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QMDB project activity 4:

Value chain analysis of high value horticulture products and report documentation from the Queensland Murray-Darling Basin.

Authors and acknowledgements

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Executive summary

The goal of this project is to establish new, profitable and resilient irrigated horticulture value chains in the Queensland Murray Darling Basin (QMDB). The three export chains are:

- frozen sweet corn to Japan,
- fresh blueberries to the United Arab Emirates, and
- fresh leafy vegetables to Taiwan.

No data were obtainable with respect to current or historical import prices of either frozen sweet corn or fresh blueberries (Austrade, pers. comm., 16 March, 2017). However, Austrade advises Australian clients that retail prices are typically marked up by 100-200% on imported prices, including CIF (cost of insurance and freight). Assuming that Australian suppliers cannot influence retail prices, if the importing agent takes a greater percentage (mark-up) then Australian growers get a lower price.

We found that frozen sweet corn production within the QMDB is promising, with good returns for broadacre growers and processors, but the current limitation is capital infrastructure of processing and packaging facilities.

The estimated Japanese import market price are between $1.76-2.64/kg for frozen sweet corn kernels and $1.59-2.39/kg for cobs, based on 200-100% mark up for retail. This would result in expected margins for Australian processors between $0.54-1.34 for frozen sweet corn cobs and $0.37-1.25 per kg of kernels, depending on the mark up requirements.

Under the best case scenario, which may be due to a combination of favourable demand and Japanese/Australian exchange rates, the processor's margins can be as high as $1.30-$2.47/kg for frozen cobs and $1.20-2.49/kg of frozen kernels. Under the worst case scenario the margins are as low as $0.03-$0.56 for cobs and -$0.21-0.39 per kg of kernels.

Exported fresh blueberries is feasible however at the moment local returns offer higher premiums and lower risk, but this may change if there are oversupplies in the domestic market. Labour costs for picking are high and automation may provide Australian growers a competitive advantage in the domestic and international markets.

The estimated fresh blueberry import market price ranged between $15.97-23.98 per kg, based on 200-100% mark up for retail. This could result in the margins for the grower/packer between $2.23-11.81 per kg under the best case scenario, and between $-4.31-2.00 per kg under the worst case scenario.

The expected (average) margins are between Au$-0.91-7.09/kg.

Fresh leafy vegetables is an export opportunity, but this is a small market and limited opportunity when considering the scale of the QMDB. Due to it being a niche market, leafy vegetables have been analysed as a case study rather than a full economic value chain analysis.

Introduction

The goal of this project, *High value horticulture value chains for the Queensland Murray-Darling Basin*, is to establish new, high value, profitable and resilient horticulture value chains within the Queensland Murray-Darling Basin (QMDB).

The project consists of five activities designed to identify and develop opportunities in the Balonne catchment and Border Rivers areas:

1. <u>Crop Suitability</u> – Identification of potential high value horticultural crops to grow in the defined project area at certain times of the year
2. <u>Industry Engagement</u> – Increase capacity of value chain participants to innovate, adopt and implement new business opportunities by engaging local irrigators to identify the barriers to horticulture industry expansion and solutions to overcome these barriers.
3. <u>Market Development</u> – Identify opportunities for horticultural produce in both domestic and export markets, developing an understanding of the market requirements for horticulture products that can be potentially produced in the region.
4. <u>Value Chain Requirements</u> - Develop model supply chains for a range of potential new horticultural value chains identified through Activities 1 – 3. Including a detailed evaluation of value chain requirements (transport, storage, value adding etc.).
5. <u>Business support for new value chains</u> – Provide direct financial support to new, high value, profitable and resilient horticulture value chains in the Qld Murray Darling Basin.

The University of Southern Queensland team and Department of Agriculture and Fisheries have been working on Activity 4: Value Chain Requirements. The objective is to increase high value add produce across the MDB region. This report is the third in the series and analyses value chains that were identified as promising in Activities 1 to 3. These comprise:

- Frozen sweet corn exports to Japan;
- fresh blueberry punnet exports to the United Arab Emirates;
- and fresh leafy vegetables exports to Taiwan.

These supply chains were chosen to cover a range of crop types and potential export destinations. The detailed analysis focuses on two products that have the potential to grow extensively in the MDB region, which are sweet corn and blueberries. The leafy vegetables represent a small, niche market, and there is limited capacity in the region to grow fresh leafy vegetables. Leafy vegetables have been analysed as a case study rather than a full value chain analysis.

While the findings are focussed on these products, they are also intended to be helpful in assessing the business case for other promising irrigated crops within the QMDB and to export destinations along similar supply chains via sea and air freight.

Drawing on the team’s multi-disciplinary expertise we have analysed the export products taking a whole of systems approach that includes economics, quality control and export documentation analytics. In so doing we have been able to develop a deeper understanding of the challenges and opportunities for high value add horticulture.

The report is in three sections, with Section A analysing Frozen sweetcorn to Japan, Section B fresh blueberries and Section C leafy vegetables. Each horticultural product is first analysed from a historical and global context then the product is assessed for the opportunity it presents for Australian farm businesses.

Section A: Export of frozen corn to Japan

Sweet corn, (*Zea Mays Saccharata)* is a cereal grass, but its large and tender grain head is sometimes treated as a vegetable. It is grown in temperate regions of Australia with different planting times based on local conditions.

Corn is a highly versatile crop. Different varieties, and different harvest times produce corn for human consumption, stock feed, processing and ethanol production. Corn is sold fresh, frozen, in vegetable mixtures, as a flour or as corn oil and syrup which are common ingredients in processed food products. This report looks in particular at sweet corn, a high sugar variety that is harvested at the milk stage and is suitable for human consumption or processing markets.

Sweet corn is well suited to production in the Queensland Murray Darling Basin (Carey et al., 2017). Here corn could be a viable irrigated broad-acre crop in rotation with cotton. Maize (harvested at ripening stage for animal feed) is commonly used on cotton rotations as a break crop to reduce pest and disease pressure; however, gross margins are not as high as those offered for sweet corn (AgMargins, 2017). Therefore sweet corn within a cotton rotation is highly relevant to the Murray Darling Basin provided there is a market and processing facilities – the QMDB is currently responsible for 95% of Australia's cotton production (MDBA, 2015).

Global and Japanese sweet-corn markets

Frozen sweet corn exports are led by the United States (73,000 tonnes) and Hungary (59,000 tonnes) with smaller contributions from China (32,000), France (27,000), Belgium (20,000) and Canada (16,000) (Figure 1; FAO, 2016). Japan is the single largest importer of frozen sweet corn, a position is has held since overtaking the United Kingdom (UK) in the early 1990s (Figure 1; FAO, 2016).

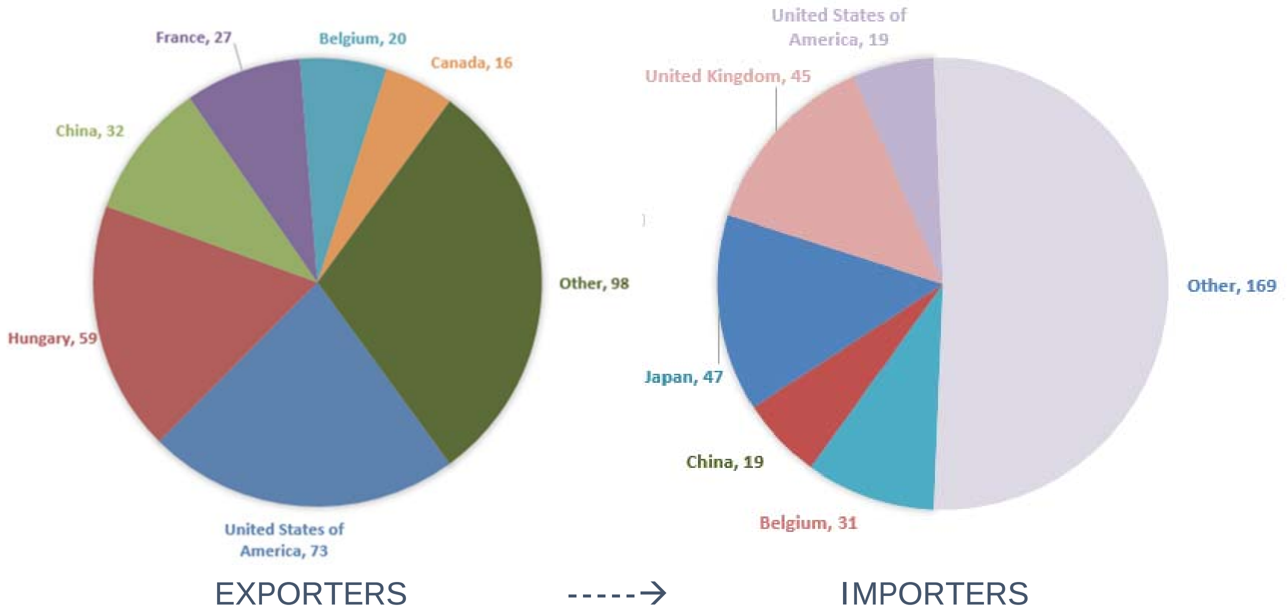
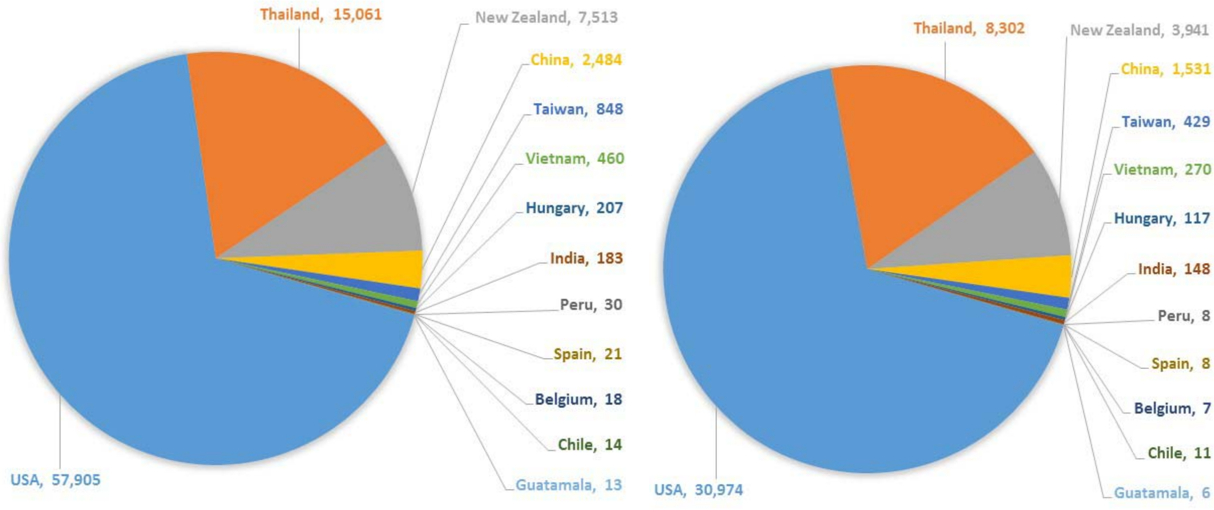


Figure 1: World exporters and importers of frozen sweet-corn '000 Tonnes, 3 year average 2011-13 (FAO, 2016; Crop & Livestock Products - Item Code 447).

Japanese frozen sweet corn imports by origin

Frozen sweet corn for the Japanese import market is mainly sourced from nations on the Pacific Rim. These countries benefit from close proximity and therefore lower shipping costs. The main exporters to Japan are the United States (67%) Thailand (18%) and New Zealand (9%) (volume; Figure 2). From an Australian perspective it is an attractive trade partner, both due to our proximity and the preferential treatment afforded to Australian imports under the Japan Australia Economic Partnership Agreement (JAEPA).



Average value Au$(1000) Average volume tonnes

Figure 2: Origin of imported frozen sweet corn to Japan (2012-15) HS: 071040000 (TSJ, 2016).

Australian exports

In global terms, Australia is a minor corn producer growing 62,019 tonnes of sweet corn in 2014/15 from a production area of 6,865 hectares with a value of Au$62.9m (HIA, 2015). Queensland produced 46% of Australia's fresh sweet corn, followed by NSW (26%) and Victoria (22%) (HIA, 2015). This low production and exports is in part due to the difficulty of matching production with demand of a highly perishable product in the summer period with limited processing facilities. In 2015, India accounted for 70% of Australian exports but this was only 128 tonnes of frozen sweet corn (Warfield et al., 2016). Australia reported no significant export of frozen corn to Japan between 2012 and 2015 (DFAT, n.d.-a). However "ABS unpublished foreign trade data" identified ~190 tonnes of Australian frozen sweet corn was exported to Japan in 2014 (Warfield & Huggins, 2015).

Historical frozen corn price trends, variance and individual sweet corn products landed prices

Based on US export (1989-2009) and Japanese import (2009-2016) values, the world price of corn has declined steadily in real dollar terms at a rate of $0.02/kg/year (Figure 3; USDA, 2010; RBA, 2016; TSJ, 2016). This is consistent with declining trends of many agricultural prices, in response to ongoing improvements in farm and processing technologies, increased production efficiencies, and increasing economies-of-scale at the farm level. The detrended data indicates the variance of price around the long-term average price. The 2016 price of Au$2.13/kg is marginally above the long-term average price of $1.73.

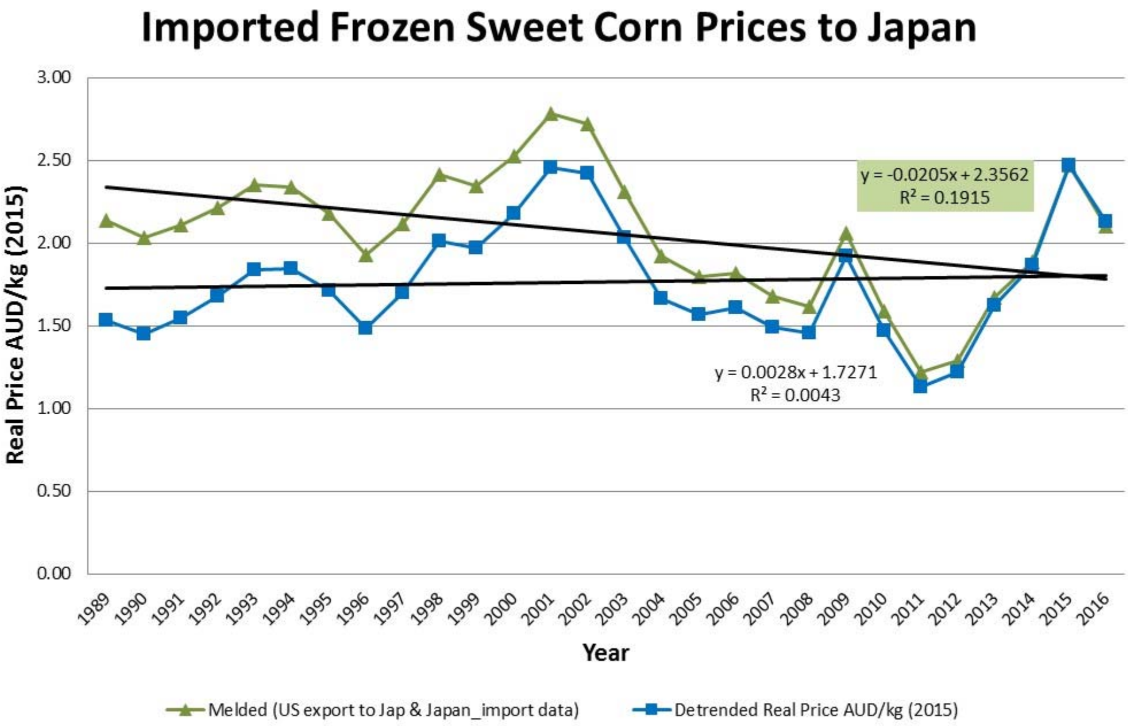


Figure 3: US export frozen sweet corn real prices to Japan (USDA, 2010; RBA, 2016; TSJ, 2016).

