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Development of *Prunus mume*, a new tree crop for Australia

**A report for the Rural Industries
Research and Development
Corporation**

by B Topp, J Noller and D Russell

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Foreword

There is no Australian mume industry although mume is an important fruit in many Asian countries and mume products are imported to Australia. This study investigates both market and agronomic aspects of mume production. The market research identifies the products and markets which could support a viable industry. The agronomic research studies the adaptation of five mume cultivars under Australian growing conditions.

The report identifies domestic and international market prospects for the world's three leading mume products – salty plum (dried mume snacks), umeboshi (mume pickle) and umeshu (mume liqueur) – and evaluates and describes their domestic and Japanese markets.

The key findings are that there are no export markets for fresh fruit, some potential for umeboshi pickles in the Japanese market, and an opportunity for umeshu in domestic and export markets, although competition from an expanding industry in China is likely to intensify.

The research will enable producers, manufacturers and investors to evaluate the feasibility of producing mume in Australia.

The findings indicate that a fruit industry will depend on a domestic processing industry capable of producing products acceptable to experienced consumers and willing to develop new markets. This will in turn require developing strategic alliances with the Japanese industry to produce and market competitive products.

This project was funded from RIRDC core funds which are provided by the Australian Government through the Asian Foods Program, the Queensland Government and industry revenue.

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Abbreviations

ARS	Applethorpe Research Station
JETRO	Japan External Trade Organisation
MAFF	Ministry of Agriculture, Forestry and Fisheries
MRS	Maroochy Research Station

The exchange rate used to convert prices during the Japan visit is A\$0.01197 to one Japanese yen, or ¥82.53 to one Australian dollar.

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Executive Summary

What the report is about

Prunus mume, commonly called mume or Japanese apricot, is a deciduous fruit tree that is grown and used throughout Asia. However mume has not been grown commercially in Australia. This report provides details of agronomic and market research of mume production that will assist in deciding the potential of mume as a new crop in Australia.

Who is the report targeted at?

This report is targeted at, orchardists and food/beverage manufacturers and policy makers who are considering the worth of investment in mume as a potential new crop in Australia.

Background

In Asia, mume is used in a large number of foods, drinks and medicines ranging from pickles and beverages to ice-cream and shampoo. Mume products are highly esteemed in Japan for their medicinal and health promoting properties. The fruit are never consumed fresh due to their high acid content. The three main mume products are umeboshi (Japanese pickled mume), umeshu (a Japanese mume liqueur) and salty plum (dried and salted mume).

Aims/Objectives

This project investigated market and agronomic aspects of mume production that will assist in development of an Australian mume industry. The objectives were to (1) identify current domestic and export markets and determine attractiveness and competitiveness of Australian mume products on those markets; and (2) study the adaptation, cropping and agronomy of mume under Australian environments.

Methods used

Mume market research was conducted by literature searches and interviews with producers, manufacturers and distributors of mume products in Australia and Japan.

The adaptation of mume under Australian conditions was studied by establishing and evaluating mume cultivar trials at research stations of the Queensland Department of Primary Industries & Fisheries and at grower properties. Five mume cultivars, imported from Japan and Taiwan, were evaluated in these experiments. The trials involved statistically replicated experiments at a temperate (Applethorpe) and a sub-tropical (Nambour) location and five observational trials.

Results/Key findings

During this project mume cultivars were identified that are adapted for fruit production in subtropical and temperate regions of Australia. The Taiwan cultivars Daching and Ellching produced heavy crops at the subtropical location of Nambour in Queensland. These two cultivars plus Ianjy have been established at a commercial plantation in north Queensland. The orchard will produce its first crop for harvest in October 2006. This is the first commercial planting of mume in Australia and represents a significant achievement of the project. Fruit from this orchard is to be processed by the project commercial partner. The success of this enterprise will provide a guide to the adaptation of mume in Australia's subtropics.

The Japanese cultivars Nankou and Bungo produced moderate crops at the temperate location of Applethorpe in Queensland despite flowering in July and August when freezing temperatures were

experienced at the trial site. Nankou and Bungo failed to crop at Nambour due to insufficient chilling to break dormancy. These cultivars are not suited for growing in sub-tropical locations.

The market research in this project concentrated on the main processed mume products (salty plum, umeboshi and umeshu). The key findings for these three products were as follows:

Salty plum is a highly dried, salted and sweetened mume snack of Chinese origin. The Australian domestic salty plum market size was estimated at 25–30 tonnes, with a market value of \$325,000–390,000 in 2004, and stable or declining. Shortages of product with legally acceptable additives were identified, but are likely to be met by emerging Chinese and Taiwanese products. There are very small potential niches in Australian markets for sweeter less salty products, better packaging and labelling, product information and store tastings. However, Australian product would need to compete with Chinese salty plum being imported at around \$10 a kilogram and retailing at around \$15 a kilogram, so is unlikely to be price-competitive long term. The literature search indicated Australian product could not compete with most countries with mume industries and/or markets.

Umeboshi is a Japanese mume pickle that is made by a complex process of salting, pressing, drying, re-imbibing and flavouring. The Australian domestic market for umeboshi was estimated as only 3.25 tonnes with a value of around \$130,500 in 2004. There is a tiny market for ume paste (chopped umeboshi). The main markets are Japanese residents and visitors. There is a minor opportunity to supply the Japanese tourist market through hotels in Cairns and Sydney with a lower priced product. There is also a small emerging market of Australians shopping at health food stores, where a low-salt Australian product, preferably organic, could compete. However, prices have fallen to around \$17 a kilogram with the introduction of Chinese umeboshi, indicating increasing price-competition. Japan is the only substantial market for umeboshi. Japanese people consumed around 89,000 tonnes of umeboshi in 2004-5, of which half was imported as finished product or as salted sun-dried 'shiroboshi' from China for finishing in Japan. Demand has stabilised and is not expected to grow. Umeboshi is used as a health food and preservative. There are potential markets for a high quality Australian product in consumers seeking both quality and price, and older people and young women who are particularly health and food safety-conscious. Australian umeboshi is likely to need Japanese branding to access retail outlets in Japan. Options include supplying dried salted mume to manufacturers for finishing, or finished mume to repackers to pack and distribute under Japanese brands. As the industry gains experience and capacity to supply, the food service sector and supermarket chains also have potential, most likely for finished products under their house brands. Australian product would need to compete on quality and price, between high quality Japanese product and low-priced Chinese imports. Key quality attributes of Japanese umeboshi are a finished product with large size, soft flesh and skin, and use of high quality salt and natural flavourings.

Umeshu is a mume liqueur, sometimes called plum wine. The Australian domestic market was around 6,060 litres in 2003, with a value estimated at \$121,000. Market development by Japanese manufacturers has resulted in increasing demand from Japanese, Chinese and Australian consumers, with supply shortages occurring in 2006, and an expanding product range, including a Chinese product. Retail prices in Australia are around \$15 to \$25 a litre. Japanese manufacturers have expressed interest in developing Australian product from premium cultivars such as Nankou and Bungo for the domestic market. The Japanese market is roughly estimated at 62 million litres of umeshu and more than 11 million litres of umeshu mixed with soda, with strongly growing demand, production, product range, and supply shortages due to increased promotion and competition following deregulation of liquor retailing in 2003. Consumption trends towards lighter sweeter low alcohol drinks indicate continuing strong demand for umeshu, particularly from young women and the health-conscious. Most umeshu retails in Japan at A\$6 to 17 a litre. To compete against emerging Chinese products, Australian umeshu would need to be superior quality or differentiated. Quality attributes are regarded as cultivars with desired flavour, type of alcohol base, years of maturation and low chemical residues.

Implications for relevant stakeholders

(1) The importance of this fruit in Asia has implications for the development of mume in Australia. Despite being hardly known in Australia mume is the basis of large Asian manufacturing industries and is highly regarded for its health properties. It is used mostly in three traditional products that are centuries old, but also has other uses in traditional and emerging products. The traditional nature of mume products means that initial choice of cultivar is likely to favour Nankou. The Nankou cultivar is used extensively in the Wakayama prefecture of Japan which is renowned for its production of high quality mume products.

(2) Umeshu was identified as a mume product that could be produced in Australia with some potential for domestic and export sales and expressions of interest by commercial beverage manufacturers in development of this market. Supplying the Japanese market will require extensive communication and co-operation with importers. Future development of umeshu enterprises should involve the experience of commercial manufacturers that have Japanese marketing linkages and expertise.

(3) The identification of mume cultivars that are adapted for fruit production in sub-tropical and temperate locations of Australia will enable investors to select cultivars suited to various potential growing regions. The observational trials have provided initial information on cultivar selection but should be confirmed via the randomised trials. The randomised trials established during this project will mature over the next 3 years and produce data that will allow verification of these initial observations.

(4) The health benefits of mume may provide the basis for development of a new group of consumers of mume products in Australia. There is current research from China and Japan that is examining the anti-cancer, antioxidant and blood fluidity properties of mume products.

Recommendations

The current Australian domestic market for mume products is small but there is potential for the umeshu market to expand. Development of an Australian mume industry to produce umeshu is based on the following findings:

- Market research identified a small but growing domestic market for umeshu in which an Australian product would be moderately competitive.
- Umeshu is a growing market and therefore represents a more plausible market to enter compared to the stable umeboshi and salty plum markets.
- Australian production systems are regarded as low chemical input and environmentally responsible compared with those of China;

It is recommended that development of the umeshu market be further investigated using an industry partner with experience in umeshu production, production facilities in Australia and established supply outlets in Australia and Japan. Use of such an industry partner will ensure an efficient route between product development and consumption.

1. Introduction

Mume can be considered as the “Olive of Asia”. It is never eaten fresh but is used to make a dried salty product called salty plum, a pickled product called umeboshi, and a fruit liquor product called umeshu. All products are popular in Asia and also in Australia with specific ethnic groups. Mume has not been trialled as a commercial crop in Australia.

The fruit is used widely in Asia, and as part of this study, market research has been conducted in these markets to determine what market potential exists. The main mume food products - salty plum, umeboshi (Japanese pickle) and umeshu (Japanese plum wine) - are imported into Australia, and therefore import replacement opportunities have also been investigated.

1.1 Description of *Prunus mume*

Prunus mume Sieb. et Zucc is commonly called mume or Japanese apricot. It is also referred to as ume (in Japan) or mei (in China) and is sometimes incorrectly referred to as a plum. It produces a small stonefruit similar in appearance to a small yellow apricot.

Fig. 1.1: *Prunus mume* (cultivar Nankou)



Mume is a native of China and is found growing wild in central China, South Korea and southern Japan. Botanically the tree and fruit resemble the European apricot, *P. armeniaca*. Leaves on mume trees have a distinctive downward sloping orientation, appearing as if wilted. Leaves are described as ovate, finely serrated with lanceolate apices. Flowers of fruiting mume cultivars have a single whorl of white petals but ornamental cultivars exist with double whirls of petals coloured white, pink or red. Fruit are generally round to ovate in shape, small to medium size (3-60 g), clingstone, with yellow to green flesh and skin that is high in acid (Mehlenbacher et al. 1990). Whole fruit contains approximately 64% moisture, 1% protein from nitrogen, 1.3% fat and 6.7 total carbohydrate, including fibre (FAO 1972).

1.2 Importance of mume in Asia and range of mume products

Mume is not traditionally consumed fresh due to its low sugar and to a bitter taste from cyanogenic glucosides (prunasin and amygdalin) which can accumulate as cyanide in the body. This is reduced by crushing, slicing, peeling, washing or soaking to rupture the cell membrane, although some flavour is lost (Grauf 2004, pers. comm.).

Mume is used across Asian countries to make a wide variety of foods and drinks (Table 1.1). Information from a literature search and interviews with Australian importers indicates that Chinese salty plum, Japanese umeboshi pickle and Japanese umeshu are the main mume products consumed and traded in Asian markets.

Table 1.1: Range of mume products produced and sold in Asia

Product	Country	Description
Dried		
Salty plum	China	Small dried salted mume, sweetened and sometimes coloured.
Sweet and sour ume	Vietnam	Ripe mume mixed with sugar and dried
Kari Kari ume	Japan	Crispy dried whole mume snack.
Plum toffee	China, Japan	A cut-down salty plum in toffee, individually wrapped.
Crack seed	Hawaii	From 'seed' (dried fruits) and 'crack' (exposes the kernel)
Pickled		
Umeboshi	Japan	Traditional Japanese pickle made with fruit and salt.
Umezuke	Japan	Similar to umeboshi, but made on brine.
Ume paste	Japan	Pureed mume and perilla leaf.
Ume vinegar	Japan	Mume in vinegar; also the brine from umeboshi processing.
Sweet umeboshi	Japan	Mume in sugar syrup, also by-product of juice making
Salted plums in brine	China	Pickled whole plums in brine, used in some Chinese cooking
Beverages		
Umeshu/plum wine	Japan	Liqueur from steeping whole mume in sugar and white spirit.
Green plum wine	China	Similar to Umeshu.
Ume wine	Japan, Vietnam	Fermented fruit wine from mume juice
Ume with green tea	Singapore, Korea, Japan	
Ume juice	Japan, China	Juice extracted from mume
Other products		
Ume sauce	Japan	Mume based sauce
Plum sauce	China	Sweet/sour sauce popular with roast duck
Katsuo-ume	Japan	Seasoning powder from dried bonito, powdered mume and perilla
Furikake	Japan	Seasoning from powdered salted mume and red perilla
Ume biscuits, rice cakes	Japan	Bakery products with pieces of mume
Ume jam	Japan	
Ume & umeshu jelly	Japan	Jellied desserts from mume and umeshu respectively.
Plum toffee	Japan	Boiled sweets containing particles of mume or mume juice.
Banaiku	Japan	Health tonic from green mume cooked until concentrated
Plum balls	Japan	Medicinal tablets
Umeboshi lotion	Japan	Made from umeboshi and sake

Source: Domestic retail audit 2003; Japanese retail audit 2005, manufacturers' brochures and websites; Nguyen 2003.

It is evident mume is a versatile fruit, and likely processors and manufacturers would explore new uses once fruit is available. Australian processors foresaw potential as dried fruits and in snack bars (Holmes, W 2003; Morris, 2004, pers. comm.). Several research projects have been investigating mume's therapeutic properties as an anticancer, anticoagulant, antioxidative and antimicrobial agent (Appendix A).

1.3 Objectives of the project

The objectives of the project were to investigate the possibility of developing mume as a new fruit tree crop in Australia. Specifically we aimed to:

- Determine new markets and potential competitors and to quantify the domestic and international market potential for products resulting from the development of an Australian mume industry.
- Study the adaptation, cropping and agronomy of mume in Australia and determine potential yields, consistency of supply, and make recommendations on suitable varieties.
- Evaluate mume as a genetic bridge in the development of other Prunus species and create novel products for processing.

