Of course, extracting less of the grape juice from the initial press results in lower volumes of the wine from the first press. However, because Pét-nat is a second production method, it results in much larger volumes of wine produced in total. By using techniques known in Roman times and reducing the extraction rate, Doug is able to almost double total production.

Financial projections indicate that by embracing using his grape marc to produce Piquette wines, Swinging Gate will increase its revenue from the same volume of grapes by over 80%, and his profit margin by almost 100%.




INGING GATE
Sparkling Rosé
NV
TASMANIA

6.4.4 Functional Drinks

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Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Fruit 'Plus' Drinks	✓	✓		✓	CS, J, FD, B	LOW	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (from alcohol)	✓	✓	✓	✓	CS, J, FER, A, B	MODERATE	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Alcohol Free Drinks (brewed as AF)	✓	✓			CS, FER, B	HIGH	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online
Drink 'Shots' / Biotics	✓	✓		✓	CS, J, FD, B	MODERATE	$$	✓	✓	✓		Cellar Door, Farmers' Markets, Supermarkets, Online

6.4.5 Biochemical and Other Fermented Products

.

Product	Fruit Quality				Infrastructure Required	Tasmania's Capacity	Product Value	Partners				Markets
	1st	2nd	3rd	Waste				Growers	Processors	Producers	Other	
Tartaric Acid	✓	✓		✓	CS, FF,	MODERATE	$ - $$	✓	✓	✓	✓	
Grape Marc biochar						MODERATE	$ - $$	✓	✓	✓	✓	Growers, Agriculture
Grape seed exfoliant	✓	✓		✓	CS, OTH,	LOW	$$	✓	✓	✓	✓	
Phenols from seeds	✓	✓	✓	✓	CS, OTH,	LOW	$$	✓	✓	✓	✓	
Liquid Tanin		✓	✓	✓	CS, OTH	LOW	$$	✓	✓	✓	✓	
Polyphenol concentrate	✓	✓		✓	CS, J?, FF?, FER?, FD?, DP	MODERATE	$$$$		✓	✓	✓	

7. The value of Tasmania

Tasmania has a strong and long-standing reputation as the home of some of the World's finest produce, meaning products that are Tasmanian-made often have a clear and differentiating selling point in Australian and International markets.

Although identifying the value of Tasmania in selling products was not expressly included in the Project design, all stakeholders have identified the importance of Tasmania as a trusted brand in increasing Tasmania's GDP. Promoting products from Tasmania will create a price premium for some products made in attempting to increase valorisation from Fruit Waste.

Consequently, some analysis of Tasmania's reputation for food and beverages, and leveraging that reputation is warranted.

7.1 Tasmania as a globally recognised region

Tasmania, according to Brand Tasmania[20] is globally famous in agribusiness for its honey, wines, seafood, spirits, beers, ciders, mixers and fruits and vegetables.

Part of Tasmania's reputation is built on the quality of its fresh grown fruits and vegetables, while another part, including Tasmanian's reputation for high quality spirits, is based on commitment to quality without being connected to Tasmanian sourced ingredients other than water.

Tasmania can further leverage its existing Brand to capitalise on high-value products in existing and new markets.

7.1.1 Creative City of Gastronomy

Launceston's status as host of one of the World's few cities recognised as a UNESCO Creative City of Gastronomy, recognises the quality of Northern Tasmania's food and culture. That status also demands an ability to show tangible examples of an ongoing commitment to high quality food products, and the building of the Fermentation Hub Is one of many initiatives in support of Launceston's status.

7.2 Protected Areas of Designation

Regions in the world that have garnered a specific reputation for commitment to quality food are often protected by being legally protected in protected areas of designation. Protection can arise from distinctive foods, such as Parmesan, or food from designated areas, such as Champagne.

7.2.1 Tasmanian Protection

Once it is recognised that Tasmania's culture, growing conditions and environment are unique, recognition of the distinctiveness of Tasmania's produce could follow, along with legal protection in Australia and globally. Types of protection include the following EU categories of protection:

- Protected Designation of Origin (PDO)

[20] https://trade.tasmanian.com.au/trade_snapshots/agribusiness

- Protected Geographical Indication (PGI)
- Geographical Indication (GI)
- Traditional Specialty Guaranteed (TSG)

Protection could be in relation to claims made about goods sold in Australia as to Tasmanian content, such as honey that claims to be Tasmanian with only a small percentage of Tasmanian honey, or for goods sold anywhere in the world, although the latter would require significant lobbying at the international level and a clearly distinctive production method or tradition.