The price of imported sweet-corn from the USA into Australia is more volatile than to Japan or the world (Figure *4*). As a small, mostly self-contained market for corn, Australian pricing can be expected to be strongly directed by domestic production with weather events having a significant impact.

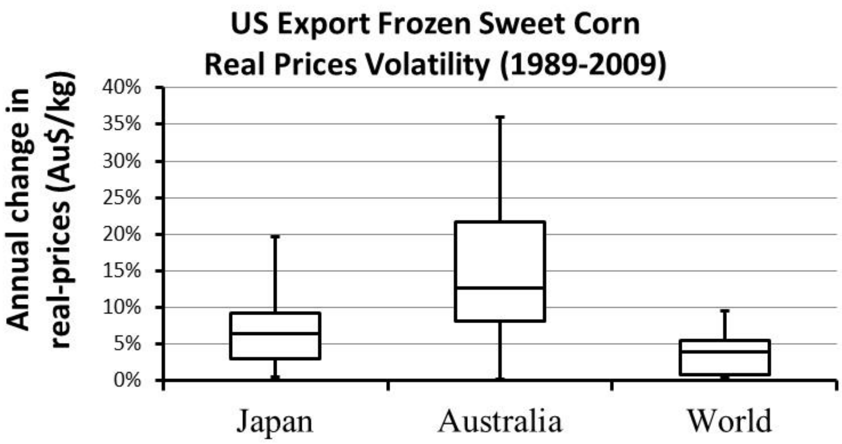


Figure 4: Twenty-year price volatility for US exports of sweet corn by destination 1989-2009 *(USDA, 2010; RBA, 2016; TSJ, 2016). Boxes depict the 25th, 50th, 75th percentiles and whiskers the 0 and 100 percentiles.*

The comparatively steady pricing of corn in the Japanese market makes it attractive as a destination for Australian corn producers.

Exporting frozen sweet corn to Japan

The following sections describe the supply chain, quality control, and economic analysis of exporting frozen sweet-corn to Japan.

Supply chain and market analysis

In Australia, farmers growing sweet corn for freezing are contracted by processing companies. Simplot and McCain are the two major processors in Australia and are both located in Victoria. Recently, McCain stopped contracting Australian sweet-corn growers, leaving Simplot as the only processor for frozen corn in Australia.

The frozen sweet corn supply chain is from the grower through to the end consumer (Figure 5). Whilst it is imperative that Australian growers and processors are aware of the complete supply chain, including consumers' preferences, constraints and risk, there are limitations to what they can action. Within this analysis we will be focusing on the Australian sweet-corn supply chain, with the customer being a Japanese importer or food manufacture.

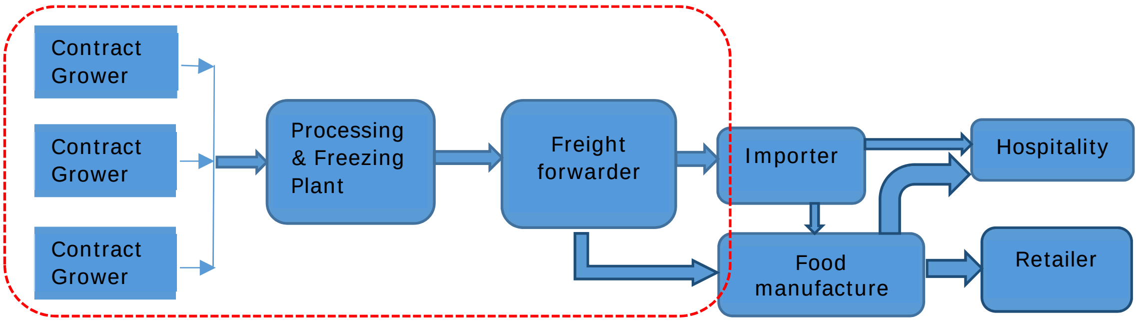


Figure 5: Complete frozen corn supply chain to Japan, red dotted line indicates the Australian sweet-corn supply chain.

To do this we will walk along an existing Australian sweet-corn supply chain operated by Simplot, which is primarily focussed on the Australian domestic mark, but does undertake some exporting via sea freight.

Simplot frozen corn growing, processing and exporting

Simplot provides the sweet corn seed to contracted-growers in Tasmania, Victoria, New South Wales and Queensland, with the main varieties consisting of Escalate, Galaxy and Krispy King. The choice of sweet corn cultivar variety is important as it needs to:

- have resistance against pests and diseases, particularly whose that can damage corn cobs and;
- have a uniform ripening time – one of the most important factors that determines the quality of kernels for processing.

To maintain consistent quality, Simplot is also responsible for harvesting and transporting cobs from the fields to its processing plants.

Fresh corn is highly perishable. The sugar content of corn quickly converts to starch upon harvest if it is not rapidly cooled to 0°C (GCCA, 2008b). Traditional varieties of chilled sweet corn can be stored for 4-8 days. Supersweet varieties have been specially developed with a higher initial sugar content and inhibited sugar-starch conversion. These can be stored for up to 3 weeks.

Freezing is an effective means to improve corn's handling characteristics. Freezing interrupts the conversion of sugar to starch greatly increasing storage life. Frozen corn can be stored for up to 12 months at -18°C or possibly for up to 18 months at -23 to -28°C (GCCA, 2008b). As a further benefit, frozen corn can be kept within a wider range of temperatures than fresh corn.

The quality of sweet corn for freezing and processing is determined mainly by the kernel hardness and taste. The kernel taste largely depends on the content of sugars and water-soluble hydrocarbons (Evensen & Boyer, 1986). To achieve the optimal quality, the corn for freezing needs to be harvested at the right time.

The harvest time is determined by Simplot technicians 2-3 weeks prior to harvesting, a technician visits farmer's crops to take samples of 25 cobs and bring them back to the factory for an assessment. The predictors for harvesting includes sample weight, husked weight, average length, average diameter, kernel weight, moisture content and kernel recovery. When the moisture reaches around 77% and the kernel recovery is reasonable, then it is ready for harvest. If any problems exist, such as high levels of smut[1] or excessive immature cobs, the technician takes another sample, and ultimately decides if the crop is to be harvested. Once the loads have come to the processing plant, another sample is taken. The quality of corn is determined by the level of rejection. If the rejection level is below 8%, growers will receive maximum bonus. As rejection increase, grower's bonus decreases till they have no bonus above a rejection of 11.4%. The rejection level is an accumulation of immature cobs, endfill, grub damages, smut and poor pollination.

Simplot uses sea freight forwarders to manage their products for export to Japan. It takes two weeks to ship frozen corn from Melbourne to Japan. Simplot sells frozen cobs and kernels under the Birdseye brand as cut cobs (1kg bags) and as kernels (0.5kg and 1kg bags). Simplot also sells retail packages that include corn kernels in 'Country Harvest' frozen vegetable mixes and 'SteamFresh' microwaveable portions of frozen mixed vegetables. Japanese food manufacturing customers use the frozen corn to produce mixed frozen vegetable products, or repack the bulk into different package sizes suitable for the local retail or hospitality industry. Some food manufacturers or hospitality firms in Japan may use third party importers to obtain frozen corn from Simplot rather than import themselves due to the small volume they need.

Economic analysis of exporting frozen sweet-corn to Japan

The following sections work along the supply chain: producers, processors, transportation to port, and shipping (freight forwarders) (Figure 5). Within this

[1] A common fungal disease that affects corn and maize.

analysis it will be assumed that the greatest constrain is a processing facility, which does not currently exist within the QMDB. In essence this analysis is looking the viability of establishing such an enterprises in both scale and location(s). Therefore, processors are the greatest stakeholders, as growers have the option of growing alternative crops. It will be assumed that growers will supply fresh sweet corn to the processing plant for a given quality and cost for a required gross margin. Transportation both by land and sea will be assumed to be scale independent. Therefore the processing facility will be the bearer of both risk and rewards of enterprise scale and price changes. They may also be the best party to establish international business relationships and therefore may influence the price they receive for the quality they provide. Moreover they will also be the ones exposed to Japanese and Australian exchange rates. There may also be other influences on price, with respect to tariff agreements between Japan and other countries, as well as supply shocks by other countries that may have a knock-on effect to Japanese market price of imported frozen sweet corn. This risk is also borne by the processor rather than the farmer. To investigate price risk we obtained historical price trends and variances for all sweet corn supplied by the USA to Japan.

Australian sweet corn production costs and gross margins

In consultation with growers and advisors we adapted AgMargins*TM* fresh sweet corn gross margins which are now stored online under “Sweet Corn: For Freezing (Goondiwindi) 2016” (AgMargins, 2017), see 0.

The estimated cost of producing sweet corn for processing into kernels and cobs was $0.354 and $0.159/kg, respectively. This was based on a 45% conversion ratio of cobs to kernels, i.e. it requires 2.22 kg of cobs to produce 1.0kg of kernels. Assuming a yield of 22t/ha under irrigation, which seems high compared to many broad-acre crops but is due to the corn being harvested at the milk stage, and selling it at $300/t or $0.30/kg resulted in a gross margin of $3,099/ha.

Processing of frozen sweet corn

To establish a frozen sweet corn industry within the QMDB would require the establishment of a new processing facility due to the high transportation costs and quality limitations of transporting bulk product to Simplot’s nearest processing facility in New South Wales. Without undertaking a detailed analysis of such a facility, which is beyond the scope of this project, we can make some approximation for such a facility at varying scales. The ideal capacity, with minimum shut-downs of machinery, was assumed to be operating 24hrs a day and 5 days a week to process: 200t, 400t, and 800t/day for the seven month season (Table 1).

Table 1: Annual capital, overhead and variable costs of a new sweet corn processing facility (200t, 400t, and 800t per working week).

	Small plant, optimal capacity 200 t/day	Medium plant, optimal capacity 400 t/day	Large plant, optimal capacity 800 t/day
Initial Factory Costs (bricks & mortar)	$7,500,000	$12,500,000	$20,000,000
Initial Equipment Costs (machinery)	$7,500,000	$12,500,000	$20,000,000
Total Initial Investment	$15,000,000	$25,000,000	$40,000,000
Depreciation $/p.a. (Factory over 25Y & Equipment over 10Y)	$1,050,000	$1,750,000	$2,800,000
Senior staff	$750,000	$1,000,000	$1,500,000
Overheads fixed	$650,000	$1,000,000	$1,750,000
Fixed costs sub total $/p.a.	$2,450,000	$3,750,000	$6,050,000
Production variable costs (8hr day shift)	$200,000	$266,666	$400,000
Operating staff (8hr day shift)	$200,000	$266,666	$400,000
Variable costs sub total $/p.a.	$400,000	$533,332	$800,000

It was assumed that as production increases, afternoon and night shifts will be employed with associated penalty rates of 25% and 50%, respectively. However fixed costs will remain unchanged and production variable costs will be incurred at a standard hourly rate. By working weekends output can be increased to a maximum of 40% more production but at higher cost. The minimum (optimal) total process cost was estimated at $0.13, $0.09, and $0.07/kg for each processing facility scale (Figure 6). We based our total processing cost for this analysis on $0.13/kg for cobs and $0.20/kg for kernels.

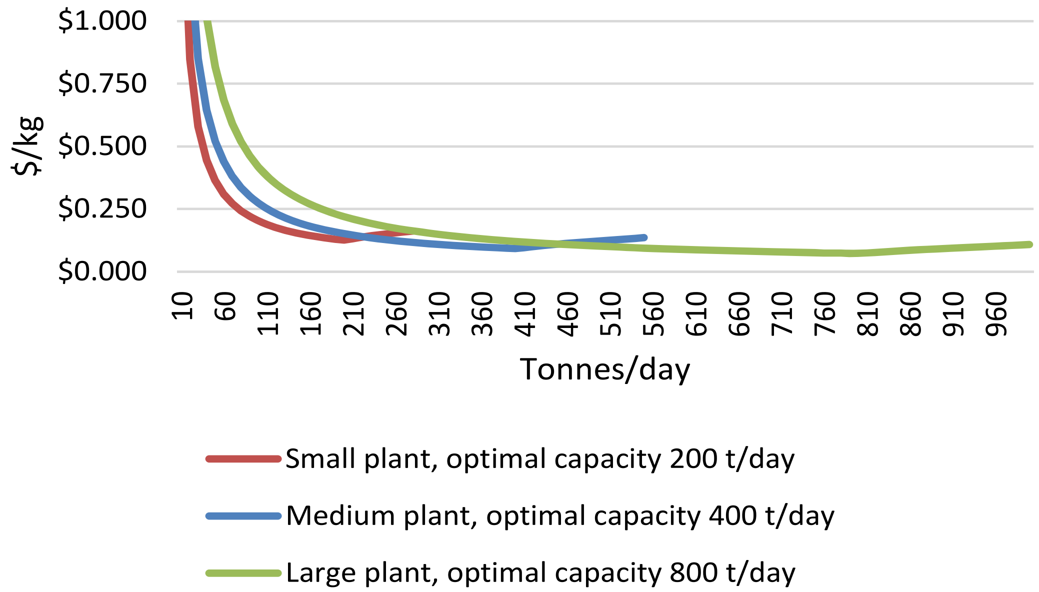


Figure 6: Total cost of processing sweet corn with different enterprise scales.

Packaging of cobs was based on 12 x 1kg bags of cobs per box (38x28x27 cm), with 70 boxes per pallet. Kernel packaging was based on 12 x 1kg bags per box (38x23x26 cm), with 91 boxes per pallet. Using material cost of $0.08 (bags and labels), $1.85 (boxes), and $16.00 (pallet) resulted in material packaging costs of $0.25/kg, for either cobs or kernels.

Freight to port, quarantine (biosecurity), and sea shipment costs

Transportation from the QMDB to port was based on 40' refrigerated containers. The volumetrics of pallets per contain results in 15,120 and 16,794 kg of cobs and kernels per container, respectively. Using $800 for road transportation costs to port and $100 for quarantine-biosecurity cost per container equated to $0.05 and $0.01/kg.

Detailed sea freight costs per container are given in Table 2. The volumetrics per container results in sweet corn cobs and kernels sea freight costs being $0.30 and $0.23/kg, respectively.

Table 2: Sea freight costs from Australia to Japan (M. Parfuss from CMA-CGM Shipping, pers. comm. 16 March, 2017).

Sea Shipment Costs (Freight Forwarder and Shipping Company)		AUD	
Base shipping rate per container		$1,700	per container
Consolidator / freight forwarder charge		$0	per container
Bunker Adjustment Factor (BAF)		$2,100	per container
Origin Terminal Handling Charge (OTHC)		$397	per container
Port Service Charge (PSC)		$188	per container
LoLo (Lift on - Lift off)		$75	per container
Terminal Security (TSS)		$6	per container
Carrier Security (CSS) - normally in USD		$6	per container
Documentation Fee		$95	per Bill of Lading (BL)
Advanced Manifest (AMS) - normally in USD		$32	per Bill of Lading (BL)
Cost per container landed in Japan		$4,599	per container (AUD)
Shipment Details			
Sweet corn cobs (kg) per container	15,120	$0.30	AUD per kg
Sweet corn kernels (kg) per container	19,656	$0.23	AUD per kg

Individual commodity pricing

The prices so far have been based on the World Customs Organization's Harmonized System (HS) code used for customs tariff classification. In this case the 9-digit use was 0710.40.000 (sweet corn frozen). This is for all frozen sweet corn products, which includes bulk processing product through to value added niche ready to use products. Moreover, there is no differentiation between sweet corn cobs or kernels. No data were obtainable from Japanese importers with respect to current or historical import prices of either kernels or cops (Austrade, pers. comm., 16 March, 2017). However, Austrade advises Australian clients that retail prices are typically marked up by 100-200% on imported prices, including CIF (cost of insurance and freight). That is, assuming that Australian suppliers cannot influence retail prices, if the importing agent takes a greater percentage (mark-up) then Australian growers get a lower price. We obtained internet Japanese retail prices for both kernel and cob frozen sweet corn products (Figure 7). For parity pricing, we also obtained Australian retail sweet corn prices.