2. Profiles of overseas mume industries and selection of overseas market for further research

2.1 Methods

To identify potential export markets to focus on and products for further detailed in-market research:

- Literature search of international markets to determine key mume products and potential markets for Australian mume products, using the following sources:
 - Internet reports including Food and Agriculture Organisation industry profiles and JETRO exporter guides and market reports
 - Internet databases including Japan Customs Import Statistics, CIA The World Fact book and APEC Tariffs database
 - RIRDC research paper: 'Pickled and Dried Asian Vegetables' (Nguyen, 2000).
- Interviews with experts and industry in Australia, to assess the potential of the Japanese market:
 - Dr V Nguyen, Research Scientist, NSW Agriculture
 - Dr K Beppu, Associate Professor, Kagawa University, Japan
 - Mr S Yiu, Director, Oriental Merchant (leading Asian foods importer and distributor)
 - Mr H Takeuchi, Purchasing Manager, Japan Food Corporation (Australia)
 - Mr M Kurata, former Managing Director, Sun-Masamune (Australian sake manufacturer and exporter).

2.2 Burma

Mume has been one of Burma's major deciduous fruit crops for more than 70 years. Production is located mainly in elevated regions on the Chinese and Thai borders and near Mandalay, and has been expanding to meet increasing demand from local processors. Constraints to industry growth have included the lack of suitable cultivars, rootstocks, propagation methods (including training and pruning), proper research and technology transfer, as well as inadequate road infrastructure, transport and irrigation in remote areas. While most cultivars are local and seed-grown, some have been selected and distributed by Government horticultural farms. All fruit is processed in local cottage operations, mostly as dried salted fruit (Hla Bo, undated).

Demand in this impoverished country is likely to be low, especially for costlier Australian products.

2.3 China

Mume is native to China and has been cultivated there for more than 3000 years. It is one of China's leading deciduous fruit industries, with high and low chill cultivars. To avoid spring frosts, commercial production is confined to the Yellow River and Yangtze River valleys in South China, mainly Zhejiang, Jiangsu and Hunan provinces (Zai-Long, undated) While Japanese manufacturers have supplied the premium Nankou cultivar for propagation, China's dryer conditions appear to produce different quality to Japan (Japanese trade interviews, 2005).

No production statistics were found for mume in China. However, recent plantings have resulted in increased production, causing oversupplied markets and dramatic falls in farmgate prices. Quoted prices fell from around A\$0.90 a kilogram in 2000 to A\$0.30 in 2003 and A\$0.17 in 2004 (depending on fruit size and quality). In 2005, producers harvested a large crop but did not cultivate or spray due to low prices and mume's low agronomic requirements. This situation is expected to continue as more trees mature (Japanese trade interviews, 2005). Post-harvest handling, storage facilities and processing

have fallen behind expanding production of mume and other fruits, causing saturated markets, depressed prices, high wastage, and planting of low quality cultivars (Zai-Long, undated).

Chinese consumers eat mume as dried salty plum snacks, also using it as appetisers and to flavour rice wine. Prices for large salty plums in supermarkets and grocery stores in 2003 were around 22 yuan (A\$4.00) a kilogram. There is no real demand for pickles (Hayward, S, 2003, pers. comm.; Japanese trade interviews, 2005).

Japanese umeshu is served in 5-star Chinese hotels where 180ml bottles, both with and without the fruit, are offered in minibars for Japanese guests (Hayward S, 2003, pers. comm.). There is emerging Chinese production and exports of 'green plum wine' (like umeshu, it is made from mume fruit steeped in alcohol), and some development is occurring in mume-based health foods (*Green Plum Wine*, undated).

China has become the leading supplier to Japan for semi-processed and processed mume for umeboshi (Japan Customs, 2006). Due to Japanese investment in Chinese factories, exports are expected to increase (Japanese trade interviews, 2005). A Japanese manufacturer noted improvements in import quality, including large fruit sizes and better grading for blemish (Hayward, S 2003, pers. comm.).

China's exports to Japan of semi-processed mume ranged from 30 130 to 42 095 tonnes a year from 1998–2005, while average annual prices fell from A\$2.75 to 1.00 a kilogram CIF. Meanwhile processed mume imports rose from 810 to 9 500 tonnes, and from \$2.75 to \$4.30 a kilogram (Japan Customs, 2006).

Chinese processing factories are located near the orchards to facilitate immediate processing. Mume for product intended for export is usually handpicked before it colours; otherwise, the tree is shaken until the fruit falls. Processing facilities are usually owned by joint ventures between Japanese pickle manufacturers and Chinese companies, with modern manufacturing facilities and sound operations resulting in high quality product at low prices (Japanese trade interviews, 2005).

Given that China's industry is very large and expanding, with increasing exports, improving quality and very low prices for fresh and processed mume, an Australian product is unlikely to be competitive in the Chinese market, or against equivalent Chinese product in the Japanese market. However, Australian producers and/or processors could build strategic partnerships in China to enable exchange of knowledge and skills.

2.4 Indonesia

Japanese companies have invested in Indonesian plantings to supply the Japanese market (Japanese trade interviews, 2005). Indonesia exported 4 tonnes of semi-processed mume to Japan in 2000, and 17 tonnes in 2001 at average prices of A\$1.92 and \$1.76 a kilogram respectively, with no exports in 2005 (Japan Customs, 2006). Australian product could not compete directly against these prices in the Japanese market.

2.5 Korea

Mume is widely grown in both Koreas; however, no production statistics have been found. The fruit is used in umeboshi, 'maesilju' (the Korean term for umeshu) and maesil (mume) juice (Nguyen, 2003, pers. comm.; 'Ume', 2006). Maesilju is a light drink very similar to Japanese umeshu, and often has fruit in the bottle. The main market is women, particularly young women,

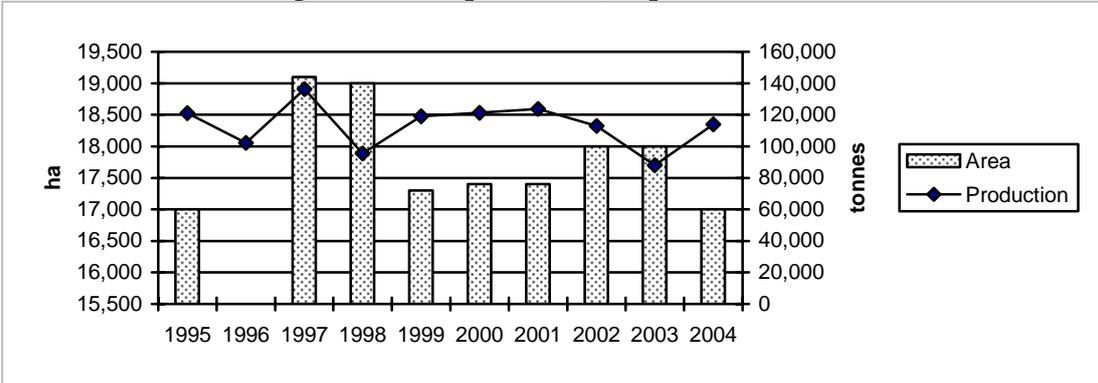
Both countries have exported processed mume intermittently to Japan in recent years. The Republic of Korea supplied 50 tonnes of semi-processed mume in 2001 and 17 tonnes in 2002 (at average annual prices of A\$2.72 and \$1.47 respectively). In 2003 the Democratic Republic of Korea exported 13 tonnes of semi-processed mume to Japan, at an average annual price of \$1.18 a kilogram (Japan Customs, 2006).

Korea is unlikely to provide a market for Australian mume products, and given that it processes and exports low-priced mume products, it is likely to be a competitor in the Japanese market.

2.6 Japan

Mume introduced from China in around 600BC is a major industry in Japan. Production fluctuated between 85 000 tonnes and 140 000 tonnes from 1995–2004, being 114 000 tonnes in 2004. Production area has also fluctuated, and was around 17,000 hectares in 2004 (Fig. 2.1).

Fig. 2.1: Mume production, Japan 1990–2004



Source: All Japan Tsukemono Federation of Tsukemono Cooperatives statistics, 2005; *Production and shipment of cherries, Japanese apricots and loquats*, 2001, Ministry of Agriculture, Forestry and Fisheries, Japan; *Production and Shipment of Loquats, Cherries and Mume apricots*, 2004, Ministry of Agriculture, Forestry and Fisheries, Japan

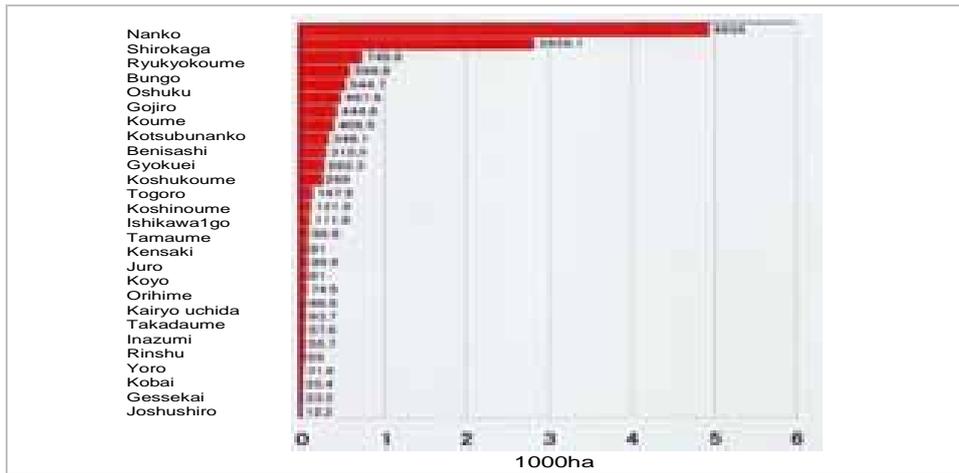
Production was said to be declining in Japan, with competition from low priced imports from China, ageing growers and lack of succession seen as future threats to production (Japanese trade interviews, 2005).

Mume production in 2000 was 121 000 tonnes with a market value of ¥16 512 million, and a national average price of JP¥136 a kilogram (A\$1.63) (MAFF, 2001).

Mume is produced across Japan, except in the more extreme climates of Hokkaido in the north and Okinawa in the south. Half the crop is produced in the Minabe and Nanbu districts (Kishu region) of Wakayama Prefecture which in 2005 harvested 48 000 tonnes of fruit from 6643 farms totalling 290 hectares (Table 2.1).

Japan production includes 200 cultivars, including ornamentals, across various geographic regions and harvest times (Beppu, 2003, pers. comm.). Harvest season is divided into early (with cultivars such as *Koume*, *Shirokaga*, *Gessekai* and *Kagajizou*) and late (including *Nankou*, *Jurou* and *Yakushiume*). Researchers are trying to extend the maturation period from early to late (Yaegaki, 2005, pers. comm.) *Nankou* has overtaken *Shirokaga* as the main cultivar (Fig. 2.2). It has high yields of large and medium fruit and the trees maintain short spurs, keeping their productivity with age. It is preferred for premium grade umeboshi and also used in premium umeshu as its fruit is large with thin skin, and good flavour and texture (Japanese trade interviews; Kurata, 2004, pers. comm.). *Nankou* flowers late and requires a polliniser (usually *Kotsubu Nankou*), being self incompatible, and manufacturers warned it can be a difficult cultivar to handle (Japanese trade interviews, 2005).

Fig. 2.2: Leading mume cultivars, Japan, by area of production



Source: Yaegaki, H 2005, National Institute of Fruit Tree Science, Tsukuba, Japan

Wakayama Prefecture’s mild climate particularly suits Nankou and the *Koshiro* variety grown specifically for umeshu. Nankou production costs have been stable most years, and Wakayama production has been more profitable and therefore more attractive, than other regions. However, a recent decline in production was attributed to climate change, typhoons imports, sudden tree death syndrome (also known as tree decline syndrome) and manufacturers’ increasing use of low priced imports. In 2005 a shortage of a preferred rootstock (*Seigo*) also limited new plantings (Japanese trade interviews, 2005). The local government’s Ume 21 Research Centre supports the industry with research in cultivation and processing, and the Wakayama Prefecture Mume Research Centre has been investigating sudden tree death syndrome (Kansai in Focus: Living with Ume in Minabegawa Village, 1997).

Mume is grown mainly on small farms with pack sheds and glasshouses, and sometimes on tiny orchards within built-up areas or in valleys. Many orchards are on steep hillsides allowing use of otherwise uneconomical land and also ensuring good drainage. It is common to cover the orchard floor with synthetic netting (Fig. 2.3). Fruit are allowed to completely ripen and then are collected once they fall onto the netting.

Fig. 2.3: Small mume orchards in Japanese valley with under-tree netting placed on orchard floor



There is little use of sprays. In harvest season the ground is covered in blue mesh so Nankou for umeboshi can fully ripen on the tree and drop onto mesh over the ground for collection. Grower co-operatives and factories are located in the production area, and some factories have retail outlets.

2.7 New Zealand

There is some minor production of mume in New Zealand. A Dunedin-based company has developed 'Bush Road New Zealand Umeboshi' using the Nankou and Kojio cultivars for the domestic market, and anticipated exporting to Japan although no imports to Japan have been recorded (Japan Customs, 2006; New Zealand Umeboshi, undated).

2.8 Singapore

The Singapore market is based on imported salty plums, mainly from China, repackaged under Singapore brands for local consumption and re-export to Australia and other countries (Hayward S, 2003, pers. comm.; domestic retail audit, 2003).

Singapore's food laws do not permit the use of saccharine, which is widely used to sweeten salty plum (Hayward S, 2003, pers. comm.). However, any opportunity for an Australian supplier using alternative sweeteners is likely to be short-term, as China has already developed aspartame-sweetened salty plum which it has begun exporting to Japan (Japanese trade interviews, 2005).

2.9 Taiwan

Mume is Taiwan's leading deciduous fruit industry (Deng, 1999). Production is concentrated in the Shin-Yi region near Taichung in southern Taiwan. The main cultivars are Daching and Ellching. There are no grading or set prices, and fruit may be used for any product. Mume farms are mostly very small, on marginal land with few inputs. Producers supplement their income through farmgate sales of wine and pickled fruit and picnic sites in the orchards during flowering. From 1994-2003, production fluctuated while declining overall from 71 517 to 53 874 tonnes a year (Table 2.2).

Table 2.1: Mume production, Taiwan 1994-2003

Year	Trees Planted (x1000)	Area (ha)	Yield (kg/ha)	Total Production
1994	3 457	10 509	7 878	71 517
1995	3 681	10 529	4 046	38 022
1996	3 448	10 835	9 409	90 505
1997	3 274	10 388	9 966	94 090
1998	3 276	10 428	5 405	50 549
1999	3 088	9 526	6 277	55 376
2000	2 910	9 442	6 959	63 317
2001	2 921	9 328	6 326	55 956
2002	2 851	9 166	5 092	45 218
2003	2 783	8 828	6 175	53 874

Source: Taiwan Agricultural Statistics Yearbook, 2003

In recent years production has been shifting to mainland China. Mume manufacturers have relocated their factories due to Taiwan's falling producer numbers and rising labour costs (Japanese trade interviews, *Ume growers and processing*, 2003).