As one example, Tasmania could seek to protect its cider tradition based on uniquely Tasmanian varieties or blends of apples.

7.2.2 Australia's Framework for Protection

Many products sold on mainland supermarket shelves include claims as to Tasmanian origin or content. However, there are few controls on who can make such claims, and on what basis. Further, mechanisms for enforcing such claims are often weak or unsuitable. New technology solutions such as the food traceability and provenance tags from Natural Trace (a FoodTech Tasmania 2023 alumni company) could be one way for Tasmanian companies to protect and validate the origin of their products (https://natural-trace.com/).

Tasmania, as a distinctive region, may benefit from a clearer legislative framework than Australia's existing protections. The Australian legislative framework needs further investigation as Tasmania seeks to assert its claim to being a globally significant region for culture, including protecting Tasmania's interests in producing fine food, wine and spirits.

8. Conclusions and Recommendations

The ultimate aims of this Project are to develop a strong and sustainable agriculture industry in Tasmania and to support the objectives of the Tasmania government to realise a farmgate value of $10 billion by 2050, up from $1.6 billion in 2017-18.[21] That will involve increasing payments for Focus Fruit by-products and waste and also increasing activity on farm to add value to raw fruits.

8.1 Value of this Report

This Report is a significant contribution to growers of Focus Fruits in Tasmania, the Tasmanian Government and businesses seeking to make better use of Focus Fruit Waste. It clearly identifies products of various profit-levels for Focus Fruit Waste.

It is anticipated that this Report, and related Forums, will provide stimulus for new partnerships, new processing infrastructure and initiating research activity to promote waste reduction, waste valorisation, development of circular economies and continuous process improvement within the Tasmanian agricultural sector.

8.2 Value of Connecting People

Creation of higher-value products identified in this Report, including the Case Studies, frequently came from growers and entrepreneurs leading on additional revenue. In conversations with growers, entrepreneurs and processing infrastructure owners, collaboration across those groups was rarely identified. That was confirmed in the May 2024 Forums hosted by the Project Partners, where some of the largest growers of Focus Fruits met the owners of large Tasmanian processing infrastructure for the first time.

Finding ways of connecting stakeholders in any new ecosystem is predictive of increasing valorisation of Focus Fruit Waste, and maximising the potential valorisation identified in this Project.

8.3 Value of Developing ‘New’ Markets

For many lower-value products, there are more cost effective options available on the mainland and in overseas markets. For higher-value products, markets often already exist and efforts sell into those markets that are ‘new’ for Tasmanian growers will increase valorisation.

Without specific resources allocated to market development, increased valorisation is likely to be incremental rather than transformational. As one grower put it, “We need someone out there aggressively selling high-value Tasmanian products.”

“We need someone out there aggressively selling ***high-value Tasmanian*** products.”

[21] https://nre.tas.gov.au/Documents/Tasmanian%20Sustainable%20Agri-Food%20Plan%202019-23.pdf

9. Stop/Go on this Project

The terms of the SIPP Project funding requires a recommendation in this Report about whether additional funding is allocated to further investigate increased valorisation of Target Fruit Waste, including testing the existing infrastructure under the stress of new or alternative valorisation paths and identifying things needed to help Tasmanian growers, entrepreneurs businesses and Government make the best use of those paths.

The overwhelming weight of evidence in the Project to this point supports a very clear GO recommendation to test the infrastructure of Tasmania to support a new ecosystem, including the following observations and factors:

- Increased valorisation for growers of $1.2 million – $10.2 million
- Increased GDP for Tasmania of $55 million – $285 million
- Creation of 100 – 500 jobs in Tasmania
- Excess capacity in certain areas of the existing ecosystem
- Additional value that will be created by investment in infrastructure to support the new ecosystem.

As shown in this report, there are many possible products that may be created using alternative paths within the existing ecosystem, and additional valorisation by using existing infrastructure and by investing in certain parts of a new ecosystem.