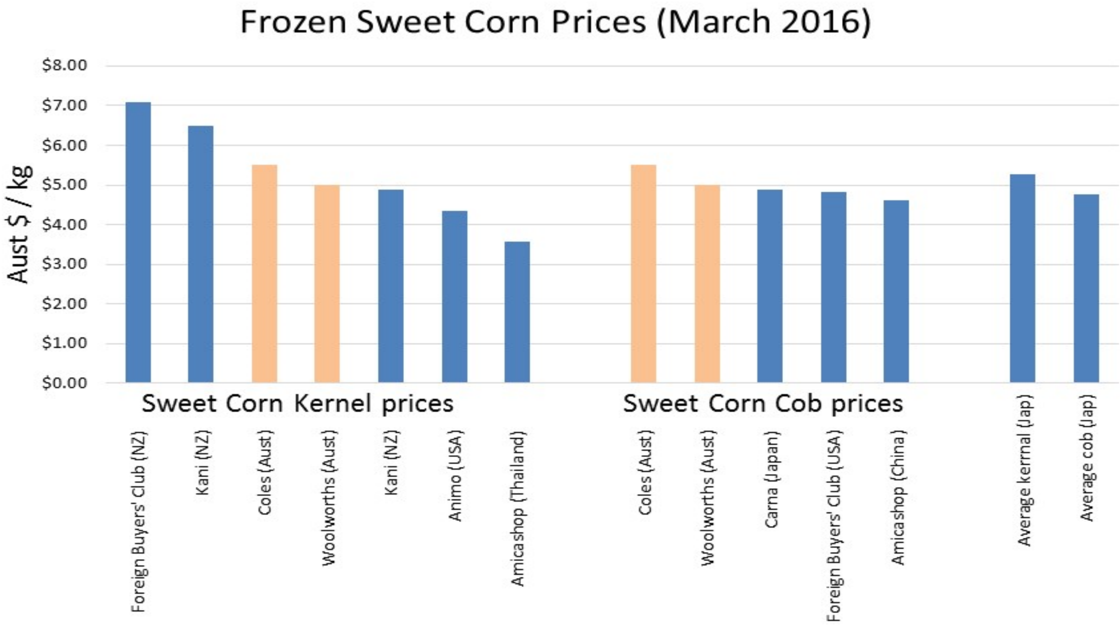


Figure 7: Online retail sweet corn prices of kernels and cobs in Au$/kg (0 has data sources).

The average Japanese online price for kernels and cobs were $5.27 and $4.78 per kg using a JPY/AUD exchange rate of 0.012. This was comparable to the Australian retail price of $5.25 for either kernels or cobs. New Zealand, USA and Japanese prices were higher than those from Thailand and China. Assuming a 200% and 100% mark-up range for retail prices, the Japanese import market price at port were estimated at between $1.76-2.64/kg for frozen sweet corn kernels and $1.59-2.39/kg for cobs (Figure 8).

Australian frozen sweet corn supply costs vs Japanese imported market prices (including CIF) and resulting margins

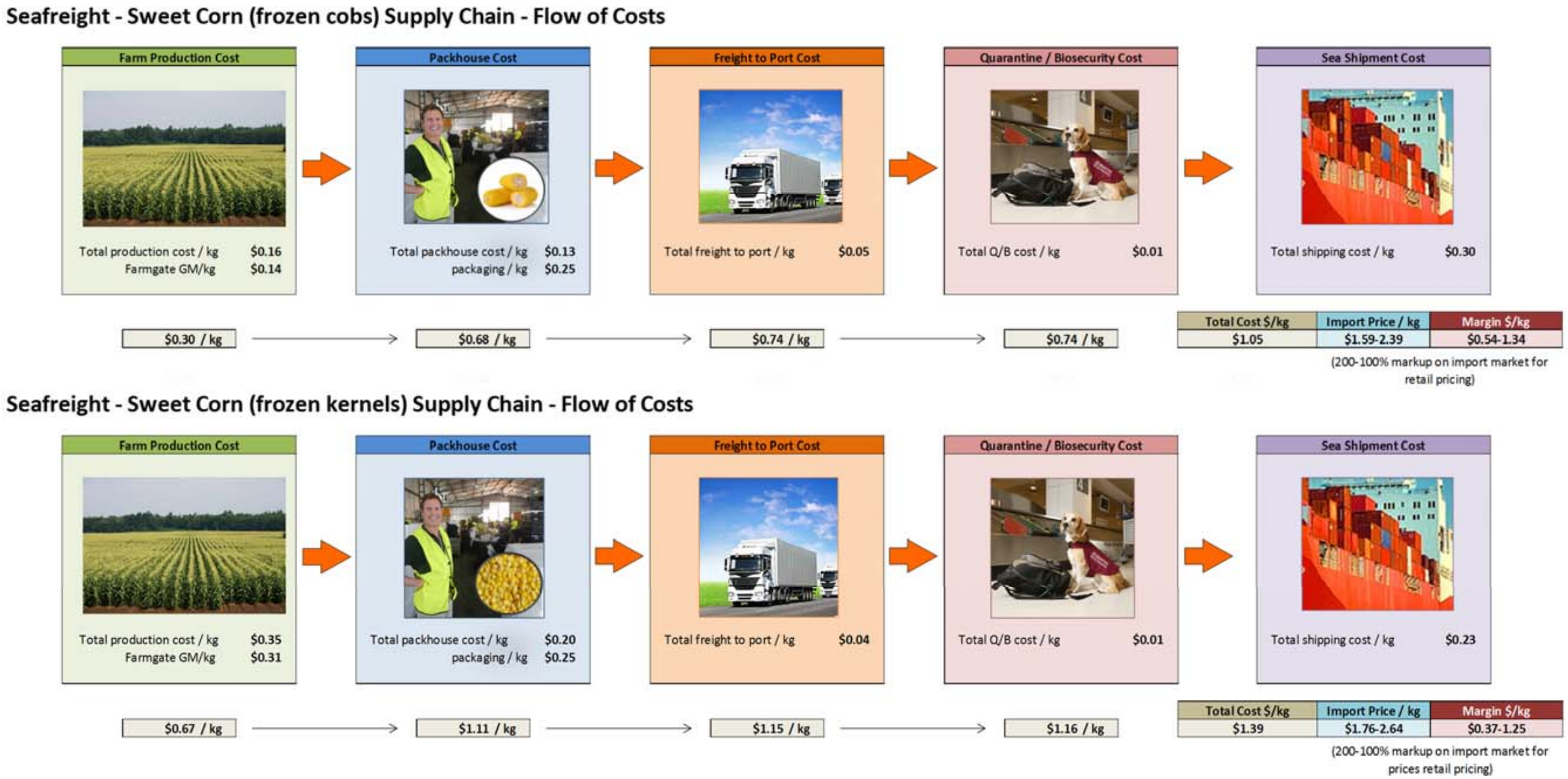


Figure 8: Australian portion of frozen corn supply chain, cobs (top) and kernels (bottom) to Japan

The above diagrams illustrate how supply chain costs are added in the Australian side of the frozen sweet corn cob and kernels against the current (2016) imported market prices including CIF (cost of insurance and freight) based on a range (100-200%) of mark-ups for retail pricing. That is, assuming that Australian suppliers cannot influence retail prices, if the importing agent takes a greater percentage (mark-up) then Australian growers get a lower price.

This results in expected processing margins between $0.54-1.34 for frozen sweet corn cobs and $0.37-1.25 per kg of kernels for the processor. However this does not provide risk information about historical global price variances and exchange rate risks. To do this we used detrending US exported frozen sweet corn prices between 1989 and 2016 in real (2016) Australian dollars (Figure 9; USDA, 2010; RBA, 2016; TSJ, 2016).

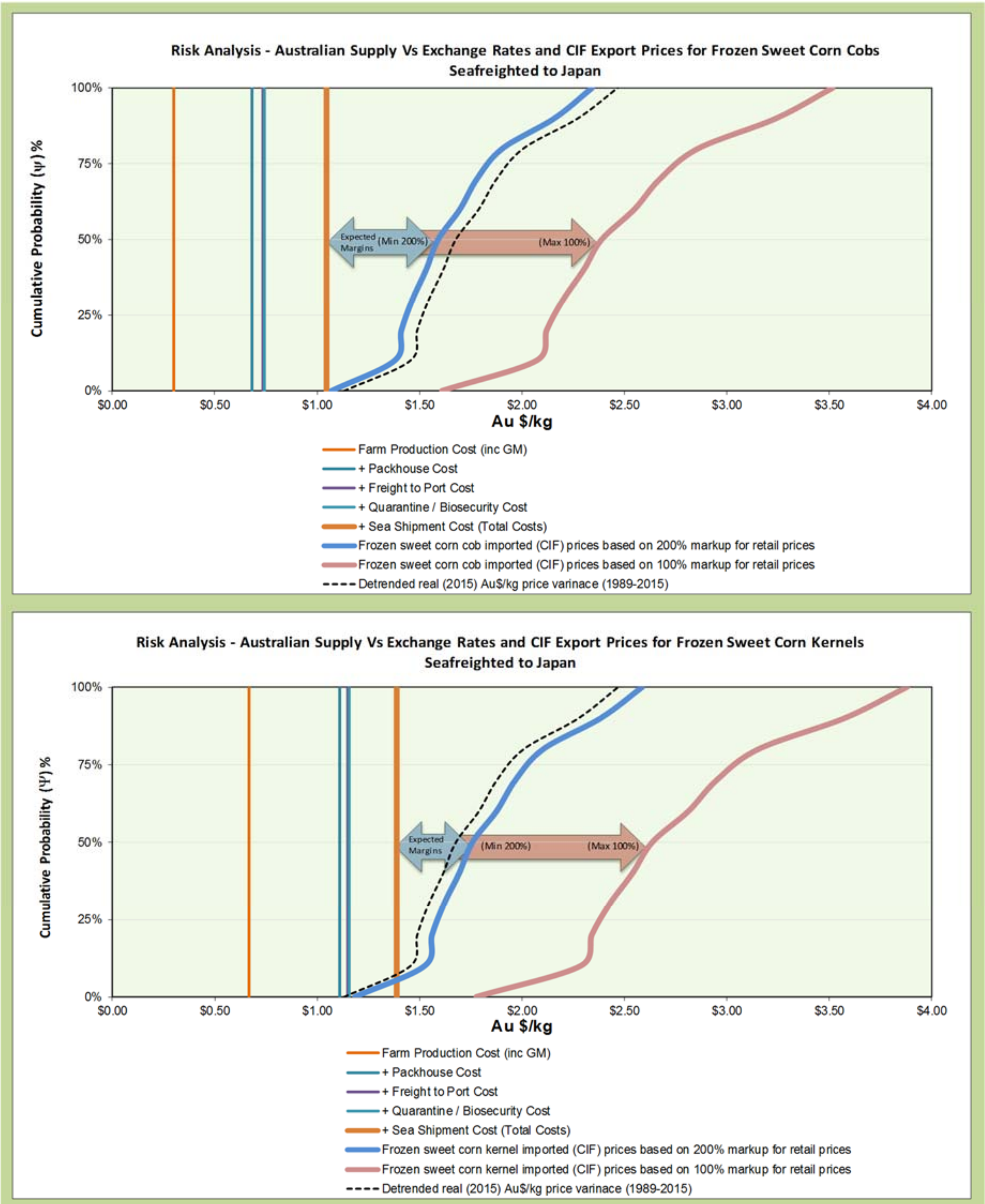


Figure 9: Comparing the estimated cost of suppling sweet corn cobs and kernels (Au$/Kg) to Japanese importers (Figure 8) against the probability of frozen sweet corn CIF prices (Au$/kg), under worst case, best case and the expected (median) outcomes, presented by Ψ = 0, 100 and 50, respectively. Distributions were obtained from detrending US exported frozen sweet corn real

prices between 1989 and 2016 (USDA, 2010; RBA, 2016; TSJ, 2016). This is adjusted based on 100-200% on imported commodities including CIF (cost of insurance and freight) for retail prices.

This distribution of prices is due to both changes in commodity prices based on global supply and demand as well as the Japanese/Australian exchange rates. The detrended US exported frozen sweet corn real prices between 1989 and 2016 (USDA, 2010; RBA, 2016; TSJ, 2016) was adjusted to represent medium (Ψ = 50%) imported market prices between $1.76-2.64 and $1.59-2.39 per kg (being 200-100% mark-up for retail pricing) for frozen sweet corn kernels and cobs, respectively. The margins offered to processor is the difference between total supply costs and imported market prices and at the medium (Ψ = 50%) this is between $0.54-1.34 for frozen sweet corn cobs and $0.37-1.25 per kg of kernels for the processor; which is in line with Figure 8. Under the best case scenario (Ψ = 100%), which may be due to a combination of favourable demand and Japanese/Australian exchange rates, the margins can be as high as $1.30-$2.47 for frozen cobs and $1.20-2.49 per kg of frozen kernels. Under the worst case scenario (Ψ = 0%) the margins are as low as $0.03-$0.56 for cobs and -$0.21-0.39 per kg of kernels. In fact, based on a 200% mark-up on imported market prices for retail and the worst case scenario cob only just breaks even ($0.03/kg), however there is a 6% chance of kernels not breaking even, this is represented by the intersection point of the "+ Sea Shipment Cost (Total Costs)" and "Frozen sweet corn kernel imported (CIF) prices based on 200% mark-up for retail prices" lines in Figure 9.

Trade documentation and tariff analysis

Export of sweet corn from Australia to Japan continue to become more competitive from a tariff perspective. Import duties have been reduced incrementally since January 2015. As of April, 2017, frozen corn imports incur duties of 3.5% (5.3% for mixtures consisting mainly of frozen corn); this is however still much lower than the WTO rate of 10.6% which is paid by the United States. The terms of the Japan Australia Economic Partnership Agreement (JAEPA) place Australia at a comparative advantage to most other western nations including the United States and New Zealand. See 0 for export documentation details of frozen sweet corn into Japan.

Free trade agreements with Japan

Free trade agreements (FTAs) are agreements to reduce barriers to trade between member nations. FTAs may provide for lower tariff rates for goods, exemptions to quotas and/or streamlined customs and inspection requirements.

The Japan Australia Economic Partnership Agreement (JAEPA) is a bilateral FTA that entered into force January 15, 2015. This agreement provides reduced tariffs for many imports and exports between the Japanese and Australian economies.

Making use of the JAEPA

The Japan-Australia Economic Partnership Agreement (JAEPA) offers preferential terms for the export and import of corn. This means that corn exported under this agreement is dutied at a lower rate than would otherwise be available.

The Australian Government has released a set of guidelines to using JAEPA to export and import goods (Figure 10; DFAT, 2015). These are based on the four step process shown in the process diagram below. This section discusses how these steps apply to the export of corn from Australia to Japan.

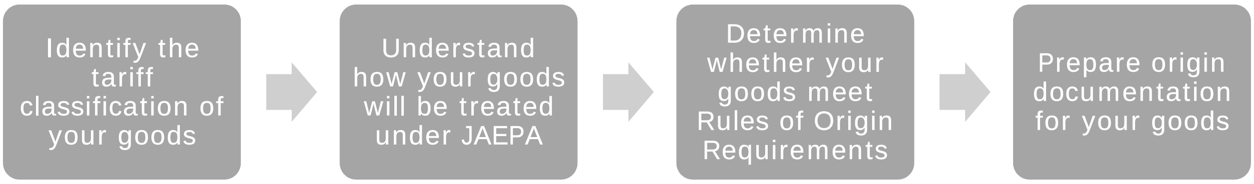


Figure 10: Steps to export and import goods under JAEPA (DFAT, 2015).

Identifying the tariff classification

Corn (*Zea Mays*) is a versatile crop that can be exported in many forms. The tariff and customs treatment, and documentary requirements for the export of corn from Australia to Japan vary by the form in which corn is exported.

These requirements are arrange around a coding system called the harmonised system (HS), an international category structure that includes around 5000 six-digit product categories. These six digit categories are often followed by a sub-classification code which is set at the discretion of the importing country (DFAT, n.d.-b). See 0 for harmonised system codes for the export of corn suitable for human consumption from Australia to Japan.