Mume is used mainly for salty plum, and some salty plum toffee and mume puree (Hayward, S, 2004, pers. comm.). The market consumes mostly salty plum snacks rather than pickled. Taiwan is also a major supplier of salty plum and plum toffee to Australia, with three Taiwanese companies promoting salty plum at the national food exhibition Fine Foods Australia in 2003, including saccharine-free products, (domestic importer survey 2004). Taiwanese consumption of salty plum has declined due to consumer resistance to its high salt content, so Taiwanese research has included projects to develop lower salt and sweeter salty plums using bulking agents (sorbitol) and artificial sweeteners (aspartame and acesulfame-K) (Tso & Ou, 1995) and heating, cooling, pressure-syruping and air-drying to increase sweetness (Chang SY, Yu, ZR, Chang CY et al, 1996).

Taiwan has exported mume to Japan for decades, mainly for umeboshi (Japanese trade interviews, 2005), but has been losing the market to China in recent years. From 1998 to 2005 these semi-processed exports fell from 5 787 to 270 tonnes, while average annual landed prices varied between A\$2.75 and 4.15 a kilogram. Processed mume exports fluctuated from 12 to 234 tonnes a year, being 126 tonnes in 2005, with price ranging between A\$4.40 and \$12.80 a kilogram (Japan Customs, 2006).

Taiwan appears to have a very large market for mume products, with higher prices than other mume producing countries, and a strong export orientation. Australian product is unlikely to be competitive on quality or price either in Taiwan or against Taiwanese exports to Japan. Australian producers and/or processors could develop strategic partnerships with Taiwanese businesses to access knowledge and skills.

2.10 Thailand

Thailand’s mume production expanded from 1 124 to 6 944 tonnes from 1998 to 2002 while average prices remained stable at around A\$0.40 a kilogram (Table 2.3).

Table 2.2: Mume production, Thailand 1998-2002

Year	Total Area	Production	Average price	Average price
	(1600 m ²)	(tonnes)	(baht/kg)	(AUD/kg)
1998	6 723	1 124	13	0.42
1999	6 991	1 423	11.58	0.37
2000	7 108	2 179	11.07	0.36
2001	6 263	2 340	10.81	0.35
2002	8 368	6 944	13.39	0.43

Source: Ministry of Agriculture and Co-operatives, Thailand, 2003

While several imported and local cultivars have been grown in Northern Thailand for more than 40 years, industry development has been hampered by the lack of quality cultivars, water for irrigation, transportation from remote areas, land with sufficient altitude and chill, and poor growing skills. In recent years, Thailand’s Royal Project Foundation has encouraged hill tribesmen to grow mume and other deciduous fruits to replace revenue previously derived from opium poppy.

Most fruit has been used in pickles and preserves for domestic consumption, processed as salted pickles for cooking or as a popular ‘Japanese apricot’ drink by private factories in Chiang Mai or by the Royal Project Foundation’s canning factories (Subhadrabandhu, undated). Thailand has recently begun exporting dried salted mume to Japan. From 1998 to 2005 annual volumes peaked at 249 tonnes, declining to 12 tonnes by 2005, with average annual landed prices of A\$0.87 to \$2.40 a kilogram (Japan Customs, 2006; Japanese trade interviews, 2005).

As Thailand is building export markets, and has very low prices for mume, it is more likely to be a competitor in Japan market than a market prospect for Australian suppliers.

2.11 United States

Japanese Americans have developed small plantings of mume in California, with some potential to replace costly imports. Demand for umeboshi is likely from Japanese, American and Canadian consumer segments (Japanese trade interviews, 2005).

Small quantities of salty plums (‘crack’) are consumed in Hawaii, where mume is also used in cocktail flavourings (Laudan, 1995).

2.12 Vietnam

In 1993 mume was Vietnam's second largest fruit industry after citrus, and cultivated across the country. The main cultivars have been *Mo Vang Bach Thong* ('Yellow apricot'), *Mo Vang Moc Chau* (yellow type) and *Mo Ma Dao* ('Pink apricot'). Industry growth has been constrained by the lack of infrastructure and poor production skills (Cao-Van P & Nguyen MC, undated; Nguyen, 2000, p113).

Mume is used mainly for dried fruit products and wines for the domestic market (Cao-Van P & Nguyen MC, undated). A sweet and sour form of salty plum is a popular snack (Nguyen, 2003, pers. comm.).

In recent years Vietnam has been growing, pickling and exporting increasing volumes of mume and pickling vegetables to Japan. From 1998 to 2003, it sent between 5 and 43 tonnes of semi-processed mume a year, at average annual landed prices of A\$3.25 to \$5.90 a kilogram, and from 2002–4 it supplied between 8 and 47 tonnes a year of processed mume at prices averaging A\$5.15 to \$5.80 a kilogram (Japan Customs, 2006). Exports are probably by Japanese manufacturers with operations in Vietnam, via Japanese trading houses (Nguyen, 2003, pers. comm.).

Australian mume products are unlikely to be competitive against low priced local salted mume in the domestic market and pickled mume in the Japanese market.

2.13 Selection of overseas market for research

A literature search was carried out to identify all significant markets for mume products. These were scored by Judy Noller on market attractiveness and competitiveness factors considered critical by industry opinion (Table 2.4). The top ranking markets, Japanese markets for umeboshi and umeshu, were selected for primary research.

Table 2.3: Attractiveness of potential export markets for an Australian industry

Market attractiveness & competitiveness factors	Weighting	Country ²										
		JAP	SIN	MAL	THA	ROK	VIE	BUR	CHI	IND	DRK	TAI
Population	10	50	10	30	50	40	50	40	50	50	30	30
Existence of attractive market segments	20	100	80	80	100	80	80	60	100	20	60	20
Gross Domestic Product per capita (A\$)	10	50	40	20	10	30	10	10	10	10	10	40
Domestic industry will not constrain imports	10	50	50	20	20	20	10	10	10	10	30	10
Australian products will be price-competitive	10	30	30	20	10	20	10	10	10	10	10	10
No significant entry barriers for processed product	20	100	100	100	80	40	100	80	20	100	20	20
Opportunities for Australian product	20	80	60	40	20	40	20	20	20	20	20	20
Total weighted scores	100	460	370	310	290	270	280	230	220	220	180	150

² Country abbreviations: BUR Burma, CHI China, DRK Democratic Republic of Korea, IND Indonesia, JPA Japan, MAL Malaysia, ROK Republic of Korea, SIN Singapore, TAI Taiwan, THA Thailand, VIE Vietnam

Sources: The World Factbook Database, 2004, Central Intelligence Agency, United States; *Tariff database 2006*, Asia-Pacific Economic Corporation

3. Evaluation of the Australian domestic market

No literature was found regarding mume products in Australia, so the domestic market research has relied on interviews and store audits.

3.1 Methods

Domestic market research to provide indications about which products an Australian industry should develop by identifying current markets, and assessing their likelihood of switching to Australian product, and their product requirements: The research stages were:

- A literature search which determined there was no literature available for use
- Preliminary interviews with Asian food wholesalers and retailers in Cairns and Brisbane to determine the main domestic markets for the leading mume product imports
- Trade interviews to investigate the market situation and market requirements for these products, and the likely demand for similar Australian products (Table 3.1)
- Store visits and interviews with a cross-section of Asian food retailers and a retail audit to identify the importers, wholesalers, retailers and food service using or likely to use salty plum, plum toffee, umeboshi, ume paste and umeshu (definitions in Glossary). Most distributors of salty plum and plum toffee were identified from product labels, supplemented by trade recommendations and Telstra Yellow Pages listings. This list consisted of 11 businesses importing, eight wholesaling, 17 retailing, five chefs and five large tourist hotels.
- The three leading importers of Japanese foods and drinks.

Table 3.1: Interviews with domestic market trade

Company	Description	Mume product discussed
Amyson, Sydney	Importer	Salty plum, umeboshi, ume paste
Asian Foods Australia, Cairns	Wholesaler, retailer	Salty plum, plum toffee, umeboshi, ume paste, umeshu
Burlington's Supermarket, Haymarket, Sydney	Asian foods retailer	Salty plum, plum toffee, umeboshi, ume paste, umeshu
Cairns International Hotel, Cairns	Tourist hotel	Umeboshi, ume paste, umeshu
Chinatown Cellars, Haymarket, Sydney	Liquor retail outlet	Umeshu
Daiwa, Melbourne	Importer, wholesaler, retailer of Japanese foods	Umeboshi, ume paste, umeshu
Darwin Importers, Darwin	Importer	Salty plum
Downtown Duty Free, Sydney	Retailer	Umeshu
Ginza Teppanyaki Restaurant, Melbourne	Japanese restaurant	Umeboshi, ume paste, umeshu
Great Eastern Food, Melbourne	Large Asian foods retailer	Salty plum, plum toffee, umeboshi, ume paste
Holiday Inn, Melbourne	Tourist hotel	Umeboshi, ume paste, umeshu
Ippon Sushi Restaurant, Haymarket, Sydney	Japanese restaurant	Umeboshi, ume paste, umeshu
Japan Food Corporation, Sydney	Importer, wholesaler, retailer of Japanese foods	Umeboshi, ume paste, umeshu
Jun Pacific Corporation Pty Ltd, Sydney	Importer, wholesaler, retailer of Japanese foods	Umeboshi, ume paste, umeshu
Kappo Okita Japanese Restaurant, Melbourne	Japanese restaurant	Umeboshi, ume paste, umeshu
Ly Trading, Melbourne	Large importer, wholesaler, retailer	Salty plum
Macro Foods, Bondi Junction, Sydney	Health foods retailer	Umeboshi, ume paste

Company	Description	Mume product discussed
Matson Plaza Hotel, Cairns	Tourist hotel	Umeboshi, ume paste, umeshu
Mercure on Broadway, Sydney	Tourist hotel	Umeboshi, ume paste
Miracle Supermarket, Chatswood, Sydney	Asian foods retailer	Salty plum, umeboshi, ume paste
New Eastland Pty Ltd, Melbourne	Importer	Salty plum
Nihonbashi Zen-Kushijah Restaurant, Melbourne CBD	Japanese restaurant	Umeboshi, ume paste, umeshu
OK Supermarket, Ashfield, Sydney	Asian foods retailer	Salty plum, umeboshi, ume paste
Oriental Merchant, Melbourne	Leading importer and wholesaler, Asian foods category manager for retail chains, supplies Asian food stores	Salty plum, umeboshi, ume paste
O'Sullivan's Health Foods, Northbridge, Sydney	Health food retailer	Umeboshi, ume paste
Radisson Hotel, Cairns	Tourist hotel	Umeboshi, ume paste, umeshu
Spiral Foods, Sydney	Importer	Umeboshi, ume paste
Thai Kee IGA Supermarket, Haymarket, Sydney	Large Asian foods retailer	Salty plum, umeboshi, ume paste
Tokyo Mart Liquor Wholesalers, Sydney	Wholesaler	Umeshu
Ume Nomiye Japanese bar & café, Fitzroy, Melbourne	Japanese restaurant	Umeboshi, ume paste, umeshu
Vintage Cellars, Chinatown, Melbourne	Liquor chain retail outlet	Umeshu
Wah Lien Trading, Melbourne	Importer	Salty plum
Wei Hwa, Sydney	Importer	Salty plum, umeboshi, ume paste
Wing Ling, Fortitude Valley, Brisbane	Small Chinese food & herbs retailer	Salty plum
Woolworths, Sydney	National retailer	Salty plum, umeboshi, ume paste, umeshu
Woolworths liquor store, Northbridge, Sydney	National retail chain outlet	Umeshu
Yamato Japanese Restaurant, Melbourne	Japanese restaurant	Umeboshi, ume paste, umeshu
Yuen's Market Trading Co., Fortitude Valley, Brisbane	Large Asian foods importer, wholesaler and retailer	Salty plum, plum toffee, umeboshi, ume paste
Yuki's at the Quay, Circular Quay, Sydney	Japanese restaurant	Umeboshi, ume paste, umeshu

- Collation and analysis of data
- Selection of products to focus on for the domestic market.

All mume consumed in Australia is imported in processed form. As only salty plum, umeboshi and umeshu are consumed in any volume, this study has concentrated on those markets.

3.2 Salty plum

3.2.1 Market size and growth

It was not possible to obtain statistics on market size or growth, as the Australian Bureau of Statistics incorporates salty plum data in total prune imports. A medium sized importer suggested most importers handle around 100 kilograms a year. Market size is estimated at 25–30 tonnes from volumes reported by individual importers (domestic trade interviews, 2003).

Market value was estimated at \$325 000–390 000 in 2004, using the landed price of \$13.00 a kilogram paid by larger importers for product from China and Taiwan (domestic trade interviews, 2003).

Most retailers reported either stable or slowly growing demand. Three larger importers ceased handling salty plum in 2002 and 2003 because they could not buy product containing sweeteners permitted by new Australian food standards. Retailers noticed no significant market reaction to this substantial reduction in supply, so assumed demand to be weak (domestic trade interviews, 2003).

3.2.2 Market segments

Chinese market

The main consumers are ethnic Chinese residents born in China, Hong Kong and Singapore (domestic trade interviews, 2003). This community is around 556 000 persons according to 2001 Census data from the Australian Bureau of Statistics, plus the Taiwan-born Chinese not included in the Census. As consumption varies with the individual, it was not possible to estimate total consumption for this or any other market.

Chinese people use salty plum mainly as an occasional snack, much like chewing gum. It is also used medicinally, for morning sickness, travel sickness and other forms of nausea; for sore throats (because of its high salt content); for warming the body after giving birth; and as a stimulant for drivers on long journeys. Some add a salty plum to a glass of rice wine.

Demand has not been strong because ethnic Chinese people usually prefer sweeter styles of dried plums over salted mume, and generally do not like very salty foods. Consumers buy in small quantities because they only eat a few of the highly salted fruit at a time. Salty plum is not considered an essential product in the Asian food category.

This market eats salty plum at all ages. However, while the first generation of Chinese immigrants shops almost exclusively in Asian food stores for salty plums and other Chinese groceries, the Australia-born second generation is less likely to eat salty plum, and shops more at retail chain stores (domestic trade interviews, 2003). This trend suggests demand for salty plum will fall as the immigrant generation ages.

Additional ethnic Asian markets

Demand from other Asian segments stems mainly from Australian residents born in Malaysia, Indonesia, the Philippines and India, a population of around 542 000 according to Australian Bureau of Statistics 2001 census data for residents born in South-East Asia. Those from South East Asia shop at Asian grocery stores that are usually owned by Chinese or Vietnamese retailers and typically have a large range of salted and dried plum products (domestic trade interviews, 2003; domestic retail audit 2003).

Salty plum has also been in strong demand from tertiary students from Thailand, China, Hong Kong, Singapore and Malaysia (both Chinese and Malay), who use salty plum mainly as a snack, and have strong preferences for familiar brands and styles. Japanese people also buy it occasionally (domestic trade interviews, 2003).