9.1 Successful Increased Valorisation Examples

All of the Case Studies in this Report identify non-traditional valorisation of Focus Fruit Waste, including:

1. **Salvage Drinks Co** turning waste fruits and fruit by-products into flavour-forward alcohols (see p. 22)
2. **Eden Orchard** creating a market for cherry juice including promoting health benefits of cherries (see p. 24)
3. **Rowella Cherry Farm** using freezing to shift time of supply of cherries, and creating products that actively seek to reduce the amount of waste from their fruits (see p. 35)
4. **Swinging Gate** using grape marc to produce Pét nat wines, including reducing their waste and increasing profits (see p. 40)

Fruit growers may benefit from understanding such new and existing practices and seeking additional valorisation opportunities in partnership with existing processors and entrepreneurs.

9.1 GO Products Recommendation

The Project Partners unanimously and unequivocally recommend that the remainder of the Project be completed. In particular, testing a new ecosystem should target testing the viability of increased valorisation of Focus Fruit Waste by further investigation of some or all of the products identified in Table 4, listed by each of the Focus Fruits. A larger number of products have been identified than is likely to be tested because it is anticipated that not all products will have willing test partners.

In addition, if the existing ecosystem can cope with freezing cherries, including 2nd grade cherries that have historically remained unpicked and / or gone to waste, then several cherry products become more viable.

Table 4 – Most Viable Products from Focus Fruit Waste

Fruit	Product	Partners Needed	Markets	Product Value
	Functional Drinks	Growers, Processors	Cellar Door, Farmers' Markets, Supermarkets, Online Sales	$ - $$
	Apple Baby Food (fermented)	Growers, Processors	Supermarkets, Health Shops	$$
	Apple Cider Vinegar (high quality)	Growers, Processors	Cider Manufacturers, Cellar Door, Farmers' Markets	$$ - $$$
	Apple Spirits	Growers, Processors,	Growers, Distillers	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$
	Cherry Functional Drinks	Growers, Processors	Farmers' Markets, Supermarkets, Online Sales	$$
	Cherry Shelf Stable Products	Growers, Processors,	Growers, Farmers' Markets, Supermarkets, Online Sales	$$
	Cherry Spirits	Growers, Processors,	Growers, Bottle Shops	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$
	Grape Marc Powder	Wine Makers, Processors	Wine Makers	$ - $$
	Pét nat wines	Growers, Wine Makers	Cellar Door, Bottle Shops, Online Sales	$$
	Grape Spirits	Wine Makers, Brewers	Cellar Door, Bottle Shops, Online Sales, Grower use	$$ - $$$
	Polyphenol / Antioxidant Concentrate	Growers, Processors	Nutraceutical Manufacturers	$$$$

9.2 Socialising a New Ecosystem

Other projects in Australia that have investigated increased valorisation from fruit waste have concluded that successful valorisation requires education of ecosystem participants, facilitation of new relationships, identification of new / existing markets and possible investment in infrastructure. For example, as part of investigations of increasing valorisation

from stone fruit waste in Victoria[22], successful valorisation occurred most often when growers, processors and entrepreneurs worked collaboratively. One of the key project partners, when asked about success in increasing valorisation of only a few of the wide array of identified products in relation to cherry waste, said "The job is to make connections to the infrastructure [owners] and the markets and develop an appropriate product that connects the dots."

Those types of insights, along with our observations in our Forums held in May 2024, mean that it is a recommendation that the Project include a further Forum to bring together potential participants in the proposed New Ecosystem.

"The job is to make connections to the **infrastructure** and the **markets** and develop an ***appropriate product*** that connects the dots."

9.3 New Ecosystem Forum

In order to socialise the findings of this report, and to increase opportunities for collaboration among participants in the existing ecosystem to create new valorisation opportunities, the Project will host additional Forums inviting representatives from the following sub-sectors:

- Growers
- Entrepreneurs
- Processing
- Manufacturing
- Industry Specialists
- Tasmanian grocery buyers
- Tasmanian Government
- Research Providers
- Biotesting

[22] The preliminary reports were conducted by Monash University, https://assets.sustainability.vic.gov.au/susvic/Report-Waste-Valorisation-options-for-stone-fruit-waste-Monash-University_2022-07-18-051339_ehur.pdf

Appendix A – Stages of this Project

Project Stages

Stage 1 – Existing Ecosystem Report
Identification of the existing Ecosystem in relation to Target Fruits.

Stage 2 – Polyphenolic Fruit Byproduct / Waste Report
A Report that identifies the Fruit Waste and by-products from Tasmanian Fruits.