Table 5 within 0 provides harmonised system codes for corn in various forms. If the product classification is unclear, it is possible to request an advance ruling on classification from Japanese Customs informally via telephone or email or in writing by filing Customs form C-1000 (JC, 2016). Informal requests can be helpful for planning however only responses to written applications are respected by customs examiners.

Understanding how goods will be treated under the JAEPA

Corn is treated differently depending on its form and degree of processing. All of these rates are reduced on 1 April each year until eliminated in accordance with the JAEPA.

Determining whether your goods meet Rules of Origin requirements

Rules of origin set the agreed criteria for which products qualify as originating in Australia for the purposes of free trade agreements. The JAEPA states the following:

(i) Wholly obtained or produced entirely in Japan and/or Australia;
(ii) Produced entirely in Japan or Australia from materials classified as originating under the rules of origin; or;
(iii) Produced in Japan or Australia using inputs from other countries and meets the Product Specific Rule that applies to that product (DFAT, 2015, p. 9).

Corn which is grown in Australia is considered wholly obtained in Australia. The *de minimus* rule provides that a very small proportion of imported inputs such as imported packaging will not affect the products eligibility so long as it does not comprise more than ten percent of the product's value.

Corn grown in other countries will not be considered Australian merely by being packaged or preserved in Australia however more transformative processing, such as the milling of cornflour may qualify under the product specific rules in Annex 2 of the JAEPA.

The JAEPA accounts for modern logistics practices such as shipping hubs, shipments therefore may pass through foreign ports on route to Japan without compromising their status under rules of origin.

Conclusion

We found that frozen sweet corn production within the QMDB for exporting is promising, with good returns for broadacre growers and processors; but, the current limitation is capital infrastructure of processing and packaging facilities. The advantage of this vegetable crop is that it can easily be adopted by broadacre irrigated-farmers within current crop rotations and with little additional on-farm capital expansion. One of the primary farm limitations is to achieve the product within product specification and to arrange harvest timing so that it can be processed. As the sweet corn is processed and frozen the quality is a little less stringent than for the fresh whole corn-ear market. The added advantage is the low labour requirements, where the vast majority of operations can be undertaken by tractor: seeding, spraying and harvesting – which is desirable for many broadacre farmers.

Frozen corn also has a lower risk of obtaining phytosanitary certification, as pest and diseases are neutralised through the processing and freezing operations, compared to fresh product. A possible current limitation is that of international food processor may not be willing to develop a processing infrastructure within the QMDB, as they already supply international markets from other countries. Therefore, there may be opportunities for other capital investors outside of the industry to establish one or more processing facilities to export Australian frozen sweet corn. Within this analysis we had assumed that the processing plant will only operate during the QMDB sweet corn harvesting season (summer), therefore there may also be opportunities to use these facilities for other winter vegetable crops such as frozen bean, peas, sweet potato and carrots. The processing facility may also obtain sweet corn outside of the QMDB to extend the processing window, for example northern NSW or regions north-easterly of the QMDB before or after the QMDB harvesting season. Australia has a comparative advantage in exporting frozen sweet corn to Japan, due to the lower tariff rate of 3.5% compared to the USA with a rate of 10.6%. The Australian Government has released a set of guidelines to using the Japan-Australia Economic Partnership Agreement (JAEPA) to export and import goods (Figure 10; DFAT, 2015).

Section B: Export of fresh blueberries to the United Arab Emirates

Blueberries (*Vaccinium Corymbosum)* are a perennial bush-plant grown commercially for fruit production. Blueberries account ~927 ha and 208 businesses in Australia (ABGA, 2016). The average farm size is ~4 ha, indicating that the average farm has limited production capacity to meet the volume requirements for export. The consolidation of blueberry exports is often done by larger Australian growers or a consolidator. A commercial blueberry trial within the QMDB, at St George in South-West Queensland, as part of the High Value Horticulture Value Chains for the Queensland Murray-Darling Basin Project has shown great production potential (Justin Heaven, pers. comm., 10 March, 2017).

The Australian blueberry industry is still a relatively new industry when compared to many other horticulture industries. The average annual gross margins for blueberries at $16,592/ha is attractive and such blueberry plantings within Australia is continuing to expand the industry (AgMargins, 2017; Carey et al., 2017, see Appendix B). At the moment supply is less than national demand; however, with every increasing plantings supply is increasing. Therefore, exporting blueberries may be an opportunity in the near future to prevent national oversupply.

Global and UAE blueberry markets

Blueberries are grown mainly in North America; the USA produced 239,071 tonnes and Canada 109,007 tonnes (Hortidaily, 2016). This data did not however include Chile, the largest producer in the Southern Hemisphere. Chile exported 91,038 tons in the 2015-16 season (Burfield, 2016, Oct. 24). Australian blueberry production is also not included in FAO statistics but a figure of 6,000 tonnes has been reported, with an average farm-gate price of $20/kg (ABGA, 2016; FAO, 2016).

Between 2011-13, blueberry exports were led by the United States (47,693 tonnes) and Canada (26,673 tonnes) with smaller contributions from Poland (6028), Spain (5958), Netherlands (4688), Sweden (3588) and Morocco (3001), these represent 92% of global exports (Figure 11; FAO, 2016). Interestingly, both USA and Canada are also the largest importers of blueberries (78% of imports), with the rest of the import demand dominated by the European Continent (Figure 11). It is not known what portion of these exports are fresh or processed blueberries.

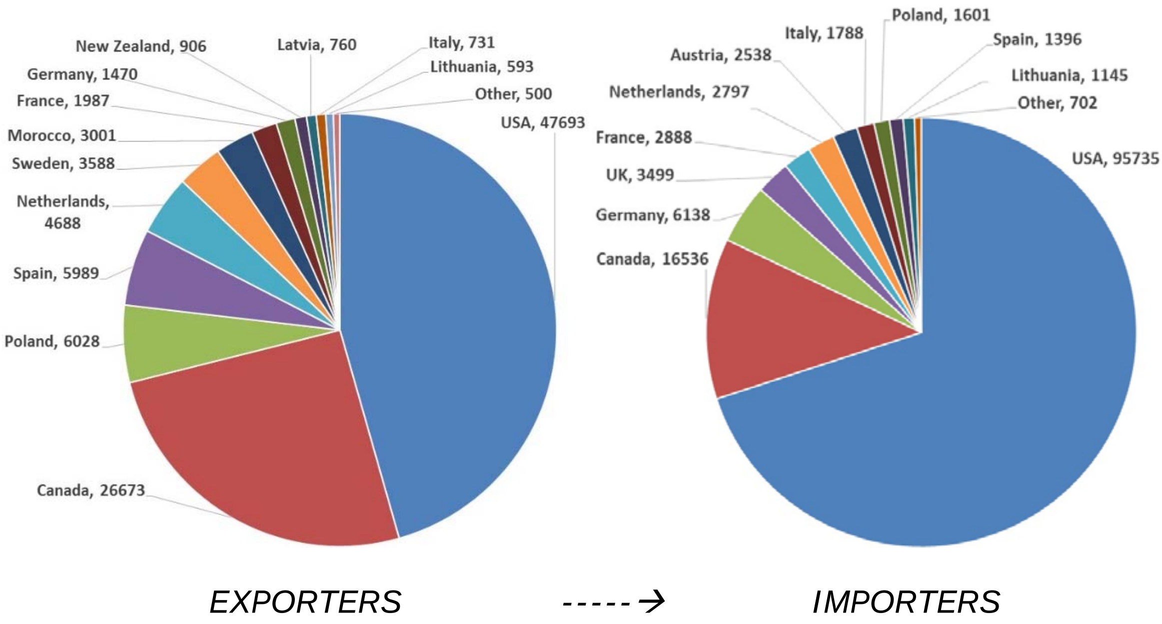


Figure 11: Global exporters and importers of blueberries Tonnes, 3-year average 2011-2013 (FAO, 2016).

Historical blueberry price trends, variance and landed prices

Based on FAO data global blueberry export (1989-2013) data, the world price of blueberries has increased steadily in real dollar terms (Figure 12; FAO, 2016). This may be due to increase demand for the health benefits of blueberries (Wilk & Burns, 2010). This is unusual as agricultural real prices tend to decline, in response to ongoing improvements in farm and processing technologies, increased production efficiencies, and increasing economies-of-scale at the farm level. The detrended data indicates the variance of price around the long-term average price. The 2015 price of Au$5.58/kg is marginally below the long-term detrended average real price of Au$5.94/kg.

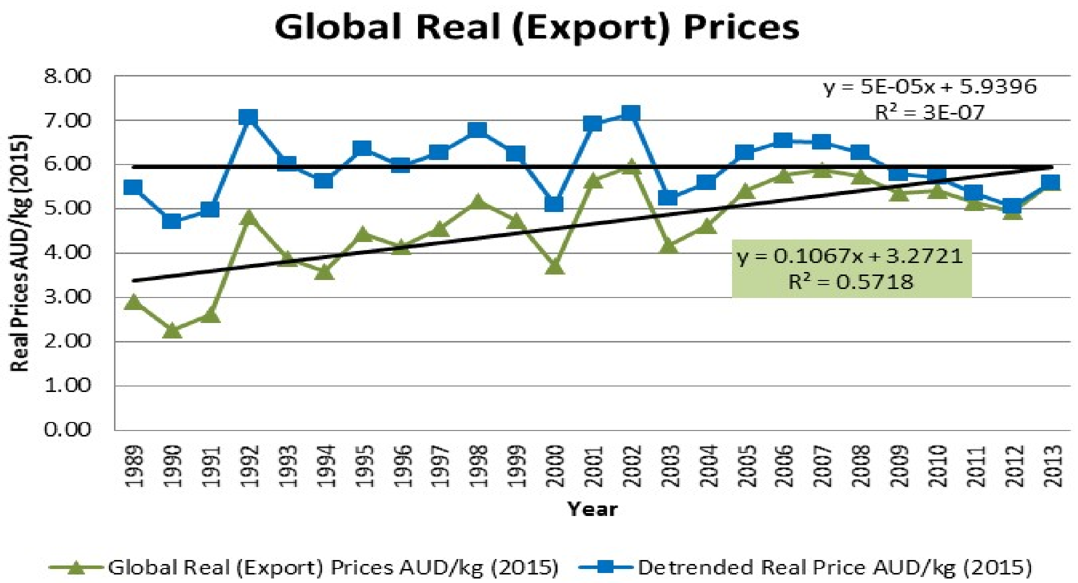


Figure 12: Global (All Countries) blueberry export prices (FAO, 2016; RBA, 2016).

Fresh blueberry pricing from Australia into UAE

The blueberry prices in Figure 12 are for all exported blueberries with no explanation about the portion of production that have been dried, frozen, processed or supplied fresh. This analysis is solely on fresh blueberries to UAE, the information from Figure 12 indicates that future real fresh blueberry prices may increase, it also provides some information around the variance in price from both global supply and demands of all blueberries as well as Australian exchange rates to global markets. We were unable to obtain UAE import blueberry prices (Austrade, pers. comm., 16 March, 2017). However, Austrade advises Australian clients that retail prices are typically marked up by 100-200% on import prices including CIF (cost of insurance and freight). That is, assuming that Australian suppliers cannot influence retail prices, if the importing agent takes a greater percentage (mark-up) then Australian growers get a lower price. The Australian Blueberry Growers' Association Industry Development Officer (Melinda Simpson, pers. comm., 17 March, 2017) also stated that current blueberry prices were ~Au$20/kg landed overseas.

Exporting blueberries to the UAE

The following sections describe the supply chain, quality control, and economic analysis of exporting blueberries to the UAE.

Supply chain and marketing analysis

The fresh blueberry supply chain is from the grower through to the end consumer (Figure 13). Whilst it is imperative that Australian grower/packers are aware of the complete supply chain, including consumers' preferences, constrains and risks, there are limitations to what they can action. Within this analysis we will focus on the Australian fresh blueberry supply chain, with the customer being an UAE importer.

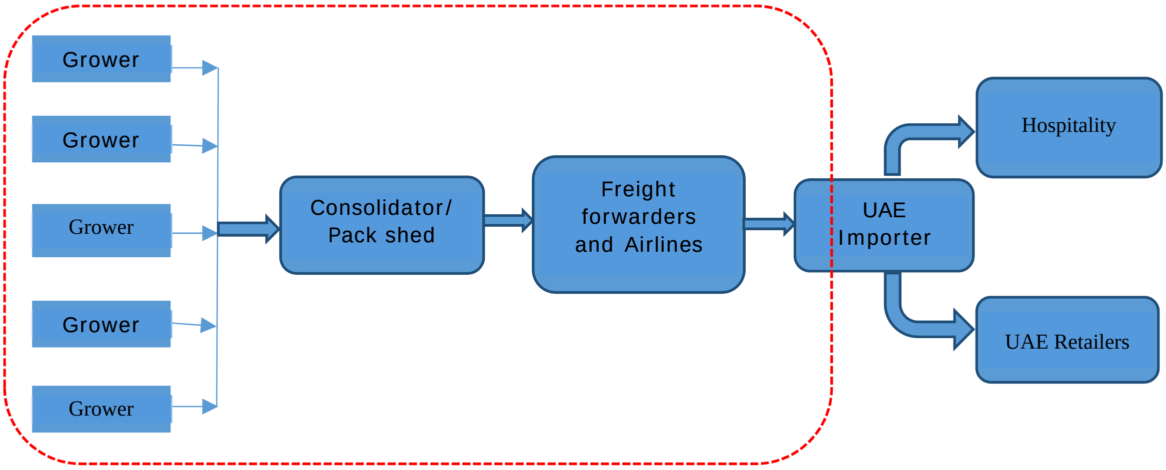


Figure 13: Complete fresh blueberry supply chain to UAE, red dotted line indicates the Australian supply chain.

To do this we will walk along an existing Australian fresh blueberry supply chain, based on exporting via air freight.

Growing, picking, packing and exporting Australian blueberries
Blueberries are produced in temperate to cool regions of Australia. In Southern Queensland, blueberries are in season from June to February. Blueberry bushes are commercially harvested in their second year and produce increasing yields until they reach maturity in their fourth year. Blueberry bushes do not ripen uniformly, and will contain both ripe purple fruit and unripe green fruit.

The quality attributes of blueberries for market, include (AgVic, 2010):

- Intensity and uniformity of blue colour;
- Undamaged fruit;
- Even ‘bloom’ (white, dusty coating);
- Sweetness;
- Juiciness;
- Flavour;
- Sweet/acid balance;
- Firmness/crunch;
- Uniform size; and
- Longer shelf-life.

Although these quality attributes of blueberries are influenced by many factors along the supply chain, harvesting is dominant factor of quality (Kahlke, 2012; DAFWA, 2016):

- Blueberries are classed as climacteric and do not sweeten post-harvest. To ensure consumers receive sweet fruit, blueberries are required to be harvest when mature;
- Given blueberries do not all ripen at the same time, this requires multiple harvests;
- Mixtures of harvested soft ripe and hard ripe fruits can increase the speed of fruit deterioration of all the fruit;
- Blueberries are very delicate and easy to damage. Therefore, pickers need to gently pick fruit with their thumb and forefinger and then place them into a small field bucket;
- Avoid excessive handling to maintain the bloom;
- Keep all harvested fruit out of the sun to reduce rapid deterioration; and
- Avoid harvesting wet fruit as this is susceptible to rapid fungal decay.

Fruit is typically hand harvested as mechanical harvesting has several drawbacks; it can result in more green fruit being picked, ground loss, fruit bruising, and shorter shelf-life. Mechanical harvesting is primarily used for frozen or processed product (GCCA, 2008a). Currently blueberries for fresh markets are generally hand-picked, and often harvested at night, as lower temperatures improve blueberry shelf-life. Blueberry cultivars can also extend shelf-life; Rabbiteye for instance has a strong stem scar making it more resistant to post-harvest infection. Blueberries are also being cultivated for mechanical harvesting, likewise mechanical harvesters are improving, and therefore Australian farmers may reduce high labour production costs within the foreseeable future. As an added benefit, mechanical harvesting may better lend itself to night picking.