Some ethnic Vietnamese buy Chinese salty plum and a Vietnamese sweet and sour version from grocery stores located where there are large Vietnamese populations (Nguyen, 2003). However, while distribution of salty plums to this segment has increased, demand has grown slowly (domestic trade interviews, 2003; retail audit).

Other segments

There was significant demand in two consumer segments in North Queensland and the Northern Territory. Indigenous Australians, Melanesians and Polynesians were the main consumers, both in

numbers and individual consumption, while Caucasian children often bought a few salty plums from confectionary sections of convenience stores. This market was attributed to the region's long history of Chinese immigrants and Malay and Japanese pearl divers who introduced their traditional foods.

The market size could not be assessed as salty plum is handled by numerous stores and distributors. However, a Cairns greengrocer sold only half a kilogram a week, mainly to indigenous Australians. A large Queensland distributor considered that only the indigenous market could be expanded. However, demand for salty plum has fallen markedly in the Northern Territory's indigenous population following government health education programs promoting healthy and low salt foods.

Elsewhere, there have been few sales through Asian food stores and retail chains. While it was assumed most Australians dislike salty plum and were unlikely to adopt a food with such specific ethnic appeal, there is a very small emerging segment of Australians of all demographics who do buy salty plum, usually when visiting Asian grocers in search of new foods, and encouraged by ethnic Chinese companions. Some retailers expect the market could be expanded by promotion as consumer awareness was low and Australian consumers want to know how to use a product before buying it (domestic trade interviews, 2003).

3.2.3 Supply

Most imports were from Taiwan and China, and occasionally Hong Kong, Singapore and Malaysia. As four Taiwanese companies promoted salty plum at Fine Foods Australia in 2003, Australia appears to be an attractive market for Taiwan.

Imports were stable until 2002–3, when several shipments were intercepted by Australian Quarantine Inspection Services (AQIS) because of added sweeteners and colourants outside Australian food standards (Fig. 3.1).

Fig. 3.1. Salty plums (a) with artificial red colouring, (b) with no added colouring, (c) Vietnamese



As a result, several importers, including the leading Asian foods distributor, Oriental Merchant, ceased handling salty plum. Remaining importers had not had supply shortages as salty plum's long shelf life permits intermittent imports and indefinite storage; however, in 2004 these importers were trying to find reliable overseas suppliers of saccharine-free product (domestic trade interviews, 2003).

3.2.4 Product profile

The standard salty plum is brown and very dehydrated, often with a powdery coating that is usually white in colour, but is sometimes vivid red or orange, or a dark brown-orange. There appears to be no classic flavour or production process. Retailers observed that consumers from various Asian countries have distinct preferences for the styles and brands they know, and stores serving Asian students from overseas often provided their preferred products and brands. The Chinese market also appears to have some brand loyalty, with some new brands not accepted (domestic trade interviews, 2003; domestic retail audit, 2003).

Salty plum is usually imported by sea freight in finished form although an Australian manufacturer has been importing dried salted plum and finishing them with colorants and sweeteners to comply with Food Standards Australia New Zealand (FSANZ) food standards (domestic trade interviews, 2003; Hayward S, 2003, pers. comm.).

Salty plums from mume compete with several dried salted plum products in most Asian food stores. In Sydney’s largest Asian grocery, salty plum was a fifth of total dried plum sales, while a specialist retailer in Melbourne offered only a few ‘sour plum’ products in its range of 55 dried plum lines sold loose in acrylic dispensers. Melbourne’s Asian grocers often had several salted mume products, compared with one or two in similar Sydney stores. It was said this was due to greater competition between Victorian distributors, rather than market demand. Similar products from plum tend to be sweeter, milder in flavour, and appeal more to Chinese consumers who do not like very salty foods. This market also prefers sweeter salty plums, which nevertheless have a high salt content.

The only evidence of product innovation was a Taiwanese product labelled ‘low salt’ and some foil packs from Taiwan and Singapore. Asked if salty plum could be made more appealing to non-consumers, retailers considered it a difficult style of food to modify, although adding different flavours to the base product might add value and fetch a small premium (domestic trade interviews, 2003; domestic retail audit, 2003).

Quality

While some measured quality by appearance, large size and good flavour, most retailers struggled to define quality, with some relying on prices as an indicator. One importer noted that product quality had declined over recent years, from a better tasting and more expensive Taiwanese product with larger fruit, natural colouring and low salt content to a low-cost highly salted product with less appealing flavour being imported from China and Thailand. Some importers rejected up to 10% of product on appearance when repacking imported bulk product, adding to product and labour costs.

It was suggested an Australian supplier would need to compete against low-priced imports with a high quality natural Chinese-style product from similar processes and with authentic flavours to meet consumer preferences, under an Australian brand the market would trust (domestic trade interviews, 2003).

Quality assurance requirements and food safety

Manufacturers have to use artificial sweeteners as sugar absorbs moisture and causes a sticky surface according to a Taiwanese manufacturer (Hayward, S, 2003). They also use saccharine as a drying agent, according to an importer. In Australia intense sweeteners have to comply with the Australian and New Zealand Food Standards Code (FSANZ) (Table 3.2). Schedule 1 additives have restricted permissions in specific food groups, while Schedule 2 additives are permitted at good manufacturing practice (GMP) levels in most processed foods.

Table 3.2: Sweeteners permitted under Australian and New Zealand Food Standards Code

Schedule 1		Schedule 2	
Additives with Restricted Permissions		Additives Permitted at GMP levels	
950	Acesulphame potassium	951	Aspartame
951	Aspartame (confectionery, sweetener, drinks)	955	Sucralose
952	Cyclamates	957	Thaumatococin
954	Saccharin	961	Neotame
955	Sucralose (confectionery, sweetener, drinks)		
956	Alitame		
957	Thaumatococin (brewed soft drinks)		

Source: Food Standards Australia New Zealand, Consumption of intense sweeteners in Australia and New Zealand

While some importers and retailers considered their customers were not overly concerned about additives in salty plums, several importers had ceased handling salty plum because they could not

source product with permitted drying and sweetening agents. The largest importer needed a product that would meet its retail chain clients' requirements for food safety and traceability at an acceptable price. However, a manufacturer who imported dried salted plum and sweetened it with aspartame had experienced little demand from retailers (domestic trade interviews, 2003). Meanwhile a Taiwanese manufacturer offered a new salty plum labelled 'No saccharine' and 'No stevia', at Fine Foods Australia in 2003 so as to comply with FSANZ regulations. Also, suppliers to the Japanese market have switched to aspartame-sweetened product (Japanese trade interviews, 2005).

Food safety in retailing or food service is the responsibility of state health departments. Australian Quarantine Inspection Service (AQIS) monitors food imports to ensure they meet FSANZ requirements, and by 2004 had rejected several shipments of salty plum because of colourings and flavourings. Continued routine sampling has found most product to be compliant and AQIS does not perceive any major safety problem although concedes monitoring is difficult as salty plum is imported under various categories such as example 'dried fruit', 'fruit in brine' and 'confectionary', and labelling of consignments is inadequate (Poli, 2003, pers. comm.).

Salty plum labels usually provided basic descriptions of contents, for example 'plums', 'sugar', 'salt', and occasionally 'liquorice' or 'flavourings'. The only products with the complete contents and additives panels required by FSANZ were a product finished in Australia and the Taiwanese sample previously mentioned (domestic retail audit, 2003).

Branding

The retail audit found a large number of brands, often in Chinese language only. The Taiwanese brand Eaglobe was the most observed pre-pack, with Oriental Delicacies (the brand of importer Ly Trading) being the main re-packaged bulk product. Most product appeared to have been repackaged. There was no obvious link between price and brand, with prices for any brand varying widely across stores, even in the same neighbourhood (Table 3.3). Consumers usually remain loyal to brands for certainty of taste and quality (importer and retailer surveys). Country of origin is more a concern for overseas Asian students than resident Asian consumers (domestic trade interviews, 2003).

Table 3.3: Salty plum products - Cairns, Brisbane, Sydney and Melbourne, 2003

Product name and brand	Product name and description	Weight	Retail price	Retail price/kg	Country of origin
'Sweet Red Plums', Chinese brand	Red colour	100g	\$4.95	\$49.50	China
'Salty Plums', Oriental Delicacies	Brown colour	80g	\$3.20	\$40.00	Hong Kong
'Red salty plum', Chinese brand	Dark orange-brown	500g	\$14.75	\$29.50	Taiwan
Loose in acrylic dispensers	None	100g	\$2.80	\$28.00	Not given
Eaglobe Brand Cured Prunes	White, red and orange powdery coatings	75g	\$1.95 - \$2.00	\$26.60	Taiwan
Doyou Ciahqquo	Brown colour	80g	\$2.00	\$25.00	China
Guang Xin	Low salt, foil pack	80g	\$1.70	\$21.25	China
'Red prune', Grand Continental Food	In acrylic box	90g	\$1.80	\$20.00	Not given
Sweet white plums, 'Oriental Delicacies'	Brown with white powdery coating	200g	\$2.99	\$14.95	Taiwan
'Red Plum', Xi Muoi Do	Red colour	90g	\$1.30	\$14.40	China
Wang Mui Plum	Brown colour	250g	\$3.20	\$12.80	Singapore
'Sweet cured preserved', Chinese language brand	Bright orange colour	160g	\$1.70	\$10.62	Taiwan
Xi Muoi Cam Thao Plum Candy	Dark brown, rough coating, in acrylic box	125g	\$1.39	\$11.12	Vietnam

Source: retail audit, full details in Appendix B

Packaging

Most salty plum was re-packaged by importers in clear cellophane bags of 80–500 g, or small clear acrylic boxes or trays of around 100 g. The most modern packaging was a Taiwanese foil pack (Table 4.2). Packaging has become more attractive in recent years, and good packaging can attract a slight premium (retailer survey). Salty plum was also sold loose in acrylic dispensers in some Asian stores specialising in dried fruit and nuts and confectionary, as well as from jars on counters of convenience stores and fuel outlets in northern Australia.

Salty plum's long storage life enables importers to import bulk product, and prepack as needed – this reduces purchase costs and allows simpler labelling than for imported retail packs. However, some larger stores preferred to import pre-packs to take advantage of lower packaging costs overseas and to avoid the restrictions and fees of packaging in plastic bags in Australia (domestic trade interviews, 2003).

Labelling

Australian food laws require packaged foods to carry labels with name or description of the food; details of the characterising ingredient; the presence of any additives, allergy-causing substances; genetically modified or irradiated material; best before' date; storage requirements; and a nutrition information panel in a standard format giving the amount per serve and per 100 g (or 100 ml if liquid) of the food and the amount of energy (kilojoules), protein, total fat, saturated fat, carbohydrate, sugars, salt and any other nutrient about which a claim is made, for example fibre, iron or calcium. Regulations required country of origin of packaged foods are being introduced (FSANZ, undated (b)).

An audit of products stocked by retail stores found that salty plum repacked by importers usually was labelled with the product name (in English and often Chinese or Vietnamese), basic description of ingredients (for example 'sugar', 'salt') and nutritional panel, country of origin, weight and importer details. However, imported packs were mostly labelled partly or only in Chinese. Labelling in either language rarely distinguished salty plum from true plum products, and retailers had difficulty identifying mume in such a product range, generally relying on appearance and flavour to describe it as 'sour plum'. Labels described the fruit as 'plums', 'prunes' or 'mui' (Chinese for plum), and as being 'pickled', 'salty', 'sweet', or 'sweet cured preserved'. Full ingredient and additive panels were seen only on a product finished by an Australian manufacturer and on a Taiwanese sample at Fine Foods Australia. Most distributors were satisfied that current labelling was adequate for their customers, and that current markets did not need English language labels (domestic trade interviews, 2003).

In summary, the research indicates an Australian salty plum would need:

- to be lighter and sweeter with lower salt
- to be supported with tastings, branding, labelling and point of sale information in Asian food stores
- production, packaging and distribution cost efficiencies to compete against low priced imports.

3.2.5 Pricing

Import prices were around \$13 a kilogram CIF in 2004, and have been stable except for currency fluctuations in recent years, with intense price-based competition between.

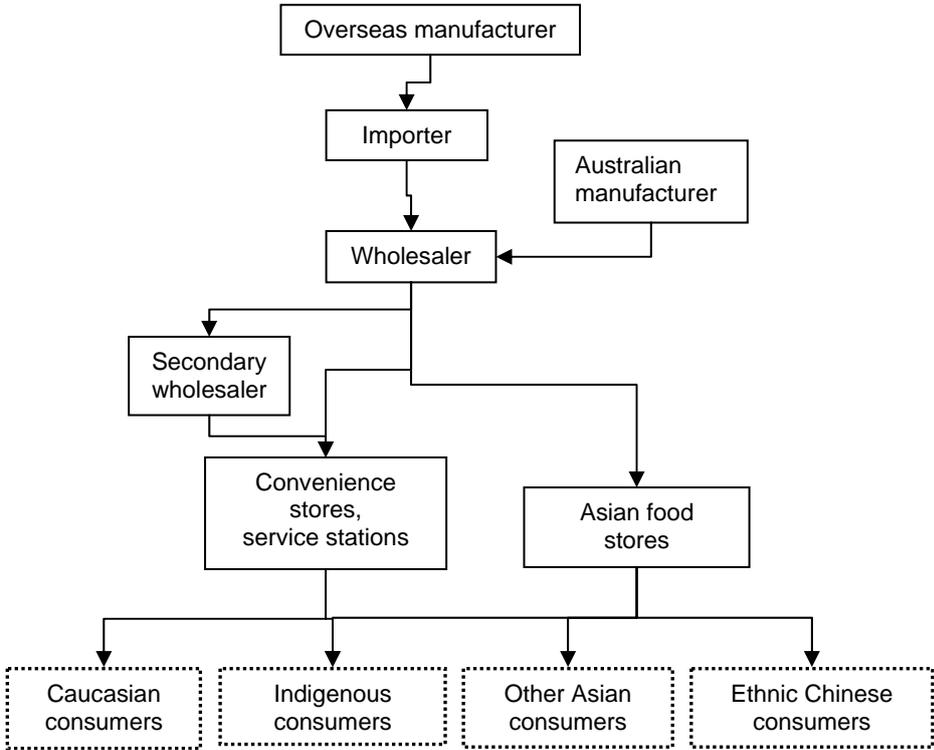
Retail prices for 1kg equivalent ranged from \$10.60–\$49.50, and most often observed at around \$23.00 (Table 4.2). However the most popular product is imported at around \$10 a kilogram and retails at around \$15 a kilogram. There is no apparent relationship between price and product, pack size or store location. Before deleting salty plum in 2003, Woolworths' retail prices were around \$1.80 for 70 g (\$25.70 a kilogram). Retailer mark-up is typically 40-50%.

For Australian product retail chains would expect similar pricing to imports, i.e. under \$10 a kilogram (15-20% less than imports at around \$11.50 a kilogram), but conceded this would be difficult (domestic trade interviews, 2003; domestic retail audit, 2003).

3.2.6 Distribution

Salty plum is distributed through conventional marketing channels, often vertically integrated (Fig. 3.2).