Stage 3 – New Ecosystem Viability Report
Identification of opportunities from a new ecosystem that creates value from Fruit Waste and fruit by-products within Tasmania

Stage 4 – Ecosystem Trial Report
Trials will be conducted to test all elements of the fermentation ecosystem with a view to various scales of production.

Stage 5 – Funding Report
Details of sources and needs for additional capital and infrastructure investment needed to support a new ecosystem.

Stage 6 – Fruit Waste Ecosystem Report
A report that summarises the whole Project, including the value to Tasmania of creating new ecosystems that support maximisation of Tasmania's Fruits.

Project Timeline

2024

STAGE 1:
Existing Ecosystem Report
Identify the existing fruit ecosystem in Tasmania for Target Fruits

STAGE 3:
New Ecosystem Viability Report
Identify existing capacity and additional capacity needed to make the new ecosystem

Q1

STAGE 2:
Fruit Waste Report
Report on the amounts of Fruit Waste in Tasmania for Target Fruits

STAGE 6:
New Fruit Waste Ecosystem Report

STAGE 4:
Ecosystem Trial Report

Q2

STAGE 5:
Funding Report
Detailing areas of investment needed

Stakeholder Consultation

Market creation launch and events

Q3

Further stakeholder consultation

Identification of Innovative businesses

Q4

2025

Target Date for Launch of the world-class fermentasmania Fermentation Hub

Q1



Anticipated Project Outcomes

The Project Partners anticipate several outcomes for the Fruit Growing sector and from the creation of new products and sectors pursuing economic opportunities highlighted in this Project.

Anticipated Project Outcomes for growers

Tasmania's growers can expect to take their share of the creation of new economic opportunities that result in:

- Higher prices for fruits and fruit by-products at certain stages of the existing Target Fruit ecosystem
- Reduced costs in relation to disposal of fruit by-products and fruit waste
- Increased value from fruit by-product streams in new market opportunities
- Reputational benefits flowing from definable and measurable reductions in carbon emissions

It is anticipated that the final outputs of this project will be the identification of:

- Clearer categorisation of Target Fruit by-products and waste streams
- Better reporting of Target Fruit by-products and waste in certain stages of growth and production
- Viable uses of existing Target Fruit by-products and waste streams in the existing and in new ecosystems.
- Highest value uses for underutilised Target Fruit by-products and waste streams.
- Market value of changing farming practice and achieving higher price points for Target Fruit by-products and waste streams
- Job creation opportunities in the Tasmanian food and beverage sector
- Pinch-points of the existing ecosystem in order to identify growth points for an additional ecosystem
- Viability of new food and beverage sub-sectors in Tasmania
- Increased utilisation of existing Tasmanian infra-structure
- Gaps in understanding of the carbon emissions of the Fruit sector in Tasmania

Further, the outcomes of this project will be a necessary input to the successful launch of the Fermentation Hub, targeting:

- 650 new jobs for Tasmanians
- Leveraging Launceston's status as a UNESCO Creative City of Gastronomy
- Food Tourism to Tasmania
- Agri-Tourism to Tasmania

Project Limitations and Exclusions

This project is limited to analysis of Target Fruits, and in addition, the following limitations are expected:

- This Project is only relevant to the 2023 growing season (although may be informed by trends in the 2024 growing season)
- In several areas there aren't complete data sets to facilitate high-quality analysis and projection, including amounts of fruit in long-term storage at farm-level. Data

projections will need to be made from the available data, and it is difficult to know how accurate those projections will be

Appendix B - Reflections on this Report

fermentasmania Reflections

As identified in the McTAvish West report in 2020, growers are loathe to recognise and identify fruits and fruit by-products as 'waste'. Classification of fruit by-products

Project Partners Reflections

Global / Australia Wide

Specific to Tasmania

Other

Appendix C – Project Partners Background and Interested Parties

SUPPORTED BY

Tasmanian Government

Tasmanian Government Supported

In 2021 and 2022, the Launceston region and fermentasmania had watershed years. In no particular order, all of the following happened:

- Funding for building of a Launceston-based world class food hub was secured; including fermenting, distilling and chemical innovation facilities.
- Launceston was designated a UNESCO Creative City of Gastronomy, becoming Australia's second such city.
- fermentasmania successfully applied to the Strategic Industry Partnership Program for funding to engage in this Project.

In 2023, it was announced that fermentasmania had been awarded funding for this project to investigate the viability of using fruit waste as an input into a new and high-value ecosystem.