Sorting and packaging are also important in quality control. From a picker's bucket, fruit is transferred in crates to the packing shed where blueberries are sorted and most commonly packed in 125g plastic punnets with a lid to prevent moisture loss. Different methods of fruit sorting are used throughout Australia. In recent times, machine packing has been used successfully, but the majority of Australian blueberries are packed through human sorting chains.

The blueberry harvested from individual farms may need to be consolidated before being sent to overseas markets. The consolidation is often done by larger growers or a consolidator in Australia. Individual growers may be contracted to supply a consolidator. To ensure consistent supply, consolidators often develop a good grower-network. By providing various support and services to the grower network the consolidator can sustain the supply to their pack house and overseas customers. Most Australian blueberries are marketed by a produce marketing groups, such as Costa to domestic and international markets. As a marketing group, Costa controls 45% of Australia's total blueberry supply (Costa, 2017).

Shelf life of blueberry is only 1 to 2 days at a room temperature of 20°C and 60% relative humidity (Mercantilia, 1989). Fruit therefore should be forced-air cooled to below 10°C with an objective of lowering the respiration and metabolism of the berries. Fruits are required to be graded and then maintained under refrigeration at 0 to 3 °C within an hour post-harvest to remove field heat and extend storage life (Perkins-Veazie, n.d.). For extended storage, blueberries should be stored at -0.5 to 1.7°C and 90–95% relative humidity. Kept under these conditions, hand-picked 1st harvest blueberries have a shelf life of 12-15 days from harvest. The shelf life of late harvest blueberries is shorter at 7-10 days (GCCA, 2008a). A carbon dioxide rich controlled atmosphere (10-15%) can be employed to extend storage (GCCA, 2008a). Blueberry cultivars can also affect shelf-life; Highbush blueberries for example can be held for up to two weeks whereas Rabbiteye last up to four weeks (Perkins-Veazie, n.d.).

Blueberries can be sent by air or sea to international markets. In Australia, blueberries are exported by air through freight forwarders. This is to reduce the risk of cold chain breakdown and fruit quality deterioration. Blueberries sent to the UAE take about 14 hours on direct flights from Melbourne, Sydney and Brisbane to Dubai and 11 hours from Perth. It could take even longer if the fruit takes indirect flight routes. The UAE boasts some of the most modern airports in the world. Blueberry shipments are usually offloaded, inspected by health officials and cleared through customs within hours of arrival at the Dubai airport. Every shipment is subject to visual inspection upon arrival to ensure compliance with label and shelf life regulations. All shipments are subject to random laboratory analysis. Blueberries will be rejected if found unfit for human consumption or non-compliant with label requirements. In either case, the product would be destroyed by the local municipality or re-exported to the country of origin within 30 days, at the importers discretion.

Once dispatched from the airport, the shipments are sent to the importers' warehouse, from there they are distributed either to the retailer outlets or the hospitality sector (Figure 13).

Economic analysis of exporting blueberries to UAE

The following sections will work along the supply chain: growers, packing shed, transportation to port, and airline freight forwarders (Figure 13). There does not appear to be any major capital infrastructure constraints, as air-freight can be obtained with moderate sized shipments (<1300kg/AKE); however to make it economically viable larger shipment volumes are required and consolidation of fresh blueberries though a single pack-house may be advantageous. Moderate sized blueberry farm enterprises may have the capacity to self-pack these quantities. Therefore we will assume that grower-packer operations will incur all risk and rewards from exporting blueberries to the UAE. They may also be the party best to establish international business relationships and therefore may influence the price they receive for the quality they provide. Moreover they will also be the ones exposed to UAE and Australian exchange rates. Transportation both by land and air will be assumed to be scale independent of cost and the amount transported. There may also be other influences on price, with respect to tariff agreements between UAE and other countries, as well as supply shocks by other countries that may have a knock-on effect to UAE market price of imported fresh blueberries. This risk is also borne by the farmer-packer operation. To investigate price risk we obtained historical global exported blueberry price trends and variances (Figure 12).

Queensland blueberry production costs and gross margins

In consultation with growers and advisors we developed and stored "Blueberries: 3600 under netting (Goondiwindi) 2016" gross margins in AgMargins^{TM} (AgMargins, 2017), see 0.

In order for a blueberry enterprise to be of sufficient size to both pack and export product we have assumed it to be 10ha of production with $156K in overhead and fixed production costs (Carey et al., 2017). Blueberries are a perennial bush which is typically replanted every 8-years. As such we assumed that a blueberry enterprise had a portioned (1/8th) of their production coming out of production and being replanted each year. This results in different annual planted cohorts in different life stages and levels of production (yields), along with different associated production costs. Based on an eight-year average, the annual total production cost was $15,592/ha/year with an average production over an eight year rotation is 9900 kg/ha/year. Therefore the average total cost of packed blueberries at the farm gate was $12.98/kg (0).

Freight to airport, quarantine (biosecurity), and air freight costs

Transportation from the QMDB to Brisbane West (Wellcamp) airport is based on pallets being loaded in refrigerated trucks. There were 12 x 125g punnets per cardboard tray and 240 trays per pallet. This equated to 360kg of blueberries per pallet. Based on 10 pallets per truck with transportation and quarantine-biosecurity costing $500 and $100 per trip respectively; equating to $0.14 and $0.03/kg, respectively. Air freight costs per AKE are given in Table 3. The volumetrics per container results in blueberry air freight costs being $3.73/kg. We obtained internet UAE retail prices for fresh blueberries (Figure 14). For parity pricing, we also obtained Australian retail fresh blueberry prices.

Table 3: Air freight cost from Australia (Wellcamp) to UAE (S. Rider: Vision International Forwarding Pty Ltd, pers. comm., 3rd April, 2017).

Air freight of AKE (1450 kg)	**AUD**	
Internal volume	**4.50**	**m3**
Insulation / Wrap	**$50.00**	**per AKE**
DAFF Facility Fee	**$50.00**	**per AKE**
Documentation Fee	**$85.00**	**per AKE**
AO Inspection Fees	**$150.00**	**per AKE**
EDN / RFP	**$100.00**	**per AKE**
Dry Ice	**$27.00**	**per AKE**
Loading / Cartage	**$200.00**	**per AKE**
Terminal Handling Fee - Origin	**$50.00**	**per AKE**
Original Charges	**$712.00**	**per AKE**
Freight Charges	**$1,900.00**	**per AKE**
Cartage Steri Gas - MAO	**$80.00**	**per AKE**
CIF	**$2,692.00**	**per AKE**
Blueberry tray volume (360 x 260 x 85mm)	**0.00796**	**m3**
Packing efficiency (volume)	**85**	**%**
Trays per AKE	**481**	**per AKE**
Blueberry kg / AKE (12 x 125g punnets per tray)	**721.15**	**kg per AKE**
CIF per kg landed in AUE	**$3.73**	**AUD/kg**

The average UAE online price for fresh blueberries was $47.95/kg using an ADE/AUD exchange rate of 0.36. This was comparable to the Australian retail price of $38.00/kg. The origin of product was not stipulated for some of the stores. Assuming a 200% and 100% mark-up for retail prices, imported market prices (including CIF) were estimated at between $15.97-23.98 per kg, respectively. This supports the premise of current overseas blueberry prices being ~AUD20/kg landed overseas (Figure 15).

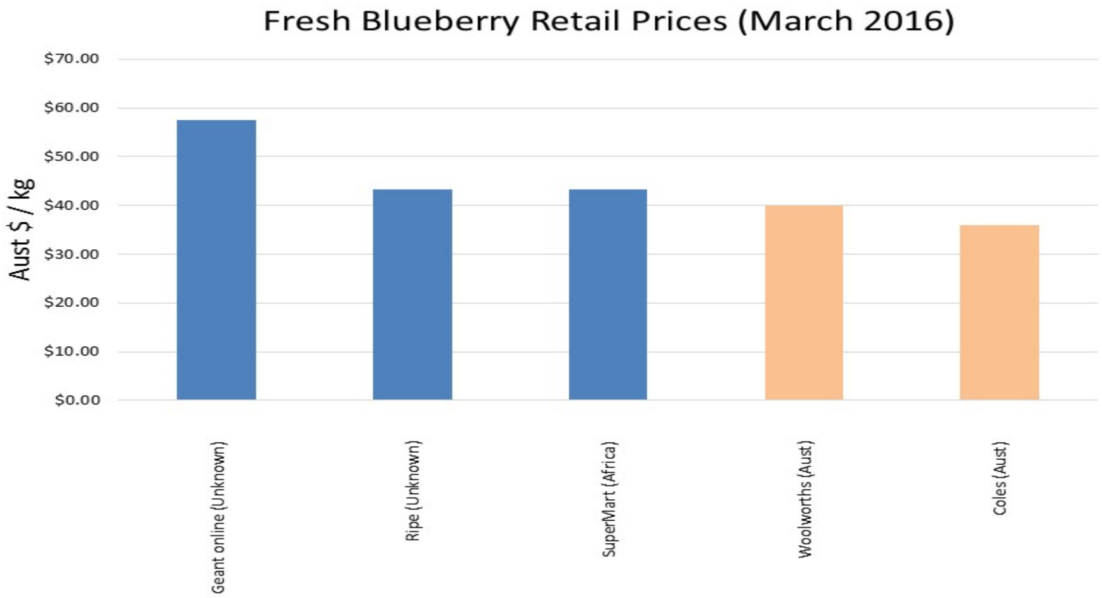


Figure 14: Online fresh blueberry retail prices in Au$/kg (0 has data sources).

Australian blueberry supply costs vs UAE import prices including (CIF) and resulting margins

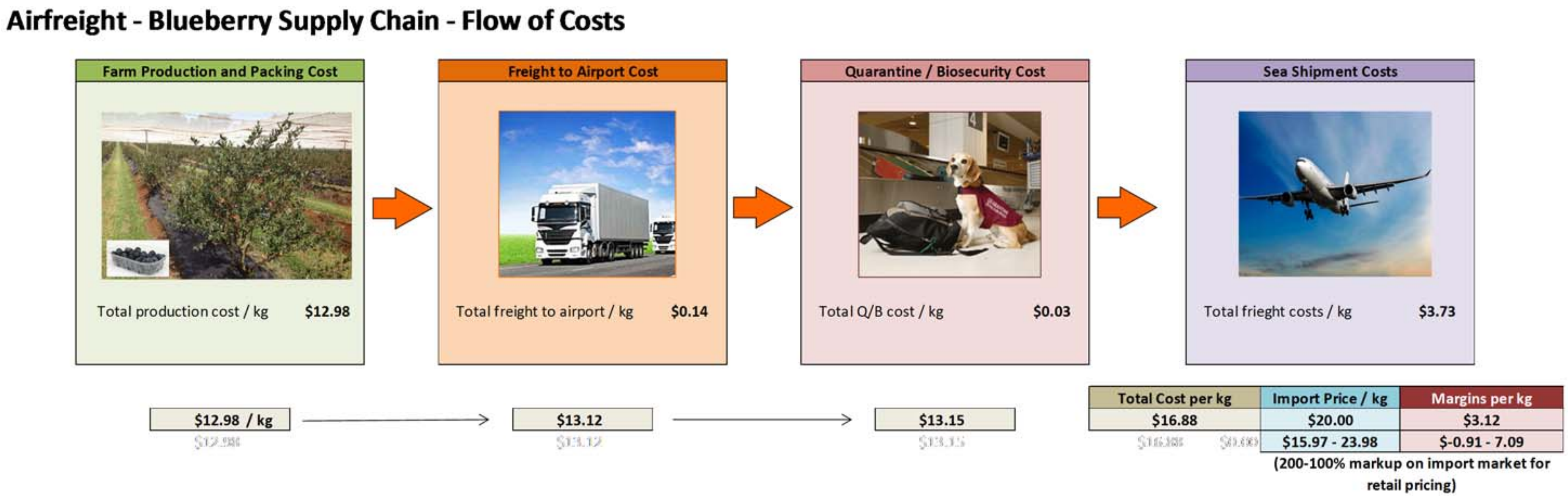


Figure 15: Australian portion of blueberry supply chain to UAE.

The above diagrams illustrate how supply chain costs are added in the Australian side of fresh blueberries against the current (2016) imported market prices including CIF (cost of insurance and freight) range of Au$15.97-23.98, based on a 100-200% mark-up for retail pricing. That is, assuming that Australian suppliers cannot influence retail prices, if the importing agent takes a greater percentage (mark-up) then Australian growers get a lower price. Growing and packing blueberries in Australia captures a higher portion of value in the Australian economy creating positive outcomes for employment and balance of trade per se. However, airfreight is a significant cost, which is not incurred when supplying the Australian domestic market. This resulted in expected margins between Au$-0.91-7.09 for the grower/packer. However this does not provide risk information about historical global price variances or exchange rate risks. To do this we used detrending global (All Countries) blueberry export prices between 1989 and 2013 in real (2016) Australian dollars (Figure 12; FAO, 2016).

Figure 16: Comparing the estimated cost of suppling fresh blueberries (Au$/Kg) to UAE importers (Figure 15) against the probability of UAE fresh blueberry imported (including CIF) prices (Au$/kg), under worst case, best case and the expected (median) outcomes, presented by Ψ = 0, 100 and 50, respectively. Distributions were obtained from detrending global (All Countries) blueberry export prices between 1989 and 2013 in real (2016) Australian dollars (FAO, 2016; RBA, 2016). This is adjusted based on 100-200% on imported market prices including CIF (cost of insurance and freight) for retail prices.

This distribution of prices is due to both changes in commodity prices based on global supply and demand as well as the ADE/AUD exchange rates. The detrended global (All Countries) blueberry export prices between 1989 and 2013 in real (2016) Australian dollars (FAO, 2016; RBA, 2016) was adjusted to represent medium (Ψ = 50%) imported prices (including CIF) between Au$15.97-23.98 per kg being 200-100% mark-up for retail pricing, respectively. The margins offered to growers/packers is the difference between total supply costs and import market prices. At the medium price (Ψ = 50%) this is between Au$-0.91-7.09; which is in line with Figure 15. Under the best case scenario (Ψ = 100%), which may be due to a combination of favourable demand and ADE/AUD exchange rates, the margins can be as high as $2.23-11.81 per kg. Under the worst case scenario (Ψ = 0%) the margins are as low as $-4.31-2.00 per kg. In fact, based on the 200% mark-up of import prices for retail there is a 70% chance of not breaking even, this is represented by the intersection point of the "+ Airfreight Costs (Total Costs)" and "Fresh blueberry import prices based on 200% mark-up for retail prices" lines in Figure 16. Based on Au$20/kg import price (including CIF), there is an expected (Ψ = 50%) margin of $3.12/kg, and a 10% change of not breaking even. Under the worst case (Ψ = 0%) this results in a margin of -$1.13.

Trade documentation and tariff analysis

The United Arab Emirates (UAE) is an attractive destination for fresh blueberries due to its strong market for premium fresh produce and open market system. Berries are popular locally, and are able to achieve a higher price when they are accredited as organic under the Emirates Authority for Standardisation and Metrology (Justin Heaven, pers. comm., 28 October, 2016). Australian growers can seek accreditation under this system through recognised local assessors.

Free trade agreements with UAE

Free trade agreements (FTAs) are agreements to reduce barriers to trade between member nations. FTAs may provide for lower tariff rates for goods, exemptions to quotas and/or streamlined customs and inspection documentary requirements. Australia does not have a free trade agreement with the United Arab Emirates (UAE). The United Arab Emirates is part of the Gulf Cooperation Council (GCC), which comprises Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. While there is no formal free trade agreement, the UAE has a liberal trade regime. Berries can be exported fresh, frozen, dried, or as preserves. Different rules apply based on the form in which the berries are imported. Exports are organised in a coding system called the harmonised system (HS), an international category structure that includes around 5000 six-digit product categories. These six digit categories are often followed by a sub-classification code which is set at the discretion of the importing country (DFAT, n.d.-b). Table 6 in 0 provides HS codes for the export of berries suitable for human consumption from Australia to the United Arab Emirates. The *GCC Unified Customs Law and Single Customs Tariff* sets a 5% tariff on most food imports and no duty on fresh fruit and vegetables – including fresh blueberries. GCC nations have agreed to a single entry policy, therefore once duty has been paid on goods enter a GCC nation no duties are levied for movement to other GCC nations. At present this policy applies only to unopened containers (USDA, 2012). All food shipments are visually inspected upon arrival and may undergo random laboratory analysis. Fines can be imposed for failing to correctly label products. A phytosanitary certificate is required for the import of fresh berries. See 0 for Australian and UAE export-import documentation details of fresh blueberries into UAE.