Fig. 3.2: Distribution channels for salty plum in Australia



Source: Domestic trade interviews, 2003

There were three main levels of distribution.

Importers

Chinese and Vietnamese businesses imported mostly small quantities of salty plum, occasionally prepackaged but usually in bulk which they repacked under the importer’s brand and supplied to Asian grocers directly or through wholesalers or agents. Smaller importers generally supplied local Asian grocers.

Oriental Merchant, who managed the Asian food category for Coles, Woolworths and Franklins and supplied Asian food stores, imported and distributed salty plum through 200 national retail chain stores in mainly ethnic areas until ceasing in 2003 because of food safety concerns (domestic trade interviews, 2003).

Wholesalers

Importers are usually also wholesalers, supplying Asian food stores direct or via secondary distributors. A small Asian foods manufacturer was importing dried salted mume, finishing the processing, and distributing to Asian food outlets and other stores, as well as through its own store (Hayward S, 2003, pers. comm.).

Retailers

Retailing of salty plum was mainly through Asian supermarkets and grocers. In northern Australia, salty plum was also sold in convenience stores, service stations and greengrocers (domestic retail audit, 2003).

3.2.7 Promotion

Retailers made little effort to promote salty plum, usually displaying it amongst dried plums and other fruits. No point of sale material was seen, and few staff could distinguish mume. Product labels, whether in English, Vietnamese or Chinese language, provided minimal information according to store staff. Retailers could identify newer mume products such as juices and teas from the fruit image on the label.

No retailers provided free tastings — customers were expected to buy salty plum to taste or be introduced to it by Asian companions. It was assumed Australian consumers lacked awareness or experience of salty plums. Some larger retailers suggested taste-testings would attract consumers, and some would pay a premium for promotion (domestic trade interviews, 2003).

3.2.8 Positioning

The research indicated Australian salty plum might be competitive if positioned as follows:

- As a high quality product, made with similar processes to Chinese salty plum
- As a lighter sweeter lower salt product than is currently sold
- With flavourings to give a range of products and differentiate from imports
- In attractive quality snackpacks
- With a strong Australian brand
- Labelled in English and Chinese language, with an image of mume fruit, product description for potential new customers, full contents and nutritional panel, and promotion of the sweetener used
- In specialty Asian food stores used by Australians, with tastings and point of sale information.

3.3 Umeboshi (and ume paste)

Umeboshi, or ‘pickled ume’, is whole mume fruit pickled in salt (Fig. 3.3), sometimes coloured pink from red perilla leaf or artificial colouring, and possibly flavoured with bonito (tuna) or honey. Ume paste is the same product in puree form.

Fig. 3.3 (a) Umeboshi and (b) ume paste from Asian food stores



(a) Umeboshi



(b) Ume paste

3.3.1 Market size and demand

In 2004 all umeboshi retailed in Australia was imported; however, actual volumes are not available as the Australian Bureau of Statistics incorporate umeboshi with ‘other pickles in brine’ products in trade data. The market size was estimated at 3250 kg valued at \$130 500 (assuming a retail price of \$40 a kilogram) based on import figures provided by the three major Japanese food importers that handle

most umeboshi. Ume paste was imported in very small stable quantities which importers could not quantify (domestic trade interviews, 2003).

3.3.2 Market segments

Japanese market

In 2004 the umeboshi market was almost exclusively Japanese residents and tourists (domestic trade interviews, 2003). Australia's Japanese resident population was 25 480 (people born in Japan) in 2001, an 11% increase since 1996 (ABS, 2004). There were 663 900 Japanese visitors in 2002, mostly vacationing couples staying in hotels and resorts in Victoria (1.04 million visitor nights), New South Wales (2.5 million visitor nights), the Gold Coast (258 000 visitors) and North Queensland (233 000 visitors). Visitors were expected to increase at an average 3.1% a year until 2012 (Queensland Visitor Survey, 2002).

Umeboshi consumption rose slowly from 1998–2003, then plateaued due to a shrinking Japanese resident population in Australia, and from tourist hotels using less umeboshi (domestic trade interviews, 2003).

In Australia Japanese consumers typically eat umeboshi for breakfast, with rice in riceball, with other pickles as snacks and with traditional Japanese meals, and in salad dressings. Japanese men often add umeboshi to a glass of sake, vodka, or shochu with hot water (Nguyen, 2003, pers. comm.).

Japanese importers have established retail outlets in areas with Japanese communities in Sydney and Melbourne. Japanese residents shop at these stores and Asian grocers, and usually prepare their meals at home. Japanese visitors also buy Japanese foods occasionally at Asian grocers (domestic trade interviews, 2003).

Australia has a large and growing Japanese restaurant sector. Japanese residents use these Japanese restaurants only occasionally, usually eating umeboshi in a mixed pickle appetiser and occasionally in sake or shochu.

Japanese visitors eating in Japanese restaurants have been the main market for umeboshi (importer, retailer and restaurant surveys). Examples include a Cairns restaurant serving 400 customers a week (breakfast, lunch and dinner) and using on average two kilograms of umeboshi a week (100 kilograms a year), and a restaurant in Melbourne's Chinatown using less than 12 kilograms a year. Demand had tracked the growth of the Japanese visitor market, and declined somewhat in recent years, according to Japanese food importers. Usage of ume paste was very minor.

Most Japanese restaurants were using very small volumes of umeboshi, mainly as a pickle in traditional Japanese breakfasts; occasionally as an appetiser, in a mixed bowl of pickles with soup at dinner, or blended into salad dressings and sauces; and some restaurants and takeaway cafes offered riceball containing an umeboshi. Japanese chefs occasionally used it in chicken, meat or seafood dishes, for example yakitori (grilled) chicken or raw squid. Whole umeboshi was also added to a drink of shochu (distilled Japanese spirit) with hot water. Ume paste is not often used in sushi, as the rice is already seasoned. An expensive Sydney restaurant serving Ume-shiso Sushi Roll used chopped whole umeboshi rather than ume paste as its customers expected all food to be hand-prepared by the chef.

Large hotels catering to the Japanese tour market, and offering a traditional Japanese breakfast buffet, have been an important market for umeboshi, but demand has declined in recent years. Some hotels in Sydney and Melbourne have experienced declining guest numbers, compounded by Asia's Severe Acute Respiratory Syndrome (SARS) epidemic in 2003. The number of Japanese-branded hotels in Sydney and Melbourne had also reduced, and hotels chains concerned about lack of growth in the Japanese tourist market, the weakened Japanese economy, and over-catering to one market segment, had refocused on stronger European markets and reduced Japanese services including the Japanese breakfast buffet. Other hotels had replaced umeboshi with lower-priced Japanese pickled vegetables.

Outside the main Japanese tourist destinations of Cairns, Gold Coast and Sydney, hotels were unlikely to introduce or expand a Japanese breakfast buffet in the medium term.

Several Cairns hotels specialise in the Japanese tourist market and offer a Japanese breakfast buffet, including the standard miso, rice and pickles (all considered health foods in Japan). Four Cairns hotels collectively served more than 400 breakfasts to Japanese visitor on an average day (an estimated 146 000 breakfasts a year), with older Japanese usually opting for the Japanese breakfast, and younger vacationers preferring bacon, eggs and hash browns. A large city hotel used approximately 200 kilograms of umeboshi a year on its extensive Japanese breakfast buffet and in Japanese room breakfasts, with most guests only eating one or two at a meal. Other chefs knew of umeboshi but preferred to use lower priced pickles (daikon radish, eggplant and cucumber). None had experienced any demand for umeboshi from consumers or tour companies, but would consider using an Australian umeboshi, depending on quality and price.

These hotels did not offer tour groups Japanese dishes at dinner (except in one hotel's Japanese restaurant), because Japanese visitors prefer beef and seafood which were expensive luxuries in Japan. One hotel would consider umeboshi for its restaurant menu, depending on price (domestic trade interviews, 2003).

Japanese tourists buy substantial quantities of souvenirs, particularly in Cairns, the Gold Coast and Sydney. Umeboshi has potential as an Australiana-packaged souvenir through airport and duty free stores and in the "authentic Australian gift" category sold on Japanese airlines. Japan Airlines (JAL) also retails its in-flight products in JAL stores in Japan for travellers seeking to buy more (Takashima, D. 2006, pers. comm.).

Chinese market

A very small slowly growing Chinese market ordered umeboshi occasionally in Japanese restaurants, but rarely bought it at retail outlets (domestic trade interviews, 2003).

Additional ethnic segments

Ethnic Korean consumers were familiar with umeboshi, and likely to be using it (domestic trade interviews, 2003). Several umeboshi products from Japan, seen in a Korean grocery store in Sydney's Bondi Junction, included large premium quality umeboshi (Nankou cultivar) at \$21.10 for 200 g, or \$105.50 a kilogram (domestic retail audit, 2003).

Other market segments

A small number of Caucasians knew umeboshi from having lived in or visited Japan, and occasionally ordered it in Japanese restaurants. However, demand was very low in a suburban Japanese bar and cafe with 90% Australian clientele and 10% Japanese. In Melbourne dishes with umeboshi sauces were popular at a Japanese restaurant serving mainly Australians, and a hotel chef used umeboshi occasionally in western dishes such as lamb shanks. It was doubted this market could be expanded significantly, because Australians rarely tried particularly traditional Japanese foods, including umeboshi, and usually did not like salt-sour combinations.

There was small stable demand emerging from health-conscious Caucasians across Australia, who bought umeboshi and ume paste in stores selling health, macrobiotic and gourmet foods. These consumers were often familiar with the health benefits claimed for umeboshi; and read health magazines that promoted those health benefits widely accepted in Japan. A television food show featuring umeboshi generated strong interest and purchases from its Australian audience.

Outside these markets, there was no consumer awareness of umeboshi (domestic trade interviews, 2003).

3.3.3 Supply

All umeboshi was imported from Japan, with supply generally reliable and of acceptable quality, but lacking the range of choices available in Japan. Most product was labelled 'Product of Japan', with the most expensive lines marked 'Manufactured in Japan' (domestic retail audit, 2003). Importers assumed the less expensive brands were produced in other Asian countries and packaged in Japan. While Japanese consumers in Australia would prefer umeboshi of Japanese origin, they were accepting Chinese product.

Umeboshi and ume paste in health food stores were produced in Japan and imported and distributed by Australian health food specialists. Whole umeboshi arrived in 25 kilogram tubs for repacking under the importer's brand. Supply was often interrupted by climatic and other factors, and at least one importer had been unable to find a back-up supplier. As health food importers and retailers prefer an assured domestic supply, they would be likely to support an Australian product with competitive quality and pricing.

No organic umeboshi was imported because a shortage in Japan had driven prices too high for Australian importers to on-sell.

A kosher umeboshi, certified in Japan by U.S. kosher certifiers, was carried by a Sydney health food store to meet demand from its mainly Jewish customers (domestic trade interviews, 2003).

3.3.4 Product profile

Quality

Umeboshi quality is usually based on size, appearance, flavour, cultivar and production process. Importers bought by fruit size and brand. Very small quantities of large expensive umeboshi were imported for eating and with sake. Quality was considered average, with Chinese quality improving in appearance and colour. Quality was not a major concern as umeboshi was not an important product, and Japanese residents were less concerned with quality than was the Japanese market (domestic trade interviews, 2003; Nguyen, 2003, pers. comm.).

Umeboshi is either light brown or pink. Colour should be consistent - the Japanese standard requires a single colour in the pack (domestic trade interviews, 2003). While some more expensive product contained red perilla leaf, most pink imports are artificial coloured according to Japanese manufacturers (Hayward S, 2003, pers. comm.).

Flavour, a key criteria, has to meet the Japanese taste. Retailers would only handle an Australian umeboshi that matched the quality of imports, with exactly the same taste as Japanese product, to meet consumer expectations, and at equal or lower prices. Hotels would require an authentic flavour acceptable to Japanese consumers, similar to Japanese product, and developed under Japanese influence (domestic trade interviews, 2003).

High salt content was acceptable when umeboshi was used as a pickle, but low salt levels are preferred if for a snack. Salt content was not a concern for the health food market, although lower salt could be promoted. Sea salt was promoted in umeboshi sold through health food stores. While Japanese food stores sold umeboshi only in the chilled section, most Asian grocers had it on open shelves (domestic trade interviews, 2003; domestic retail audit, 2003). Chilling appears to extend shelf life indefinitely (Nguyen, 2003, pers. comm.).

While consumers accepted smaller sized product than they would in Japan, there was an opportunity for more choice. Consumers lacked the choice of flavours, forms, sizes and textures available in Japan and might have more specific preferences if given more options (domestic trade interviews, 2003; Hayward S, 2003, pers. comm.).

Australian umeboshi and ume paste could compete domestically, provided quality, salt content (ideally 5-10 per cent), and price were similar to imports. Japanese importers were already seeking Australian suppliers of other Japanese foods, including pickles such as ginger, to replace imports (domestic trade interviews, 2003).

Brands

A wide range of brands were observed in Japanese, Korean and Chinese retail stores in Cairns, Brisbane, Sydney and Melbourne (Table 3.4).

Table 3.4: Australian retail audit - umeboshi and ume paste

Brand/product	Packaging	Retail price	Retail price/kg	Country of origin
Umeboshi				
'Nanki Kishu Umeboshi', very large fruit	200g	\$21.10	\$105.50	Japan
Neri Ume Umeboshi	120g jar	\$9.70	\$80.83	Japan
Spiral Foods Umeboshi	150g	\$9.45	\$63.00	Japan
Nanki ume no sama 'King of Plum'	180g	\$8.90	\$49.40	Japan
Spiral Foods 'Kosher' plums		\$7.10	\$47.66	Japan
Macro Wholefoods		\$7.10	\$47.66	Japan
Shiso-Koubii 'Fragrant' style	1kg		\$47.20	
A&O Prepared plum (Shiso-iri)	80g	\$3.50	\$43.75	'Product of Japan'
Umeboshi with perilla	1kg jar	\$43.50	\$43.50	
AJI Ume-hot	160g	\$6.50	\$40.62	
Shiakiku Pickled plums (red colour)	100g	\$4.00	\$40.00	
Umeboshi	100g	Pink \$4.00, natural \$5.40	Red \$40.00 natural \$54.00	
Mikakuto Sannen Uni	120g jar	\$4.20	\$35	'Product of Japan'
ANA Pickled Plums	250g	\$7.50	\$30.00	'Product of Japan'
Unbranded umeboshi in plastic bag	500g	\$14.55	\$29.10	
Mutenka'Asada' Hiboshiume	1kg jar	\$23.50	\$23.50	'Product of Japan'
Maruryou Tokoyuo Tsubo Umeboshi	800g jar	\$13.40	\$16.75	'Product of China'
Ume paste				
Spiral Foods ume puree	150g	\$9.45	\$63.00	Japan
Neri-ume Shisoiri Kaneku brand	300g	\$5.40		'Product of Japan'
Kaneku (prepared plum paste)	300g	\$14.20	\$47.33	Thailand

Source: retail audit, in Appendix B

All products had Japanese brands except 'Spiral Foods' umeboshi and ume paste found in health food stores and a department store food hall, and 'Macro Wholefoods' brand present in a Sydney health food store (domestic retail audit, 2003).