Fruit growers Tasmania Supported

Fruit growers Tasmania, as the second peak-industry body involved in guiding the Project, represents apple, pear, cherry, berry and stonefruit growers in Tasmania. It represents the interests of Tasmanian fruit growers and is by Tasmania's fruit growers, for Tasmania's fruit growers.

Fruit Growers Tasmania

Fruit growers Tasmania key focus areas are to support growers with matters of pest and disease management, strengthening of national and international trade and to support industry development. Fruit growers Tasmania:

- offers information and support services to make life easier for members as well as other Tasmanian fruit growers.
- organises industry information sharing activities, including orchard walks, field days, and the annual conference.
- ensures representatives and other industry leaders serve on industry Strategic Industry Advisory Panels, representing the State and their colleagues on the boards of national industry peak bodies.

- assists growers with navigating government export registrations and audit processes. Members can use our website to keep up to date with industry and government export information including audit scopes, work-plans, and other relevant information.
- assists growers meet the growing national and international food safety quality assurance certification auditing requirements by coordinating microbiological and residue testing services.

Partner Supported

In addition to Government support, and the peak industry bodies, fermentasmania and Fruit growers Tasmania, several other partners were strategically invited to join this Project. That's because we wanted this project to test the limits of the proposed ecosystem so that any interventions and supports to create new income streams can target the parts of the ecosystem that lack capacity.

Those partners are:

- **University of Tasmania** through **Tasmanian Institute of Agriculture**
  The Tasmanian Institute of Agriculture (TIA) has a mandate to deliver research, industry development and education for the agri-food industry of Tasmania.

  Our vision is to enable Tasmanian food producers and processors to accelerate primary sector productivity while maintaining and improving Tasmania's land and water quality for future generations.

  Close relationships across the agriculture and food value chain at a local, national and international level ensure we are connected with stakeholders and that our research and education priorities support industry needs and aspirations.

  Website: https://www.utas.edu.au/tia

- **Startupbootcamp**
  A global family of industry-focused programs that support early to growth stage food, aqua and agritech founders to rapidly scale their companies. We provide direct access to an international network of the most relevant mentors, corporate partners, and investors.

  We are working with startups with innovative technology, products, services or disruptive business models that solve problems or have solutions for the FoodTech, and Blue/AgriTech sectors.

All our programs align to the UN Sustainable Development Goals, continuing our focus on the Circular Economy, adding value to Australia's animal and horticultural produce as functional foods or ingredients, and finding innovative technologies to help our global food and beverage sector become more efficient and sustainable.

Website:

https://www.startupbootcamp.com.au/programs/foodtech-tasmania

- Clever Fermentation
  Clever develops fermented superfruit health ingredients for nutraceutical, supplemental and functional food brands.

  Website: https://cleverfermentation.com/

- **Forager Foods**
  Forager Food Co. is at the forefront of the Australian freeze-drying industry, offering a range of premium freeze-dried products, all expertly crafted using the finest ingredients and the latest in manufacturing facilities and technology. Commencing operations in 2009 we have quickly grown to be the largest and most advanced manufacturer of freeze-dried products in Australia.

  Forager Food Co. processes, dries, and package a diverse range of foods providing extended shelf life whilst protecting the most valuable and delicate ingredients, including vitamins, minerals, antioxidants, colours, and flavours.

  Our production facilities feature state-of-the-art freeze-drying capability and are supported by full-service manufacturing facilities, including ambient, chilled, and frozen storage, food processing, packing, despatch, and logistics services.

  Website: https://foragerfoods.com.au/about/

Interested Parties

In addition to the formal Project Partners, other parties we have identified with significant interest in the outcomes of this project, and the success of the fermentasmania hub, include:

- City of Gastronomy
- City of Launceston
- Enterprize
- Hort Innovation
- Northern Tasmania Development Corporation
- McTavish West
- Tasmanian Farmers and Graziers Association
- Tasmanian Food Cluster
- Tasmanian Fruit & Vegetable Export Facilitation Group
- Van Diemen Project
- West Tamar Council

Throughout the remainder of this project, we will add to the above list. If you would like to be kept informed of the progress of the project, please contact Dwayne Baraka by email, or on 0481 88 00 46.

Interested sub-sectors

In investigating this report, the following sub-industries were identified:

- Grappa production
- Piquette production
- Polyphenol Concentrate production
- Haskap berry growers

Future parts of the study will try to identify interested parties from within those sub-sectors.