Conclusion

Exporting fresh blueberries to the UAE is feasible, with no tariff levied on the import of fresh produce; however, at the moments local returns offer higher premiums and lower risk, but this may change if there are oversupplies in the domestic market. The price offered to Australian blueberry growers is similar domestically and internationally; however, the later includes higher transportation costs, higher risk of product being rejected with little possibility of recouping costs from alternative buyers, and international exchange rate risk. Therefore, whilst there is price parity between local and international markets, there is limited benefit from exporting at this stage. However, if there is an increase supply in the domestic market, it is likely that domestic prices will decrease, giving exporting a comparative advantage.

Many Australian blueberry farm are relatively small (~4 ha) and there is little benefit from economies of scale above 20 ha (Carey et al., 2017); however, this is based on labour intensive, hand harvesting. Mechanised harvesting can greatly reduce production costs of both picking and packing – assuming there is little fruit damage. This will involve large capital investment in automated machinery, and economies of scale may greatly reduce average production costs. These reduction in labour costs can also make Australian growers more competitive on the international marked, where fresh blueberry real-prices are tending to increase over time. One limitation to industry expanding is the supply of plant material both physically and via licencing agreements. The latter may also be restrictive in suppling certain blueberry breeds internationally due to international licensing agreements within the importing country.

Section C: Export of leafy vegetables to Taiwan

Taiwan is a developed economy with a population of ~23.5 million people and little poverty and GDP per capita (wealth) increasing faster than many Asian countries (Nations_Encyclopedia, n.d.). Taiwan has well developed cold chain infrastructures which are necessary for the handling of sensitive produce like fresh cut vegetables which have a short shelf life and narrow storage and handling temperature range of (0-2°C), see Table 4.

The colloquial term "leafy vegetables" includes baby cos lettuce (red and green), sweet crunch lettuce, iceberg lettuce, wild rocket, spinach, mesclun, kale, and cauliflower (Dewar, 2016). Products are often sold in packaged ready-to-eat form for cooking or salads for retail consumers or in bulk of for food services such as take away chains or catering. Even the size of retail packaging can range from a couple of grams to kilograms. Unlike frozen sweet-corn and fresh blueberries which are relativity generic, there is no such thing as "a typical leafy vegetable product" as product may be a single, specific vegetable or combination of vegetables in various packaging sizes and styles. Therefore it is difficult to obtain global or even national historical prices. Additionally, instead of going through the conventional chain members such as exporters, importers and wholesales, leafy vegetables are often exported directly from producers to retail chains in Asian countries, often via air top reduce time in transit.

Global and Taiwan leafy vegetable markets

The vast majority of spinach is grown in China, 21,000,000 tonnes in 2013 which is 90% of the reported world supply (FAO, 2016). The remaining 10% is spread thinly among many nations, the largest among these (US) producing only 1.5% of world supply. China is also the majority producer of lettuce though by a lesser margin 13,504,800 tonnes or 54% of world supply. Other major lettuce producers comprise the United States 3,586,106 tonnes and India 1,080,000 tonnes.

An important consideration for fresh cut leafy vegetables is the close proximity of China, Taiwan's largest agricultural trading partner and a region responsible for producing the majority of the world's spinach (85%) and Lettuce (56%) (Meltzer, 2014; Baroke, 2016; Pariona, 2017). Australian suppliers will not be able to compete with Chinese suppliers on price alone, but may be able to leverage its reputation for safety, quality and reliable supply to access premium markets. At least one Australian producer has been able to access the supermarket supply market in the premium segment of the Taiwan retail market (Andrew Dewar from Pilton Valley Produce, pers. Comm., 16 November, 2016).

In 2013 spinach production in Australia was 9,786 tonnes, lettuce production 164,023 tonnes (FAO, 2016).

Exporting leafy vegetable to Taiwan

The following sections describe the supply chain, quality control, and economic analysis of exporting leafy vegetables to Taiwan.

Supply chain and marketing analysis

The fresh leafy vegetable supply chain is from the grower through to end consumers (Figure 17). Whilst it is imperative that Australian grower/packers are aware of the complete supply chain, including consumers' preferences, constrains and risks, there are limitations to what they can action. Within this analysis we will focus on the Australian fresh leafy vegetable supply chain, with the customer being a Taiwan food services or supermarket chain depots.

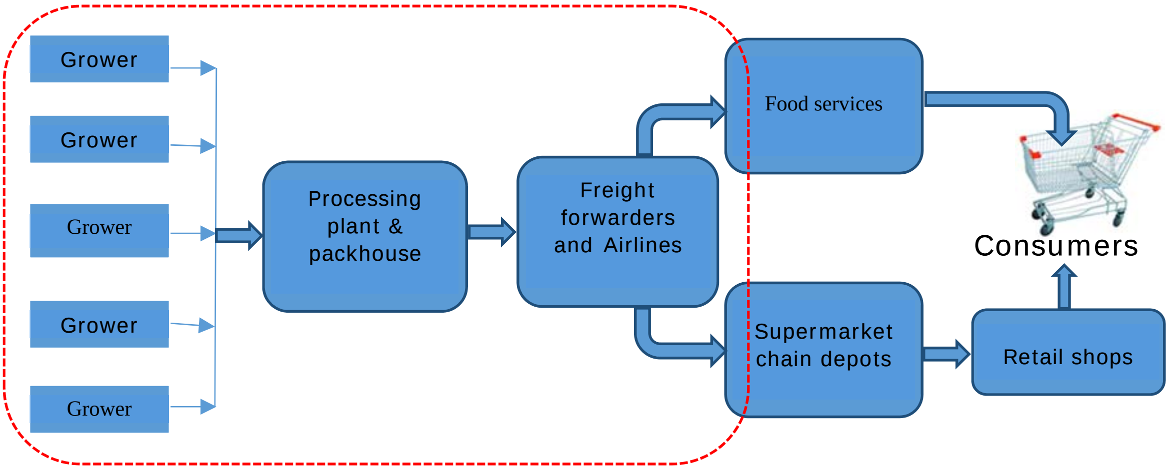


Figure 17: Supply chain for baby leaf vegetables to Taiwan

Fresh cut leafy vegetables such as lettuce, spinach and kale are typically exported fresh, washed and bagged either individually or as a leafy vegetable mix. They are graded as high care or ready-to-eat based on the degree of quality assurance. Baby leaf vegetables that are originally processed to ready-to-eat standard, are sometimes downgraded to high care, due to loss of temperature control within the supply chain (Andrew Dewar from Pilton Valley Produce, pers. Comm., 16 November, 2016). There are two main markets for fresh cut leafy vegetables, retail and commercial food service. The retail market favours small bags (100g-250g) or 1-2 whole heads.

Anecdotally, the export retail market is more willing to pay a premium for quality imports than the food service market. There are sound reasons why this might be the case, restaurants and caterers may be less likely to advertise the origin of their vegetables. Further, flaws or quality issues may be less apparent when the produce is cooked or prepared as part of a larger meal.

Growing, picking, packing and exporting Australian leafy vegetables

Baby leaf vegetables are cultivated with very high plant densities (Figure 18) and harvested and marketed in an immature stage of development compared to other vegetable crops.

Figure 18: Lettuce growing at Pilton Valley, East Greenmount Qld

The quality attributes of baby leaf vegetables include (Andrew Dewar from Pilton Valley Produce, pers. Comm., 16 November, 2016):

- Colour;
- Texture
- Aroma;
- Nutrition; and
- Microbial safety.

These quality attributes is affected all steps along the supply chain, starting from field production, processing, storage and transportation (Figure 19).

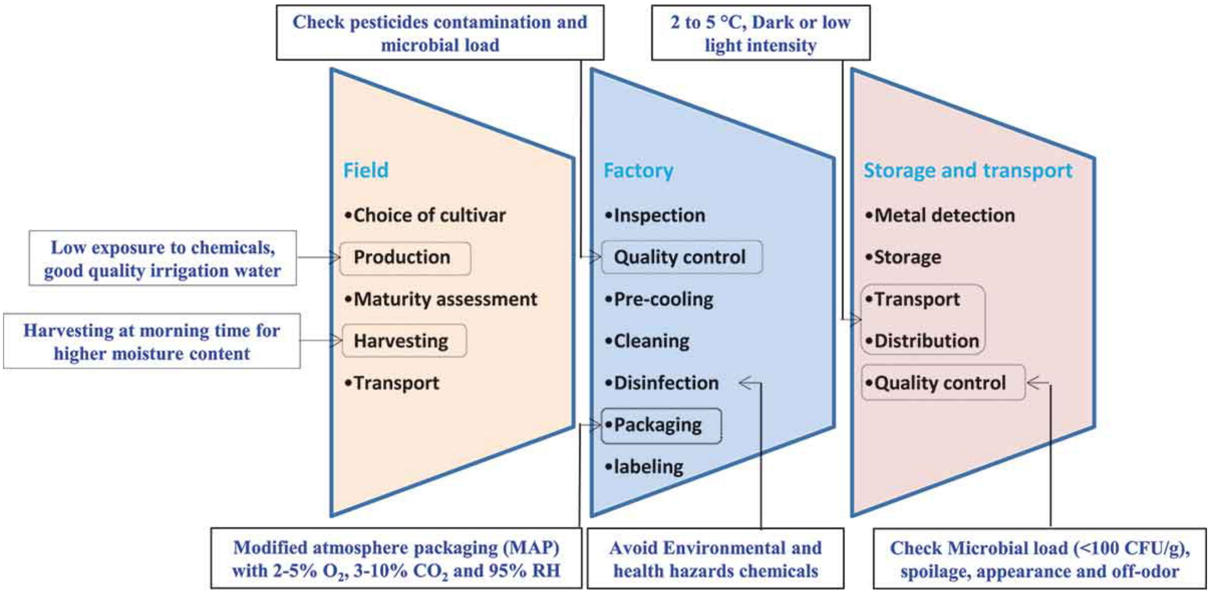


Figure 19: Quality maintenance measures in the baby leaf supply chain (Saini et al., 2016).

During the process of harvesting, processing, storage and transport, the quality could also be affected by various mechanical, chemical, physiological, physical, and microbial hazards (Figure 20). Therefore, a holistic and systematic quality management approach is need.

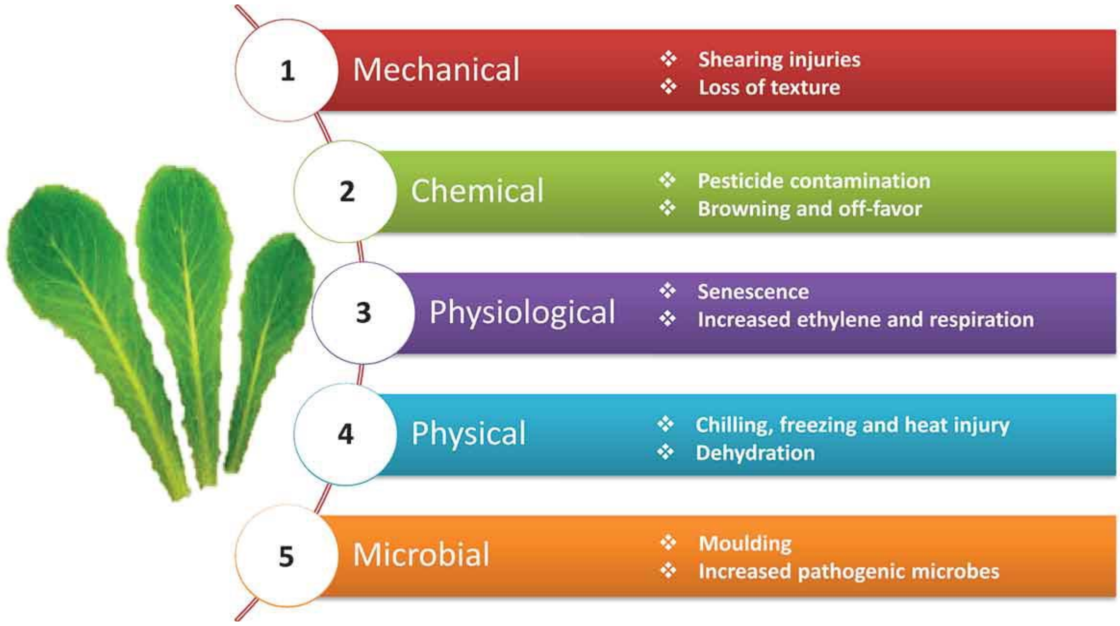


Figure 20: Categories of risk in the baby leaf supply chain (Saini et al., 2016).

Many suppliers use disposable temperature data loggers as well as batch coding to track individual products from paddocks to customer to ensure quality control for these highly perishable products, which are adversely affected by breakdowns in the cold chain. Electronic cloud-based assurance systems allow customers to report quality issues in real-time. Firms willing to export baby leaf vegetables to Asian markets need to develop their own protocols and the codes of practice for the quality control and maintenance based on the factors and aspects described above as well as their own particular situations.

Baby leaf vegetables are harvested and packed into large bulk field bins (Andrew Dewar from Pilton Valley Produce, pers. Comm., 16 November, 2016). They are typically harvested in the early hours of the morning when temperatures are cool, immediately cooled, sorted, washed, dried and packed.

Integrated processing and packing facility are often located on the farm, being owned by the farmer or a cooperation. Most produce is self-farmed; however, to ensure supply consistency, the firm may also contract other farms to supply product either locally or from another region. This may also be advantageous, when product is locally out-of-season or to reduce the risk of adverse localised climatic events, i.e. storms effecting a whole region.

Baby leaf vegetables deteriorate quickly after harvesting and the freshness can drop rapidly, with the browning and decay of soft vegetable tissue. Therefore moving product speedily through the supply chain is a key factor for the success in entering Asian markets. Figure 17 presents a typical supply chain of baby leaf vegetables from the farms in Queensland to the consumers in Taiwan.

To decrease the rate of deterioration, baby leaf vegetables are required to be packed under controlled levels of relative humidity (RH), low-temperature, O2, and CO2 concentration in order to reduce the respiration rate and microbial population. The modified packing atmosphere helps maintain the quality and extend shelf life of baby leaf vegetables. The recommended processing, packaging, and storage conditions for the major commercialized baby-leaf vegetables are listed in Table 4.

Table 4: Conditions for washing packing and storing baby leaf vegetables

Baby-leaf vegetables	Best conditions for washing, packaging, and storing
Spinach (Bergquist et al., 2006; Escalona et al., 2010; Lester et al., 2010; Medina et al., 2012; Tudela et al., 2013)	Processing at medium–low hydration levels (75–85% RH), UV-C doses (2.4–24 kJ m^{-2}), packaging with controlled atmosphere of 0.5 kPa O_2 + 10 kPa CO_2, and storage at 2–4 °C in clear polypropylene bags/containers
Salad rocket (Cefola & Pace, 2015)	Washing with ozonated water (10 mg/L total dose) activated with UV-C or dipping in 1 mM oxalic acid (OA) solution for 1 minute and then stored for 6 days at 8°C
Chinese kale (Noichinda et al., 2007)	Storage at 1 °C (95% RH) under relatively low light levels (21.8 μmol m^{-2} s^{-1})
Romaine lettuce (Martínez-Sánchez et al., 2011)	MAP with low pO_2 (0.2–0.5 kPa), under darkness
Green leaf lettuce (Ölmez & Akbas, 2009)	Washing with 2.0 ppm ozonated water for 2.0 minute, storage at 2–4 °C
Iceberg lettuce (López-Gálvez et al., 2015)	MAP with high O_2 (50% or 90% O_2 compensated with N_2) at 7 °C

There is minimal third-party involvement, mainly freight forwarders and airlines. The advantages of the fresh leafy vegetable supply chain in Figure 17, is that farmers/processors:

1) Can work directly with Asian food services or supermarket chains, making transactions more transparent and cost effective, as well as transferring market information back along the supply chain;

2) Can understand what the market wants and to make a quick response to customer requirements and market changes; and

3) To collaborate with customers (food services and supermarkets) to marketing and crop scheduling plans according to market needs.