Certain Japanese brands, particularly from the Nankou cultivar, retailed at substantial price premiums, with 'Nanko' or 'Nanki' included in the manufacturer's brand or prominently on the label. Very large Nankou umeboshi was observed in a Sydney Korean grocery store and was retailing at nine times the price of the lowest priced product (of Chinese origin) seen elsewhere (domestic retail audit, 2003). High prices also indicate more cycles of processing than for inexpensive brands (Yoshida, 2003, pers. comm.).

Quality assurance requirements and food safety

Most product labels did not have the detailed contents and additives panels required by FSANZ, either on the manufacturer's label or the importer's label usually pasted beside or over it.

It was assumed consumers had no food safety concerns about imported umeboshi. While importers were aware of chemical residue findings in Chinese imports to Japan, they assumed this problem was lessening, and that Japanese manufacturers would monitor chemical use from overseas suppliers. However, one Japanese chef felt Australian product would be safer than some imports.

Although hotels would prefer a HAACP-based quality assurance program, this was not seen as essential for umeboshi as it was not considered a high risk product (domestic trade interviews, 2003).

Packaging

Most umeboshi was imported in bulk tubs, and repacked by importers, usually retailing in small clear trays or jars from 100g, with reusable lids; or one kilogram plastic jars used mainly by restaurants. Retailers were satisfied with current packaging (domestic trade interviews, 2003). Restaurant chefs liked one kilogram jars, which allowed them to use small amounts over several weeks. Some hotel chefs recommending packing Australian product in the same plastic pouches as other Japanese pickles, in one kilogram or five kilogram sizes (domestic trade interviews, 2003).

Labelling

Most product had the Japanese manufacturer's label in Japanese language, sometimes with a few details in English, and also the Japanese importer's label in both languages.

Labels usually listed the ingredients as 'plums', 'salt', 'perilla' and sometimes 'sugar', and occasionally detailed additives such as citric acid, amino acid, 'spice', glucose, fructose and millet. Artificial colouring was rarely mentioned on pink umeboshi if perilla leaves were not evident (domestic retail audit, 2003).

Current labelling was considered adequate for Japanese restaurants. Tourist hotels considering umeboshi would need basic labelling and clear usage instructions as they rarely employ Japanese chefs and would not know how to use the product (domestic trade interviews, 2003).

Country of origin

For umeboshi, Japanese origin was considered important to Japanese consumers. Importers assumed much of the product they handled was produced in China, except for certain high quality Japanese brands. They would consider using an Australian product, having already replaced some imported Japanese foods with domestic product. Most retailers and chefs assumed they were handling Japanese product unless it was labelled otherwise. Chefs were not concerned with country of origin as their customers do not see the label, and would consider using an Australian product provided it met the expectations of their Japanese customers.

Only Japanese product was imported for the health food market as it was considered the highest quality (domestic trade interviews, 2003).

In summary, the research indicates an Australian umeboshi product would need to be

- organic for the health conscious market
- promoted as of Australian origin and from safe food production systems
- from preferred cultivars, ideally Nankou
- in a catering pack of high quality umeboshi, at prices not exceeding around \$20 a kilogram, for hotels serving Japanese tourists
- supported with product and usage information for Australian chefs
- used to test the domestic market in preparation for marketing to Japan.

3.3.5 Pricing

Import prices ranged from \$7.35 – \$25 a kilogram CIF, depending on brand and distribution channel. Wholesale prices have been constant in recent years, with currency fluctuations absorbed by importers, retailers and restaurants. The retailers' margin is typically 40% (domestic trade interviews, 2003; Hayward S, 2003, pers. comm.).

Australian retail prices were comparable to those in Japan for similar quality (Hayward S, 2003). Retail prices were mostly around \$40 a kilogram, regardless of packaging type or size, but were as low as \$16.75 a kilogram for product labelled as from China (Table 4.3). Families bought the more expensive brands to eat at home, while restaurants usually bought lower quality at a lower price. However, some price resistance has occurred when shoppers compare the fixed price on the Japanese label with the higher price in Australian stores (domestic trade interviews, 2003; domestic retail audit, 2003).

Japanese restaurants priced a small dish of umeboshi and other appetisers at around \$4-6.

Some tourist hotels avoided umeboshi for the Japanese breakfast buffet because its price (chefs quoted \$50 and \$60 a kilogram) was too high for a breakfast typically priced at around \$15. Hotels only used luxury-priced foods if the business was assured of benefiting from increased profits, visitation rates or market differentiation, and their chefs would expect prices of \$7-\$20 a kilogram, similar to the Japanese pickles they were using (domestic chef survey, 2004).

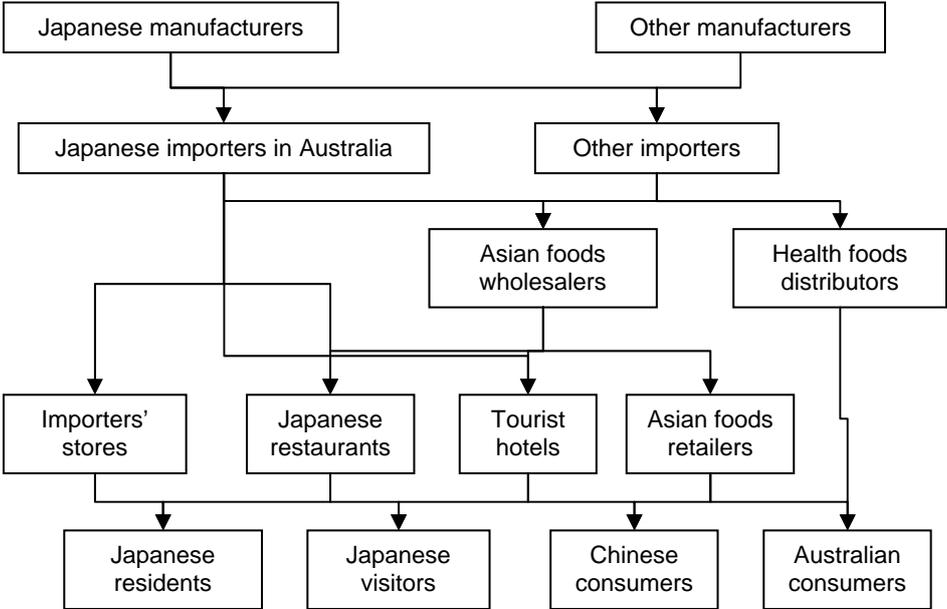
3.3.6 Distribution

Umeboshi and ume paste were usually distributed through vertically integrated channels (Fig. 3.4).

Most product was imported by two large Japanese companies, with small amounts handled by smaller Japanese importers, and Chinese and natural foods importers. Japanese importers either sold umeboshi wholesale to retailers, restaurants and hotels, or supplied other wholesalers and distribution agents.

Retailers were usually Asian food stores and supermarkets with Japanese customers, or Japanese importers’ own stores located close to Japanese communities, i.e. Northbridge, Sydney (Jun Pacific); Camberwell, Melbourne (Japan Food Corporation); and Elsternwick, Melbourne (Daiwa). Chinese importers supplied umeboshi and ume paste to Asian food stores with Japanese customers. Health food importers distributed both products direct to health and gourmet food stores, mainly in Melbourne and Sydney, with some nationally through health product distributors (domestic trade interviews, 2003).

Fig. 3.4. Australian distribution channels for umeboshi



Source: Domestic trade interviews, 2003

3.3.7 Promotion

Japanese distributors and Asian retailers were not promoting umeboshi as they assumed that all likely consumers already knew the product. Product labels provided minimal product information in English, for example ‘flavoured with honey’ on one product had not been translated from Japanese.

Umeboshi and ume paste sold in health food stores carried English language labels advising consumers of usage ideas and health benefits. A large macrobiotic foods store in Sydney provided flyers with recipes for health drinks using umeboshi and ume paste, and promoted the products at health seminars. A distributor of umeboshi and ume paste to health-conscious Australians gave usage ideas on its website, for example ‘ume spaghetti’ but lacked resources for extensive promotion. Health magazine articles on umeboshi’s health benefits had created awareness in a consumer niche interested in macrobiotic foods, and a television chef had presented umeboshi as a health food. The product could be promoted more convincingly as a health food if claims could be backed with scientific information, which has been difficult to acquire.

A chef suggested using Japanese restaurants to trial an Australian product in rice-ball or with other foods such as cucumber, as are popular in Japan, to entice Australian consumers to try (domestic trade interviews, 2003; domestic retail audit, 2003).

3.3.8 Positioning

The research indicates a number of options for competitive positioning:

- as a quality product in bulk packaging, for example plastic pouches, for tourist hotels serving Japanese tour groups
- as a low-salt product, with natural salts such as sea salt, for health food stores
- as an organic product for health food stores
- as a premium large product from Nankou cultivar for Japanese retail outlets and restaurants
- as an Australian-branded product
- use of labelling to promote significant ingredients such as cultivar, use of perilla for colouring, salt type to Japanese consumers and Japanese chefs
- use of labelling with product description, usage ideas, and promotion of health benefits for Australian consumers and chefs
- clear packaging to allow comparison with imported products.

3.4 Umeshu

Umeshu is mume liqueur made by steeping mume fruit in white liquor and sugar (Fig. 3.5), although marketed outside Japan as ‘Japanese plum wine’ (Japanese trade interviews, 2005).

Fig. 3.5. (a) Umeshu, (b) Umeshu with lemon and (c) Umeshu with honey, in Sydney liquor store



(a) Umeshu



(b) Umeshu with lemon



(c) Umeshu with honey

3.4.1 Market size and growth

The Australian domestic market consumed 6060 litres of umeshu in 2003. Market value was estimated at \$121 000 using a retail price of \$20 for 750 ml, the mid-range price observed for the leading product, Choya Plum Wine. Imports increased in recent years, with the leading importer/distributor experiencing on average 8% p.a. growth in demand since 1997 (domestic trade interviews, 2003).

3.4.2 Market segments

Japanese market

The main market has been Japanese people dining in Japanese restaurants. Demand has been strong, although sales fell in 2004, attributed to an assumption that Australia's resident Japanese population was declining (domestic trade interviews, 2003).

Japanese residents and visitors consumed umeshu mainly as an aperitif, and sometimes in umeshu jelly desserts, at Japanese restaurants and bars. They usually ordered the style without whole fruit by the glass, with groups occasionally buying a bottle (domestic trade interviews, 2003). They drank umeshu mainly for enjoyment, with health benefits a secondary reason (Brammal, 2003, pers. comm.).

Japanese visitors were the best prospect for Australian umeshu, according to Australia's leading airport duty free store chain, as they often bought liquor in duty free stores when returning to Japan. The company would offer Australian umeshu only at its Cairns International Airport store for several reasons. Japanese tourists were 50% of the shoppers at this store, and usually younger, seeking low-priced gifts for similarly-aged Japanese associates, for example office co-workers, and buying contemporary products such as vodka. The Cairns store offered local fruit wines specifically for this market. At its other key stores serving this market, Japanese tourists were usually older and bought more traditional liquors such as whiskey, and umeshu sales would probably not justify the shelf space. The stores selected product lines by passenger volume and purchasing potential, rather than focussing on a single passenger group, and prefer to turn over large volumes of major wine brands, which have been in strong demand, and would provide strong competition for Australian umeshu. Also Japanese travellers had declined in numbers and as a proportion of duty free shoppers in most of its stores (Kerney, 2003, pers. comm.).

Executive chefs in large tourist hotels used by Japanese tour groups in Cairns, Sydney and Melbourne saw potential for umeshu in their bars and restaurants, despite previously being unaware of it. Most Japanese on tour drank alcohol with dinner in a restaurant, and sometimes in hotel bars. They preferred lighter styles of alcoholic drinks, mainly wine or beer (preferably Australian, but also Japanese), and well-known brands. However, while these hotels usually offered sake and Japanese beers, demand for Japanese alcoholic drinks was very low, and while men drank somewhat more than women, consumption was very light, usually no more than a glass. Japanese visitors would probably be receptive to an Australian umeshu, but competition from Australian grape wines and beer would be strong (domestic trade interviews, 2003).

Other ethnic Asian segments

Chinese residents, mainly women, were buying small but increasing quantities of umeshu from liquor stores, Asian grocers and Japanese restaurants in Sydney's Chinatown. They prefer sweeter styles, and often buy umeshu. Chinese people rarely consume large quantities of alcohol. Other Asian consumers, usually aged 20 – 40 years, also bought umeshu from liquor stores in Sydney's Chinatown (domestic trade interviews, 2003).

Other market segments

Umeshu has a small emerging market of Australians who eat in Japanese restaurants, often attending family functions, and often becoming regular buyers of umeshu. Most consumers have been women,

infrequent drinkers, and like sweet wines. A Japanese bar in suburban Melbourne sold 225 litres (300 bottles) by the glass in 2003, mainly to women seeking sweet wines. Most Japanese restaurants offered umeshu, in a wine glass, a long glass with ice, or occasionally cocktails. Some East-West fusion restaurants also provided umeshu.

Liquor stores promoting umeshu in Sydney's Chinatown and Northbridge–Chatswood area have experienced continuing strong demand for umeshu from Australians who ask staff to recommend drinks to take to Japanese restaurants, or notice umeshu's distinctive packaging. A liquor retailer in Melbourne's Chinatown was occasionally asked for umeshu and was seeking a supplier.

Despite low consumer awareness, umeshu seems to appeal readily to the Caucasian palate, being sweet, easy to drink, and similar to the new alcoholic fruit drinks gaining popularity. Reports indicate that trial often leads to repeat consumption (domestic trade interviews, 2003).

3.4.3 Supply

Most umeshu is imported from manufacturers in Japan, with small volumes from Kikkoman in the United States. There have been no shortages of supply. An importer has trialled a European umeshu from plum but rejected it on taste (domestic trade interviews, 2003).

3.4.4 Product profile

Umeshu is made by steeping mume fruit in white liquor. The traditional base is shochu, a fermented distilled Japanese spirit from barley, wheat, rice, potato or sweet potato, with 25–40 per cent alcohol, and imported in small quantities from Japan. There is growing use of sake (Japanese rice wine) which has around 15–18 per cent alcohol, supplied in Australia by a Sydney manufacturer and Japanese importers. Fruit flavour for umeshu is extracted more effectively with a higher alcohol base such as spirits, but undiluted sake is also suitable. Granulated cane sugar is acceptable (; Brammal, 2003, pers. comm., domestic trade interviews 2004; Kurata, 2004, pers. comm., Omero, 2001, pers. comm.).

Umeshu without fruit represented 99 per cent of imports in 2003, while the remaining 100 bottles contained a few whole fruit (domestic trade interviews, 2003).

An Australian umeshu manufacturer would use fresh mume, probably grown under contract. Fruit would need to be sound, clean, rubbish-free, with no stems. Size is unimportant as the fruit would be discarded once the flavour is extracted. Processing would take around two months, and production could be spread with a longer supply season across climatic regions and several cultivars (Brammal, 2003, pers. comm.; Kurata, 2004, pers. comm.).

Quality

Premium umeshu is a darker, more syrupy liquor with strong aroma, made from high quality shochu, the largest and highest quality mume, and high quality rock sugar (korizake), and aged at least 10 years. Japanese imports were better quality than the USA product. If fruit is retained, it should be 'crunchy' when eaten (domestic trade interviews, 2003).

Quality control would need to be in place across the entire process from producer to retail, as the Japanese market will not tolerate any product faults (Noble, 2004, pers. comm.).

Branding

Three main brands were imported in 2004, and a Chinese product introduced in 2006 (Table 3.5):

Table 3.5: Australian umeshu retail audit

Brand	Product	Distributor price	Retail price	Country of origin
Choya	Liquor only, 12-13% alcohol, 750ml bottle	\$6.60 CIF (importer)	\$15.00 –25.00	Japan
Choya Kishu-Umesh	Jar with liqueur and whole fruit, 750ml jar	\$13.30 CIF (importer)	\$23.75 –50.00	Japan
Mercian	A sweeter style, liquor only, 2L Tetrapak	\$9.30 CIF (importer)	\$21.00	Japan
Mercian	Liqueur only, 600ml bottle	\$5.30 CIF (importer)	\$20	Japan
Kikkoman	Liquor only, pink colour, 10% alcohol, 760ml bottle	\$8–10 (wholesaler)	\$17.99	USA
God Forest Plum Wine	10% alcohol, 750ml bottle		\$14.99	China

Source: Domestic trade interviews, 2003; domestic retail audit 2003

These brands provide a choice of styles, flavour, packaging and price. A Japanese restaurant would prefer at least six brands on its menu (domestic trade interviews, 2003).

Packaging

While most product was in wine bottles, Mercian’s two litre tetrapaks sold well to new consumers trialling umeshu. For an Australian product, hotels would accept a 750 ml bottle but preferred a half bottle which gives two serves, for introducing an unknown beverage to the Australian market. The traditional wide-necked jars were also acceptable, being easy for staff to handle, and expected to attract consumer interest (domestic trade interviews, 2003; domestic retail audit 2003).

Labelling

Labels were in English and Japanese, providing alcohol content, volume, manufacturer details and usually a brief description of contents, including ‘Japanese plum’ (domestic retail audit 2003).

Quality assurance requirements and food safety

No food safety problems were perceived for umeshu (domestic trade interviews, 2003).

Country of origin

The market strongly preferred the Japanese products and all leading brands were Japanese. Kikkoman umeshu imported from the United States product was acceptable but the market had demonstrated resistance to a Chinese ‘Green Plum wine’ (Stewart, 2006, pers. comm.). While Japanese consumers generally prefer Japanese product and brands, they consider Australian products good quality and safe, and were expected to adopt an Australian umeshu with quality and price comparable to Japanese product. Promoting Australian-grown mume as an ingredient in a Japanese manufactured umeshu was likely to encounter less resistance from the Japanese market than would a finished product such as umeboshi (domestic trade interviews, 2003).

In summary the research findings indicate an Australian umeshu would need:

- high-chill cultivars preferred in Japan, for example Nankou and Bungo
- styles with and without whole fruit
- to be similar to the traditional Japanese product
- a product range, for example using different alcohol bases, to providing variety for Japanese restaurants
- to be developed through a strategic partnership with a Japanese manufacturer to access technical know-how
- to be marketed as both umeshu and Japanese plum wine to benefit from existing market development activities by Japanese manufacturers

- Australian branding and high quality packaging aimed at Japanese tourists
- Support through tastings, smaller containers and product information to encourage trial by Australians.

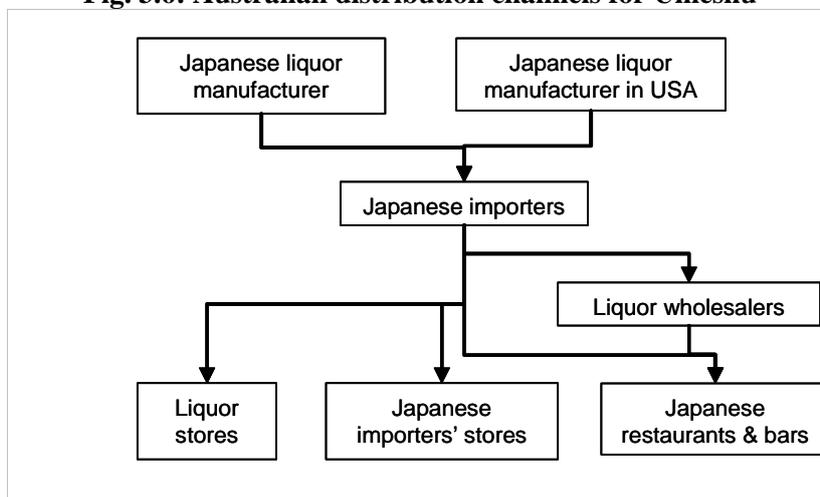
3.4.5 Pricing

Import prices were A\$5.30 – \$6.60 for 750ml, including cost, insurance and freight, for standard umeshu and A\$13.30 for 750 ml for Choya Kishu-Umesh (with fruit), with imports incurring five per cent import duty, 28 per cent alcohol tax and 10 per cent GST. Wholesale prices have been stable for some years, with importers absorbing currency fluctuations (domestic trade interviews, 2003). Retail prices across stores varied from \$15 – \$25 for a 750 ml bottle of standard umeshu and \$24 – \$50 for Choya Kishu, with whole fruit, with retailer mark-up typically around 40 per cent. Prices in Japanese restaurants and cafes were \$3.00 – \$6.00 for a 200 or 300 ml glass, and around \$25 a bottle (domestic trade interviews, 2003; domestic retail audit, 2003; Hayward, D, 2004, pers. comm.).

3.4.6 Distribution

Distribution is mainly through the same vertically integrated Japanese companies as umeboshi.

Fig. 3.6: Australian distribution channels for Umeshu



Source: Domestic trade interviews, 2003

Small volumes were handled by Australian liquor distributors and retailers, including a Woolworths trial in Sydney. Japanese importers' stores and Japanese restaurants were the main outlets (Fig. 3.6).

An Australian umeshu may have better prospects in Japan, where liquor can be sold outside traditional liquor outlets in a very large market (Kerney, 2003, pers. comm.).

3.4.7 Promotion

Awareness of umeshu has been negligible outside the Japanese market, but growing due to promotion. This was mainly by prominent displays in Japanese retail stores in Sydney and Melbourne and on Japanese liquor stands in liquor outlets near Japanese restaurants in Sydney. In the Australian market awareness and sales were growing due largely to a Japanese manufacturer's promotional flyers providing information and usage ideas and the serving of umeshu on JAL flights to Australia. Some Japanese restaurants advertised 'Japanese plum wine' on the drinks menu, and occasionally in cocktails, while an Australian-owned Japanese bar in Melbourne was building repeat customers for umeshu through providing drinking notes for three brands on the menu.

Hotel executive chefs were generally unaware of umeshu, but most volunteered to trial imported product immediately with their Japanese guests. They proposed putting it on their wine lists and having drink waiters suggest umeshu to guests, as is done for other Japanese liquors, beers and sake.

To attract Japanese tourists to an Australian umeshu, the chefs recommended manufacturers supply point of sale material such as tent cards for tables, and display the product that contains whole fruit in the cocktail bar to raise consumer interest. Umeshu could also be promoted in trendy bars and nightclubs where consumers look for new drinks, and as a low alcohol liqueur (domestic trade interviews, 2003).

3.4.8 Market positioning

The research findings indicated several strategies for creating market awareness and adoption:

- distribute through outlets with existing demand seeking greater range and lower prices, for example Japanese restaurants and liquor stores with Japanese and Chinese clientele
- introduce the mass market to umeshu through promotion in Japanese and Chinese restaurants as a sweet, fruity low alcohol accompaniment to Japanese food
- promote to Australians as an aperitif
- promote to younger Australians as a sweeter fruity alternative to wine
- make a low alcohol RTD (ready to drink)
- position umeshu from the Nankou cultivar as a premium product in the Japanese market segment
- provide either better quality than Japanese imports (likely to be difficult) or comparable flavour at a lower price than the leading Japanese brand being imported
- differentiate the product to avoid competing directly with leading Japanese brands
- as 'ume' is a distinctive word, incorporate it into Australian branding.

(domestic trade interviews, 2003; Japanese trade interviews, 2005; Noble, 2004, pers. comm.)

3.5 Other products

Plum toffee

Plum toffee is a cut-down salty plum with seed, encased in toffee, in individual cellophane packets and a cellophane bag. The main brands, 'Black Plum', 'Happi Plum' and 'Jade Mountain', were imported prepackaged from Taiwan and sold in Asian food stores with a similar Japanese product (Table 3.6).

Table 3.6: Retail audit - plum toffee

Brand	Description	Packaging	Price range	Country of origin
Jade Mountain	Prune toffee	Bag of 10	\$2.80–3.80	Taiwan
Black Plum Candy	Molasses toffee with salty plum	110g	\$1.20–2.35	Taiwan
Chinese brand	Pineapple & plum toffee	160g	\$1.65	Taiwan
Japanese brand	Toffee with salty plum	Bag of 10	\$5.20	Japan

Source: Domestic retail audit, 2003

Since plum toffee was introduced to the Australian market in 1999, retailers have observed growing demand; however, an importer felt the initial market popularity had waned, and lower demand for Japanese product was attributed to a shrinking Japanese community. Demand for Japanese and Australian product was strongest from younger Chinese and tertiary students from Thailand, China, Hong Kong, Singapore and Malaysia (both Chinese and Malay) (domestic trade interviews, 2003).

Pickled plums

A Chinese pickle described as salted plum in brine was observed in some Chinese groceries where it was occasionally purchased by Chinese women for use in chicken and pork dishes (Table 3.7).

Table 3.7: Retail audit - salted plum in brine

Product	Packaging	Price	Country of origin
Pun Chun Salted 'plum in brine'	360g jar	\$4.75	Hong Kong
Ziang Xi Bridge 'Salted plum in brine'	340g jar	\$1.95	China (Guangdong)

Source: Domestic trade interviews, 2003; domestic retail audit, 2003

Fig. 3.7: (a) Plum toffee (Japanese) and (b) Chinese salted plum



(a) Plum toffee (Japanese)



(b) Chinese salted plum

3.6 Other potential products

As the research did not identify any significant domestic market opportunity, interviews were carried out with a large dried fruits processor and a dried fruit ingredients processor and manufacturer to determine the likelihood of new mume products being developed for the Australian market.

Processed dried fruits

Australia has a large and growing market for fruit snacks, driven by consumer trends including concern with child obesity, health school programs, and demand for healthy foods. Mume may have potential for new lines of fruit snacks for this market (Holmes, 2003, pers. comm.).

Various fruits are being used in structured fruit pieces - small dried chips made from fruit, sugar and pectin – used by international and domestic food manufacturers in snack bars, yoghurts, breakfast cereals, ice creams, bakery products and other foods. As fruit can be used fresh or pureed, domestic mume would compete with low priced imports, for example Chinese apricot puree at 30¢/ kilogram and blueberry at \$4 a kilogram. As mume is known in Asian markets and has form and consistency suited to processing, it has potential in products aimed at the Asian market, including cereal bars, juice and snack bars. This manufacturer would buy fresh fruit from local growers and as a puree in aseptic packs from more distant producers (Morris, 2004, pers. comm.).

Medicinal products

Mume has prospects as a pharmaceutical product, with several research projects investigating its anticancer, antimicrobial, antibacterial, antioxidative and anticoagulant effectiveness (see Appendix A for abstracts of recent research).

3.7 Barriers to market entry for mume products

Imports of fresh Prunus fruit are prohibited to all Australian states due to the risk of introducing several pests and diseases.

Imports of salty plum, umeboshi and umeshu are permitted under quarantine regulations for ‘Prunus spp. Fruit with seeds – sun-dried, unprocessed, tenderised, rehydrated, dehydrated’ provided they have been commercially cured in salt or sugar; pickled in salt brine, vinegar or alcohol; or glacéed in sugar syrup; and commercially packaged in sugar syrup or canned or bottled in salt, salt brine, vinegar, sugar, vinegar or alcohol. Dried Prunus fruit without seeds must have been commercially processed and packaged. Imports of dried Prunus fruits (including apricot, peach, cherry and plum) not commercially preserved in these forms are not permitted because of the risk of Plum Pox Virus (Sharka disease). Importers must apply for a quarantine inspection for every shipment, which has deterred some imports of umeboshi (Anderson, 2005, pers. comm., AQIS, 2006; domestic trade interviews, 2003).

Food imports have to meet the requirements of FSANZ food regulations which apply to all foods retailed in Australia. While some imports of salty plum have failed on AQIS inspection, and will continue to be monitored, most product inspected has been within required parameters (Poli, 2003, pers. comm.).

Import duty is five per cent for all products, with an additional 28 per cent liquor tax for liqueurs (APEC, 2006; Katagari, 2003, pers. comm.).

As a liqueur, Australian-made umeshu would be subject to Australian excise duty, under the Excise Tariff Act administered by the Australian Taxation Office (Sullivan, 2006, pers. comm.). Excise is calculated by multiplying the relevant excise tariff rate by the dutiable quantity, i.e. litres of alcohol in the product. Alcohol litres are calculated by multiplying the actual volume of product by the alcoholic strength. In July 2006 excise was \$62.64 a litre of alcohol for 'other alcoholic drinks and spirits' (this includes liqueurs), exceeding 10 per cent by volume of alcohol and \$36.98 a litre if 10 per cent or less (Australian Taxation Office, 2006).

4. Evaluation of the Japanese market

Japan is considered the only market with any demand for mume, or ‘ume’, where it is used in numerous foods, beverages and medicines. The leading product is umeboshi, followed by umeshu. Minor lines include sweet ume (desserts and confectionery), nibbles (dried salted sweetened mume), mume-flavoured savoury snacks, juice, wine, seasonings, jams, teas, and medicinal tonics and concentrates. Byproducts include ume vinegar, a spirit from the mume seed, and stockfeed and fertilizer from the residue from umeshu processing (Hayward, 2004, pers. comm; JETRO 2001a, JETRO 2004; Japanese trade interviews, 2005).

While there could be several potential export markets for mume products, commercial quantities of fruit will not be available in the medium term; so international market research has focused on Japan because it is likely to have the largest market and lowest import barriers for Australian mume exports.

4.1 Methods

Select one export market for further market research using a prioritisation process of:

- Literature search on all countries known to have markets for salty plum, umeboshi, ume paste and umeshu, to determine the potential for market acceptance and sustainable markets for Australian mume products
- Rating each country on key market criteria (market size, market access, prices and consumer purchasing ability)
- Applying a weighting scale developed from peer and industry opinion
- Selecting the highest ranking market for detailed market research.