Smaller farmers-processors are often in a weaker position when negotiating with large customers, with respect to price or product acceptance. Smaller farmer-processors can improve their bargaining position by cooperating to supply larger volumes, or to coordinate supply across seasons.

An experienced and reliable freight forwarder is used to reduce the risk of cold chain breakdown and product quality deterioration. When the produce is air freighted to Taiwan, it goes through quarantine inspection and then is delivered to the supermarket chain depot. Supermarket chains such as Carrefour and Costco have their own dedicated importers to help with the import paperwork.

Once dispatched from the airport, the shipments are sent to the importers' warehouse. From there, they are distributed to either the food service or supermarket outlet.

Trade documentation and tariff analysis

Packaged food in Taiwan are governed by the *Regulations on Nutritional Labelling for Packaged Food.* These require that all packaged food products carry a general label and a nutritional label in Chinese (USDA, 2016). The Production and

Certification Management of Agricultural Products Act (2006) requires certification of all food sold as organic in Taiwan. There are four domestic accrediting bodies, but imports may only be certified by the Council of Agriculture as outlined in the Imported Organic Products Regulation (Fahey, 2007)

Free trade agreements with Taiwan

Free trade agreements (FTAs) are agreements to reduce barriers to trade between member nations. FTAs may provide for lower tariff rates for goods, exemptions to quotas and/or streamlined customs and inspection documentary requirements. Australia does not at present have a free trade agreement with Taiwan. This places Australia at a competitive disadvantage to fresh cut leafy exporters in New Zealand, who benefit from duty free imports under the Agreement between New Zealand and the Separate Customs Territory of Taiwan, Penghu, Kinmen, and Matsu on Economic Cooperation (ANZTEC)

The council requires applicants to submit a copy of their business licence, certification documents issued by an accredited international certification body, certification of quarantine inspection for imported agricultural products, proposed Chinese labelling, and any other documents required by the council (Fahey, 2007). The council may request that a sample be provided.

Fresh cut leafy vegetables are generally shipped fresh, though freezing is possible in some cases. (i.e. spinach) Exports are organised in a coding system called the harmonised system (HS), see Table 7 in 0. Taiwan maintains a relatively protectionist market for vegetable imports, with fresh cut vegetables dutied at 20% of value under the most-favoured-nation rate, i.e., the rate available to all trading partners. See 0 for Australian and Taiwan export-import documentation details of fresh leafy vegetables into Taiwan.

Whole heads are more risky to export than washed leaves as there is a high risk that contamination by soil or insects will be encapsulated between leaves and therefore evade the quality control process (Storyfresh, Pilton Valley, pers. comm., 16 November, 2016). Quality control is considered very important by growers as any incidence of contamination can have serious effects on reputation with customs and consumers.

Conclusion

Exporting fresh leafy vegetables to the Taiwan feasible; however, tariffs are high compared to other countries, especially New Zealand. Additionally many of our local growers are small compared to the size of Asian food services and supermarket chains. There may be opportunity of growers to collaborate both locally and nationally to secure the supply of high value, high quality products to Asia and simultaneously increase bargaining power. Both Australia and Taiwan have well established and modern air-freight cool supply chains that lend themselves to the exporting of Australian fresh leafy vegetables to the Taiwan. Further investigation of by individual growers will be need by individual growers to establish if a particular fresh leafy vegetables to the Taiwan has economic merit.

Appendices

Appendix A: 2016 irrigated sweet corn gross margins for Goondiwindi (AgMarginsTM)

AgMargin Report Export: Sweet Corn: For Freezing (Irrigated) Lockyer Valley 2016- Andrew Zull
Extracted I 23 February 2017 10:13:23 AM

Commodity Items

Sweet Corn: for freezing		22000 kg/ha	0.3 $/kg	6600 $/ha
			Total:	**6600 $/ha**

Variable Cost Items

Fallow Management				
Operation: Discing	2 operation	0.9 hr/ha	27 $/hr	49 $/ha
Operation: Rotary hoeing	1 operation	1 hr/ha	53.5 $/hr	54 $/ha
Labour (hours)	4 hrs	1 hr/ha	27 $/hr	108 $/ha
			Total:	**210 $/ha**
Planting				
Seed: Sweet corn	1 application	55000 seeds/ha	0.01 $/seedling	550 $/ha
Operation: planter (seed)	1 operation	2 ha/hr	129.68 $/hr	65 $/ha
			Total:	**615 $/ha**
Nutrition				
Operation: Self-propelled sprayer FORM	1 operation	4 ha/hr	60.7 $/hr	15 $/ha
Operation: FWA Light + Spreader FORM	1 operation	2 ha/hr	31.66 $/hr	16 $/ha
Labour (hours)	3 hrs	1 hr/ha	27 $/hr	81 $/ha
Nutrient: Urea - Farm Gate		300 kg/ha	0.54 $/kg	162 $/ha
Nutrient: MAP - Farm Gate		200 kg/ha	0.78 $/kg	156 $/ha
Nutrient: Sulphate of Potash (SOP) - Farm Gate		100 kg/ha	1.68 $/kg	168 $/ha
Nutrient: Ammonium Sulphate - Farm Gate		40 kg/ha	0.48 $/kg	19 $/ha
Nutrient: Solubor (foliar) - Farm Gate	2 application	1 kg/ha	2.5 $/kg	5 $/ha
Contract: Soil analysis		10 ha/test	100 $/test	10 $/ha
			Total:	**633 $/ha**
Irrigation				
Labour: Irrigation and fertigation		2 hr/ha	27 $/hr	54 $/ha
Irrigation: Center Pivot (FORM)		5 ML/ha	70 $/ML	350 $/ha
Consumable: Water		5 ML/ha	20 $/ML	100 $/ha
Irrigation: Water License		0 ML/ha	100 $/ML	0 $/ha
			Total:	**504 $/ha**
Crop Protection				
Operation: Self-propelled sprayer FORM	8 operation	4 ha/hr	60.7 $/hr	121 $/ha
Herbicide: Metolachlor (e.g. Dual Gold)	1 application	2 L/ha	15.4 $/L	31 $/ha
Insecticide: Bacillus Thuringiensis (BT) (e.g. XenTari WG)	2 application	0.75 L/ha	67.76 $/L	102 $/ha
Insecticide: Nucleopolyhedrovirus (NPV) (e.g. Vivus Max)	4 application	0.2 L/ha	129.8 $/L	104 $/ha
Insecticide: Spinetoram (e.g. Success Neo)	2 application	0.4 L/ha	391.64 $/L	313 $/ha
Labour (hours)	3 hrs	1 hr/ha	27 $/hr	81 $/ha
Contract: Crop agronomy/protection	1 application	4 ha/hr	102.6 $/hr	26 $/ha
			Total:	**778 $/ha**
Harvesting				
Harvester: Sweet corn (4 row)	22000		149.28 $/hr	164 $/ha
Operation: Chaser Bin	22000		100.65 $/hr	221 $/ha
			Total:	**386 $/ha**
Cartage				
Transportation: sweet corn ($/t/100km) to Brisbane	22000		0 $/kg	46 $/ha
			Total:	**46 $/ha**
Levies				
Levies: sweet corn		5 %		330 $/ha
			Total:	**330 $/ha**

	Total Income:	**6600 $/ha**
	Total Costs:	**3501 $/ha**
	Gross Margin:	**3099 $/ha**
Corn cobs		
	Total Income $/kg:	**0.300 $/kg**
	Total Costs $/kg:	**0.159 $/kg**
	Gross Margins $/kg:	**0.141 $/kg**
Corn kernels		
conversion ratio (%) of kernels (kg) from cob (kg)	45%	
	Total Income $/kg:	**0.667 $/kg**
	Total Costs $/kg:	**0.354 $/kg**
	Gross Margins $/kg:	**0.313 $/kg**

Appendix B: 2016 irrigated blueberry gross margins for Goondiwindi (AgMarginsTM)

Blueberry gross margins (2016)

based on 3600 bushes/ha under netting in Goondiwindi (AgMargins)

AgMargins Report Export: Blueberries 3600 under netting (Irrigated) Goondiwindi 2016- Andrew Zull

Extracted 23 February 2017 10:13:23 AM

Commodity Items	Year						
	Establishment (Year 1)	Year 2	Year 3	Year 4-7	Year 8-10	8 year rotation average	
Yield (kg/ha)	0	3600	7200	14400	10800	9900	
Income @ $/kg ($/ha)	**$0**	**$72,000**	**$144,000**	**$288,000**	**$216,000**	**$198,000**	**$/ha**
Variable Cost Items ($/ha)							
Preperation & plant management							
Spraying, green manure, bed forming, weed matting & labour	10,981						
Plants	30,240						
Weeding		2,551	2,551	2,551	2,551		
Pruning & thinning		5,103	5,103	5,103	5,103		
Pollination services (bee hive)		900	900	900	900		
Nutrition							
Sprayer		812	812	812	812		
Nutrients	96	959	959	959	959		
Leaf & soil testing		185	185	185	185		
Crop Protection							
Spraying FORM	271	1,015	1,015	1,015	1,015		
Chemicals	1,168	2,541	2,541	2,541	2,541		
Irrigation							
2ML+FORM	140						
6ML+FORM		420	420	420	420		
Harvesting							
Picking labour		13,608	27,216	54,432	40,824		
Packaging		8,976	17,952	35,904	26,928		
Cooling fruit		36	72	144	108		
Packing Labour		1,134	2,268	4,536	3,402		
Packing electricity		450	900	1,800	1,350		
On-farm cartage (FORM)		152	303	606	455		
Levies							
Commission 10%		7,200	14,400	28,800	21,600		
Industry levies 1.1%		792	1,584	3,168	2,376		
Royalties 3.0%		2,160	4,320	8,640	6,480		
Total variable costs ($/ha)	**$42,895**	**$48,993**	**$83,500**	**$152,516**	**$118,008**	**$112,932**	**$/ha**
Gross margins ($/ha)	**-$42,895**	**$23,007**	**$60,500**	**$135,484**	**$97,992**	**$85,068**	**$/ha**

Annual average fixed production costs:	**$5,925**	**$/ha**
Overheads	**$9,667**	**$/ha**
Total overheads and fixed production costs	**$15,592**	**$/ha**

Total Income $/kg:	**20.00**	**$/kg**
Total Costs $/kg:	**12.98**	**$/kg**
Net profit $/kg:	**7.02**	**$/kg**

Appendix C: Frozen sweet corn online retail pricing (March 2017)

Frozen sweet corn retail prices

kernels

Product Image	Country of Origin	Store	Price JPY	Net Weight (kg)	Au$/kg
	NZ	Foreign Buyers' Club	590	1.00	7.08
	http://www.fbcusa.com/general-store-and-deli/fruit-and-vegetables/frozen-vegetables/kernel-corn.html				
	USA	Animo	181	0.50	4.34
	http://store.shopping.yahoo.co.jp/animo-store/4984352617245.html				
	Thailand	Amicashop	297	1.00	3.56
	http://store.shopping.yahoo.co.jp/amicashop/x21140066008.html				
	NZ	Kani	408	1.00	4.90
	http://store.shopping.yahoo.co.jp/kani/ina00041.html				
	NZ	Kani	270	0.50	6.48
	http://store.shopping.yahoo.co.jp/kani/ina00041.html				
	Aust	Coles	N/A	1.00	5.50
	https://shop.coles.com.au/a/a-qld-metro-wilsonton/everything/search/Sweet%20Corn?categoryId=198503&pageNumber=1				
	Aust	Woolworths	N/A	1.00	4.99
	https://www.woolworths.com.au/Shop/Search/Products?searchTerm=sweet%20corn				

Cobs

Product Image	Country of Origin	Store	Price JPY	Net Weight (kg)	Au$/kg
	USA	Foreign Buyers' Club	230	0.57	4.83
	http://www.fbcusa.com/general-store-and-deli/fruit-and-vegetables/frozen-vegetables/sweet-whole-corn-on-the-cob-1-ear.html				
	Japan	Carna	3400	8.33	4.90
	http://store.shopping.yahoo.co.jp/carnafoods/13115.html				
	China	Amicashop	345	0.90	4.60
	http://store.shopping.yahoo.co.jp/amicashop/x40540102006.html				
	Aust	Coles	N/A	1.00	5.50
	https://shop.coles.com.au/a/a-qld-metro-wilsonton/product/birds-eye-corn-cobs-sweet-frozen-extra-juicy				
	Aust	Woolworths	N/A	1.00	4.99
	https://www.woolworths.com.au/Shop/Search/Products?searchTerm=sweet%20corn&name=birds-eye-corn-cobs-super-sweet&productId=93832				

Appendix D : Fresh blueberry online retail pricing (March 2017)

Fresh blueberry retail prices

UAE

Product Image	Country of Origin	Store	Price JPY	Net Weight (kg)	Au$/kg
	Unknown	Ripe	15.00	0.125	43.20
	http://ripeme.com/product/blueberries/				
	Unknown	Geant online	19.95	0.125	57.46
	http://grocery.geantonline.ae/p-79694-blueberry-per-pack-125-g.aspx				
	Africa	SuperMart	15.00	0.125	43.20
	http://supermart.ae/fruits/12683-blueberries-125g.html?search_query=blueberries&results=5				

Australian

Product Image	Country of Origin	Store	Price AUD	Net Weight (kg)	Au$/kg
	Aust	Coles	4.50	0.125	36.00
	https://shop.coles.com.au/a/a-qld-metro-wilsonton/product/blueberries-prepacked				
	Aust	Woolworths	5.00	0.125	40.00
	https://www.woolworths.com.au/Shop/Search/Products?searchTerm=blueberries&name=blueberry-fresh&productId=169792				

Appendix E: Harmonised System codes

The Harmonized Commodity Description and Coding System, commonly abbreviated to Harmonised System (HS), an international category structure that includes around 5000 six-digit product categories. These six digit categories are often followed by a sub-classification code which is set at the discretion of the importing country and may differ between importing nations (DFAT, n.d.-b).

Tariffs

Tariffs also known as duties are taxes levied on the import of goods. The tariff available to all importers is known as the most favoured nation rate. Lower preferential tariffs are often negotiated to facilitate trade between two or more nations. These are discussed loosely as free trade agreements and may be bilateral (two nations) or multilateral (three or more nations).

Tariffs are levied according to the value *(ad valorem)* or by the volume, mass or quantity of import (*specific rate*). Tariffs on value are usually calculated based on the import values (including CIF) which includes the cost, insurance and freight of the product.

Table 5: Harmonised System codes for corn exports to Japan

Corn product	**Harmonised System Code**	**Tariff (Jaepa)** (1/4/17)
frozen sweet corn (Including husked and unhusked cobs, kernels and baby corn spears. Uncooked, steamed or boiled)	0710.40.000	3.5% of CIF value, reduced annually, free by 1 April 2019.
frozen mixed vegetables consisting chiefly of sweet corn (Uncooked, steamed or boiled)	0710.90.100	5.3% of CIF value, reduced annually, free by 1 April 2021.
frozen mixed vegetables (Uncooked, steamed or boiled)	0710.90.200	Free
fresh or chilled sweet corn (Including husked and unhusked cobs, kernels and baby corn spears.)	0709.99.100	Free
popcorn (raw dried kernels that explode under heating)	1005.90.020	Free
stock feed (must not be used for human consumption)	1005.90.010	Free

Table 6: Harmonised System codes for berry exports to UAE (UAEFCA, 2012)

Berry Product	Harmonised System Code	Tariff (1/12/16)
Fresh Strawberries includes chilled	08.10.10.00	Free
Fresh Raspberries, blackberries, mulberries and loganberries includes chilled	08.10.20.00	Free
Frozen Strawberries with or without sugar or other sweeteners	08.11.10.00	5% of CIF value
Frozen Raspberries, blackberries, mulberries and loganberries with or without sugar or other sweeteners	08.11.20.00	5% of CIF value
Jams, fruit jellies, marmalades, purees… etc obtained by cooking, whether or not containing added sugar or other sweetening matter	20.07.99.16 (strawberry) 20.07.99.17 (raspberry) 20.07.99.19 (other)	5% of CIF value

Table 7: Harmonised System codes for Baby leaf exports to Taiwan (Chinese Taipei, WTO, 2016)

Baby Leaf Product	Harmonised System Code	Tariff
Fresh Spinach includes chilled, baby leaves	0709.70.00	20% of CIF value
Head Lettuce Lactuca sativa, includes whole head, leaves	0705.11.00	20% of CIF value
Chicory Chicorium intybus	0705.19.00	20% of CIF value
Frozen spinach	0710.30.00	20% of CIF value

Frozen (sweet corn) tariffs 0710.40.000

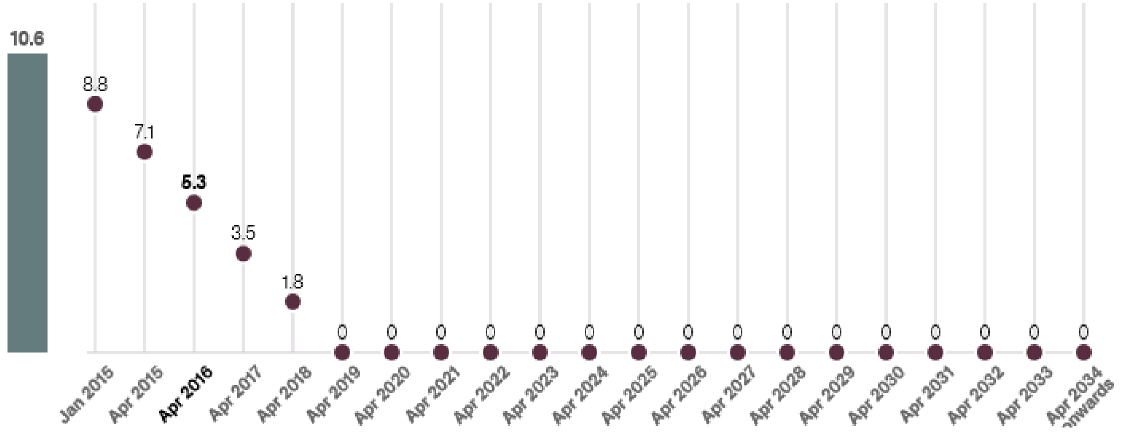
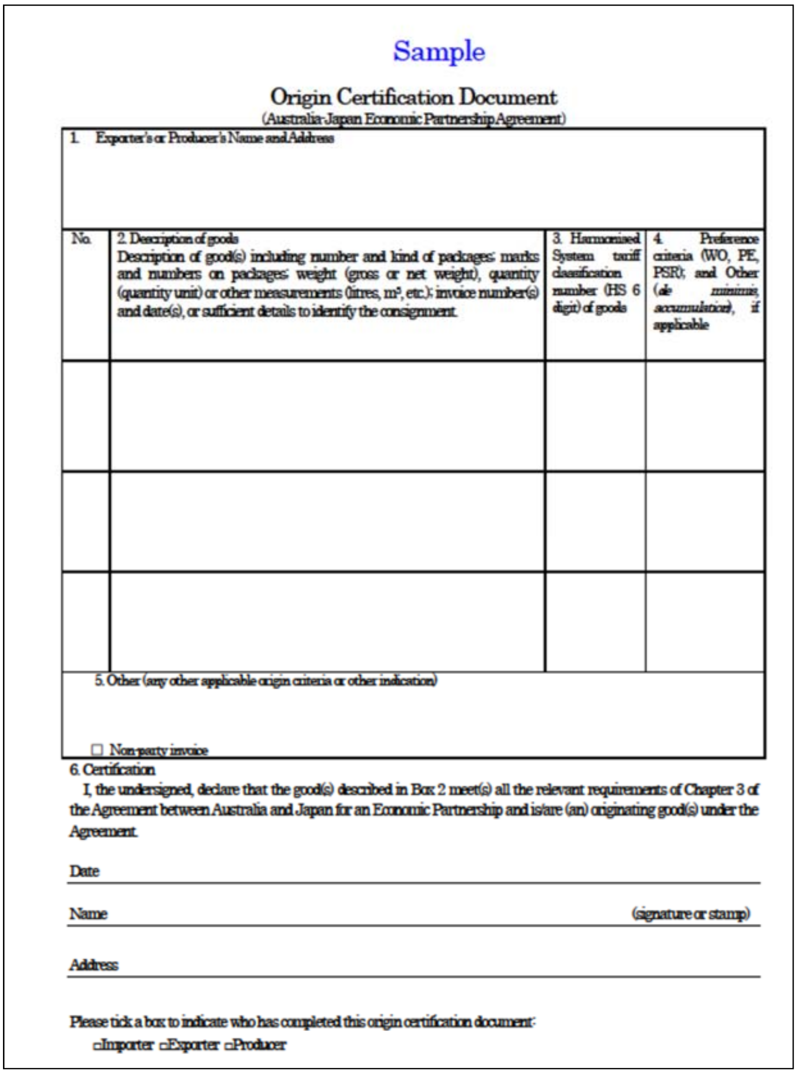


Figure 21: Tariff for import of frozen sweet corn from Australian to Japan under the JAEPA (DFAT, n.d.-a).

Appendix F: Export documentation for frozen sweetcorn

Preparing origin documentation

This reflects requirements on 21 September 2016. Check the Manual of Importing Country Requirements (DFAT, 2015) *for updated information.*



Sample

Origin Certification Document

(Australia-Japan Economic Partnership Agreement)

1. Exporter's or Producer's Name and Address			
No.	2. Description of goods Description of good(s) including number and kind of packages; marks and numbers on packages; weight (gross or net weight), quantity (quantity unit) or other measurements (litres, m³, etc.); invoice number(s) and date(s), or sufficient details to identify the consignment.	3. Harmonised System tariff classification number (HS 6 digit) of goods	4. Preference criteria (WO, PE, PSR); and Other (*de minimis*, *accumulation*), if applicable
5. Other (any other applicable origin criteria or other indication) ☐ Non-party invoice			

6. Certification

I, the undersigned, declare that the good(s) described in Box 2 meet(s) all the relevant requirements of Chapter 3 of the Agreement between Australia and Japan for an Economic Partnership and is/are (an) originating good(s) under the Agreement.

Date

Name (signature or stamp)

Address

Please tick a box to indicate who has completed this origin certification document:
☐Importer ☐Exporter ☐Producer

The preferential tariff rates available under the JAEPA are not automatic, the shipment must be certified as meeting the rules of origin requirements. Acceptable proof of origin documents consist of:

- Certificate of origin (issued ACCI or AIG); or
- Origin certification document – Customs form C No. 5292-3 (self-issued)

In many cases it may be convenient to self-certify with an *Origin Certification Document* (Customs form C No.5292-3, left), this requires the exporter or producer's name and address, description of goods, harmonised system tariff classification and preference criteria.

Figure 22: Jaepa Origin (self) certification document

Alternatively, exporters may provide a certificate of origin issued by the Australian Chamber of Commerce and Industry or by the Australian Industry Group. The Australian Export Handbook (ECA, 2016) identifies five categories of documentation required for export: required by Australian Authorities, Commercial documents, transport documents, documents required by importing country authorities and special documents. This information is given below, within the context of exporting corn from Australia to Japan.

Documents required by Australian authorities, as stated in The Australian Export Handbook (ECA, 2016):

- Export declaration number
  - Required for all exports >$2000 AUD FOB (Export Control Act 1982, FRL, 2016b)

- Obtained from Australian Customs by making an export declaration.
- May be filed up to six months in advance.

- Export Permit
  - Required because corn is a prescribed good (plant products) under the *Export Control Act 1982*.
  - Obtained from an authorised officer (under *Export Control Act 1982* s 20).
  - The officer must be satisfied that the shipment complies with the *Export Control (Plants and Plant Products) Order 2011* (FRL, 2016a).

Commercial documents (as for all exports)

- Purchase order
- Order acknowledgment
- Invoice
- Packing List
- Marine insurance policy
- Bill of exchange

Transport documents (as for all exports)

Sea freight

- Pre-receival advice (PRA)
- Shipper's letter of Instruction (SLI)
- Interim receipt/forwarding instruction
- Bill of lading

Documents required by Japanese authorities[2]

Both fresh and frozen vegetables are subject to quarantine in Japan. These products must be imported at a location that includes a quarantine station, this is available at major ports of entry. If importing through a smaller port it is important to check it has the capacity to perform quarantine checks.

- Phytosanitary certificate

A phytosanitary certificate (E16) is required for the import of fresh vegetables into Japan including fresh or chilled corn (DAWR, 2015b). This certificate is issued by the Australian Department of agriculture fisheries and forestry, and is based on international standards. The phytosanitary certificate is accepted as evidence that plant or plant products "have been inspected according to appropriate procedures, and they are considered to be free from quarantine pests, practically free from other injurious pests, and conform with the current phytosanitary regulations of the importing country." (DAWR, 2015b)

- Notification form for the importation of foods, etc. (2 copies)

Two copies of this form must be submitted to Quarantine at the port of entry, this notification may be filed up to seven days before the cargo is transported to the bonded warehouse. Quarantine officers will consider this form along with other shipment documentation. The results of any voluntary testing performed in accredited laboratories can also be submitted for consideration. In addition to

[2] Food safety and standards in Japan are governed by the *Food Safety Basic Law, Food Sanitation Law, Japan Agricultural Standards Law, health promotion law* and *Food Labelling Law.*

documentary inspection, officers may perform onsite inspection and testing for any attached soil or pests. If satisfied that the shipment is compliant, they will then stamp the nomination form to record that the shipment has “passed”. This stamped document must then be included with the Customs Declaration. If the shipment fails inspection, an order may be issued to fumigate, destroy, separate or return the shipment.

- Origin documentation

Origin documentation is required to access preferential tariff rate; this can be fulfilled by filling a certificate of origin or through self-certification.

Processed products

“Importers of processed products which are imported for the first time are required to submit reference materials showing a detailed ingredients list and the manufacturing process.” (JETRO, 2016, p. 35). Retail packaged food must meet Japanese labelling requirements under the *Food labelling Law, Japan Agricultural Standards Law Health Promotion Law* and *Food Sanitation Law*.

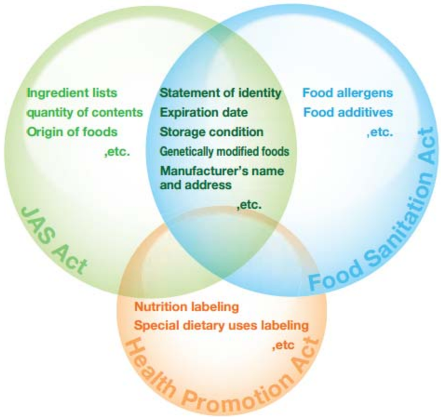


Figure 23: Labelling requirements under Japanese law (CAA, n.d.)

Labelling must be in Japanese, minimum 8 pt font and include:

- Product name
- Country of origin
- Importer
- Ingredients, other than additives in descending order of weight
- Food additives, in descending order of weight
- Net weight in metric units
- Best before or expiry date for products whose quality changes over five days
- Storage instructions
- Genetic modification information (see below)
- Allergen labelling, at a minimum of any wheat, buckwheat, egg, milk, peanut, prawn or crab content” (USDA, 2015).

Claims regarding nutrition and health benefits are regulated in Japan and require approval via application to the Consumer Affairs Agency (CAA, 2015, n.d.).

Appendix G: Fresh blueberries documentation for UAE

The Australian Export Handbook identifies five categories of documentation required for export: required by Australian Authorities, Commercial documents, transport documents, documents required by importing country authorities and special documents (ECA, 2016). This information has been replicated below in reference to exporting fresh (chilled) blueberries from Australia to the UAE.

1. **Required by Australian authorities**
   - Export declaration number
     - Required for all exports >$2000 AUD FOB.
     - Obtained from Australian Customs by making an export declaration.
     - May be filed up to six months in advance.
   - Export Permit
     - Required because berries are a prescribed good (plant products) under the Export Control Act 1982 (FRL, 2016b).
     - Obtained from an authorised officer (under *Export Control Act 1982* s 20).
     - The officer must be satisfied that the shipment complies with the *Export Control (Plants and Plant Products) Order 2011*.
2. **Commercial documents** (as for all exports)
   - Purchase order
   - Order acknowledgment
   - Invoice
   - Packing List
   - Marine insurance policy
   - Bill of exchange
3. **Transport documents** (as for all exports)

   Sea freight
   - Pre-receival advice (PRA)
   - Shipper's letter of Instruction (SLI)
   - Interim receipt/forwarding instruction
   - Bill of lading

   Air freight
   - Shipper's letter of Instruction (SLI)
   - Air waybill
4. **Required by UAE Authorities**

All berries are subject to customs inspection upon entry, a phytosanitary certificate (E16) is required for fresh berries, including chilled berries (DAWR, 2015b). In particular the Ministry of Environment & Water, United Arab Emirates advises that all fruit shipments must be free of red back spiders *Lactrodectus hasselti* (DAWR, 2015a).

A phytosanitary certificate is accepted as evidence that plant or plant products 'have been inspected according to appropriate procedures, and they are considered to be free from quarantine pests, practically free from other injurious pests, and conform with the current phytosanitary regulations of the importing country' (DAWR, 2015b).

If the shipment fails inspection, the importer may elect to have the shipment destroyed or re-export to a non GCC nation within 30 days.

Appendix H: Leafy vegetable documentation for Taiwan

The Australian Export Handbook identifies five categories of documentation required for export: required by Australian Authorities, Commercial documents, transport documents, documents required by importing country authorities and special documents (ECA, 2016). This information has been replicated below in reference to exporting fresh cut leafy vegetables to the UAE.

1. **Required by Australian authorities**
   - Export declaration number
     - Required for all exports >$2000 AUD FOB.
     - Obtained from Australian Customs by making an export declaration.
     - May be filed up to six months in advance.
   - Export Permit
     - Required because fresh cut vegetables are a prescribed good (plant products) under the *Export Control Act 1982 (FRL, 2016b)*.
     - Obtained from authorised officer (under *Export Control Act 1982* s 20).
     - The officer must be satisfied that the shipment complies with the *Export Control (Plants and Plant Products) Order 2011 (FRL, 2016a)*.
2. **Commercial documents** (as for all exports)
   - Purchase order
   - Order acknowledgment
   - Invoice
   - Packing List
   - Marine insurance policy
   - Bill of exchange
3. **Transport documents** (as for all exports)

   Air freight
   - Shipper's letter of Instruction (SLI)
   - Air waybill
4. **Required by Taiwan authorities**

Taiwanese customs system categorises cargo into three tiers with increasing levels of scrutiny:

level	*examination*
C1	No examination
C2	Document examination
C3	Document examination and goods examination

Fresh cut vegetables are assessed under class C3 meaning that they are subject to document and goods (phytosanitary) inspection. A phytosanitary certificate (E16) is required (DAWR, 2015b). This certificate is issued by the Australian Department of Agriculture and Fisheries, and is based on international standards. The phytosanitary certificate is accepted as evidence that plant or plant products "have been inspected according to appropriate procedures, and they are considered to be free from quarantine pests, practically free from other injurious pests, and conform with the current phytosanitary regulations of the importing country" (DAWR, 2015b). Taiwan requires that plant materials be free from "pests, soil, weed seeds and extraneous material" (DAWR, 2015a).

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