Research of the Japanese market was undertaken as follows:

- Literature search
- In-market research in respect to the leading mume products consumed in that market to determine which products an Australian industry should produce, by identifying potential markets, assessing the likelihood of switching to Australian product, and the markets’ product requirements (Table 4.1):
 - Personal interviews with a producer, a national industry association, a government research centre, five manufacturers and five distributors
 - Austrade interviews with six manufacturers and an importer/wholesaler
 - Collation and analysis of data.

Table 4.1: Interviews with Japanese trade and industry

Company	Description	Product discussed
Interviews by project researchers		
All Japan Tsukemono Federation of Co-operatives, Tokyo	Pickle industry association	Umeboshi
Choya Umeshu Co. Ltd, Osaka	Japan’s leading umeshu manufacturer	Umeshu
Eiko Boeki Kaisha Ltd, Tokyo	Trading company	Mume juice, dried salty plum
Fushimura family, Minabe, Wakayama Prefecture	Mume producers	Umeboshi
Marubeni Corporation, Osaka and Tokyo	Trading company and importer	Umeshu
Mume museum, Minabe-cho, Wakayama Prefecture	Mume industry information centre	Mume industry
Natori, Tokyo	Snackfoods manufacturer	Otsumami’ (nibbles)
Prefecture Mume Research Centre, Minabe-cho, Wakayama Prefecture	Government research centre	Mume research and development
S. Ishimitsu & Co. Ltd, Kobe	Trading company	Umeboshi

Company	Description	Product discussed
Showa Koueki, Osaka	Trading company, importer	Dried salty plum
Tohnosho Co. Ltd, Osaka branch	Manufacturer, importer	Umeboshi
Tokya Suka Tokyo Seicha, Tokyo	Importer, wholesaler	
Umehachi, Tokyo		Umeboshi, ume health products
Umeta Co. Ltd, Minabe-cho, Wakayama Prefecture	Umeboshi manufacturer	Umeboshi, ume desserts
Vegetable Section, Daika Osaka Seika, Osaka	Osaka fresh wholesale market	Fresh mume
Austrade, Tokyo	Wine Specialist	Fruit wines
Interviews by Austrade Business Development Manager, Tokyo		
Choya Umeshu, Osaka		Umeshu
Shinshin Food Co., Kantou (Tokyo) region	Manufacturer	Ume desserts
Aikouseicha, Kansai region	Manufacturer	Tea with ume
Mit, Kansai region	Manufacturer	Ume products
Odwara, Kansai region	Manufacturer	Ume products
Tokya Suka, Kansai region	Importer and wholesaler	Dried fruit
Iwashita Food Co., Tochigi Prefecture, Tokyo region	Manufacturer	Umeboshi and other pickles

- Drawing conclusions and making recommendations regarding the market potential for products developed by an Australian mume industry
- Assembling of market and economics information for selected products and markets.

The following section describes the markets for fresh mume, umeboshi and umeshu, with a brief overview and market observations for minor products.

4.2 Mume production in Japan

Producers process the fruit on farm for umeboshi or supply it fresh to manufacturers, often through grower co-operatives, or to wholesalers for supermarkets, grocery stores and greengrocers (*Ume growers and processing*, 2003).

Manufacturers use only fresh mume for umeboshi and umeshu, as freezing damages the fibre, rendering it unsuitable for these products. Japan produces approximately 100 000 tonnes of fresh mume a year, of which manufacturers use around 95 per cent, mainly for umeboshi and umeshu, with steady demand for the remaining five per cent (approximately five tonnes a year) from consumers preparing umeboshi and umeshu at home (Japanese trade interviews, 2005). Mume from milder climates is used for umeboshi while the harder thicker-skinned mume from cold regions is used for the minor umezuke pickle (*Ume growers and processing*, 2003). In 2005 manufacturers experienced shortages of fruit for umeboshi production and were unable to expand umeshu production to meet growing demand (Japanese trade interviews, 2005).

Quality standards stipulate attributes including fruit size, appearance and stage of ripeness. There are no national standards for fresh fruit, only regional quality standards, such as the Kishu regional standard for the 'Nankou Kishu Wakayama' brand (Table 4.2).

Table 4.2: Mume fruit grades by weight and appearance

Grade	5L	4L	3L	2L	L	M	S
Size (g)	Over 32g	25-32g	19-25g	14-19g	10-14g	7-10g	5-7g
A grade	No black point or bacterial canker marks; no damage; skin moderately soft; good shape						
B grade	Marks less than 2mm diameter; less than three marks from black point or bacterial canker; minor damage; skin moderately soft; good shape						
C-grade	Marks less than 5mm, black point or bacterial canker less than 20%						
Not used	Hard skin, leaking of polysaccharide, flesh damage from bites, fungi or breaks						

Source: Grading poster, Kishu Umeboshi Marketing Association, 2005

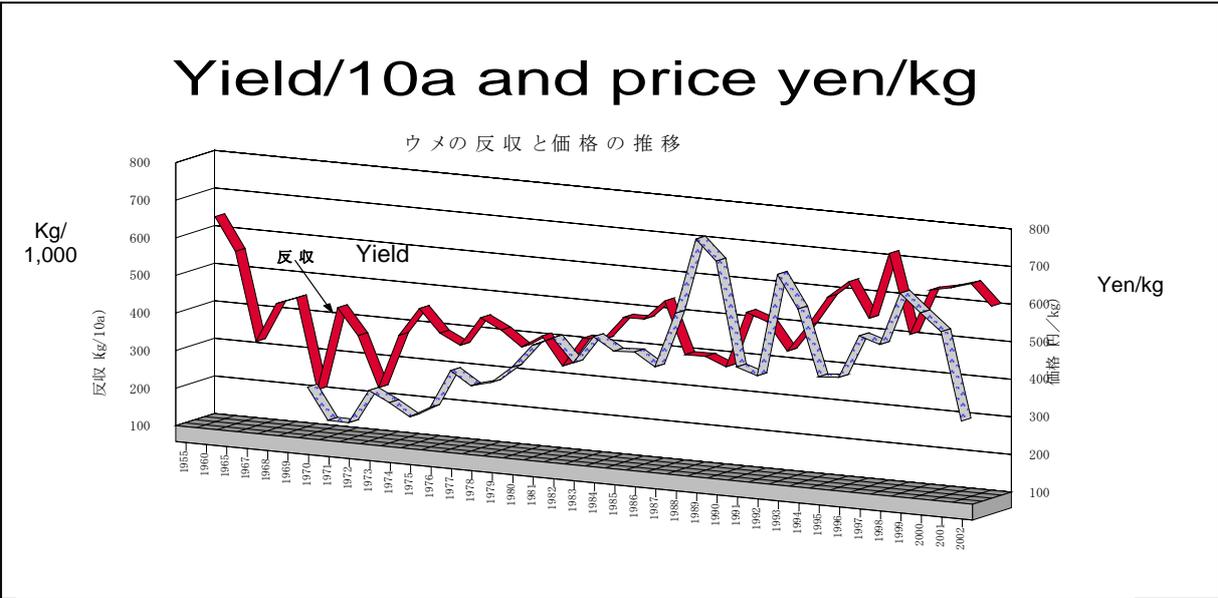
Where blemish would result in fruit rots during processing, the fruit is used but downgraded. Fruit that is over-ripe, immature (where the pubescences have not fallen), too small, poor flesh content, or with breaks or bites should be discarded (Beppu, 2003, pers. comm.; Nguyen, 2003, pers. comm). Organically grown mume is expected to have equal visual quality to standard mume.

Fruit is typically packed in 10 kilogram branded cardboard cartons for wholesale markets, 20 kilogram open-weave plastic trays to keep it cool and dry for umeshu manufacturers; or plastic bags for retail (trade interviews, store observations). Manufacturer Choya Umeshu retails Umeshu Ume-No-Mi, whole fruit in a 250 kilogram pouch, for making umeshu at home (Choya Products, 2006).

For umeboshi the fruit is allowed to drop when ripe allowing a longer harvest and gradual processing. Manufacturers and growers usually set the year’s standard and determine volume and price prior to harvest. Production costs have been stable most years for Nankou (Japanese trade interviews, 2005).

Fruit prices vary across the short harvest season. In 2005 the average farmgate price for fresh green mume from Wakayama Prefecture was JP¥500 a kilogram (A\$6.00), peaking at JP¥1000 a kilogram (A\$12.00) in late June when fruit volumes had halved. Osaka wholesale agents paid JP¥200 – 250 a kilogram (A\$2.40 – \$3.00) for fresh mume in June 2005, while an Osaka retailer sold fresh mume at ¥680 – ¥1400 a kilogram (A\$8.20 – \$16.75). Average price per kilogram rose from ¥200 in the 1970s, and fluctuated between ¥450 and ¥800 since (Fig. 4.1), with a fall since 1998 coinciding with imports for dried mume from China.

Fig. 4.1: Yield and prices for Japanese mume, 1955-2002



Source: Yaeyaki, 2005, National Institute of Fruit Tree Science, Tsukuba, Japan

For Nankou, Japan’s premium cultivar, manufacturers pay substantial premiums over other cultivars. Wholesalers will pay double for ‘Beni Nankou’ – Nankou fruit with a red blush where exposed to sunlight – if for retail (trade interviews).

4.3 Key products - Umeboshi

Although it is made from fruit, umeboshi is included in the product category of pickled vegetables, or *tsukemono*, introduced from China and Korea thousands of years ago, and an everyday food across Japan. Umeboshi is the leading mume pickle and a standard household item (Japanese trade interviews 2005).

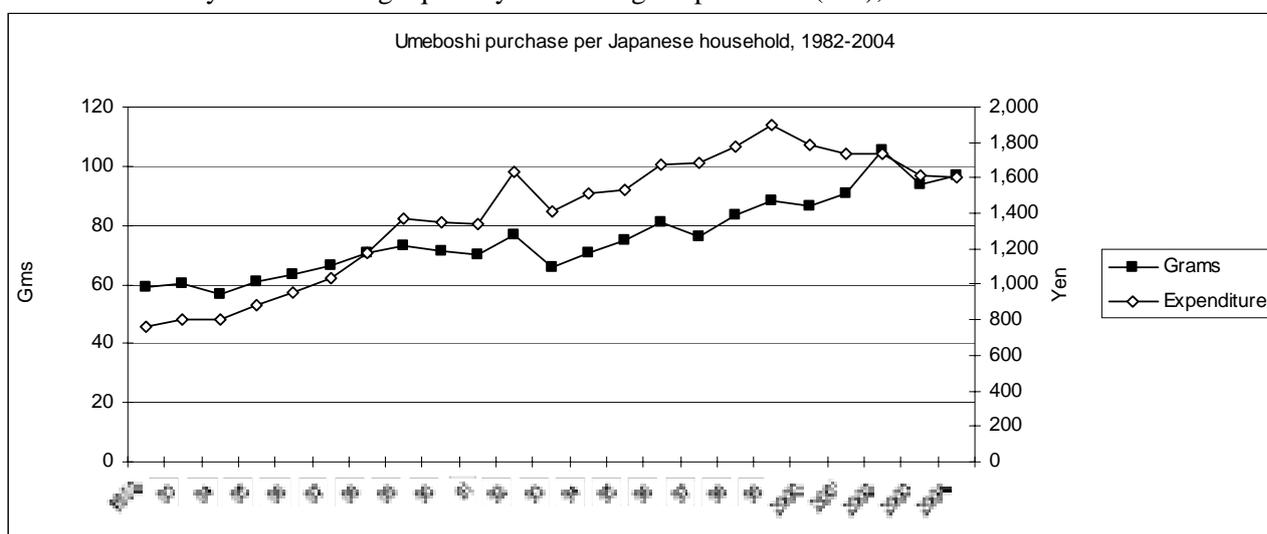
Commercial processing started in around 1900 as demand grew for a ration and medicinal food for Japan’s military forces in various conflicts, and stimulated strong growth in fruit production (*Ume growers and processing*, 2003).

4.3.1 Market size and demand

Japan has a population of 127 million, and is considered as three major regional markets — Kanto (Tokyo region) with about 38 million consumers; Kinki (Osaka region) 23 million; and Chubu (Nagoya region) 15 million (Myers, 2003, pers. comm.).

Approximately 89 000 tonnes of umeboshi were consumed in Japan in 2004-5 with an estimated value market value of \$3,500 million, based on a typical retail price of A\$40.00 observed in supermarkets and convenience stores in 2005 (Japanese retail audit). The average household consumed 973 grams of umeboshi in 2004, which was 23 per cent of their pickle expenditure (Annual report on the family income and expenditure survey 2005), indicating umeboshi is a popular pickle but used in very small quantities. Meanwhile average household expenditure on umeboshi fell from 1999 as lower-priced imports took increasing market share (Fig. 4.2). Annual consumption grew steadily at an average 2.8 per cent a year from 1995 to 2004, due largely to convenience store sales of onigiri, or ‘rice-ball’ with umeboshi (a hand shaped ball or triangle of rice wrapped in nori seaweed enclosing an umeboshi) (Nguyen, 2000, p5).

Fig. 4.2: Average annual umeboshi purchase by Japanese household by annual average quantity and average expenditure (JP¥), 1982–2004



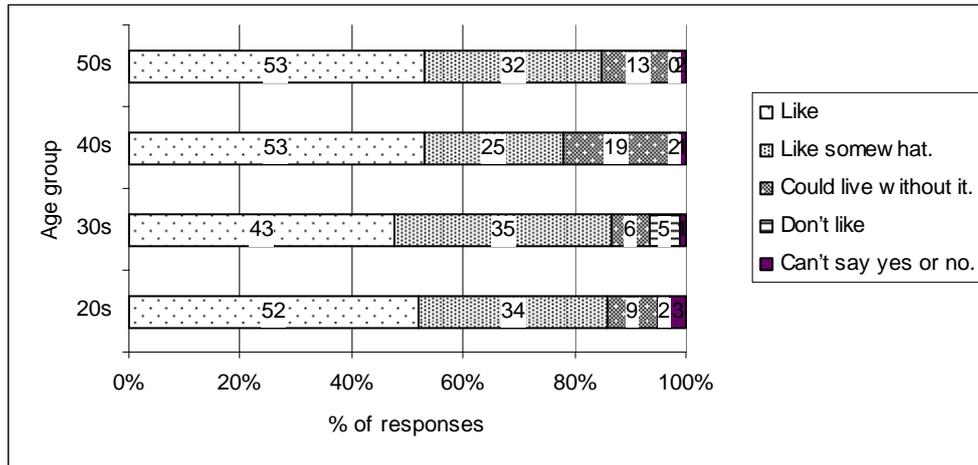
Source: Ministry of Internal Affairs and Telecommunications, ‘Annual Report on the Family Income and Expenditure Survey, 2004

While demand has been relatively stable, as evidenced by the continuing large volumes of imports, the market was regarded as shrinking, for reasons including:

- Consumers have been reducing salt in their diet, and are concerned at umeboshi’s high salt content of around 10 per cent compared with most tsukemono at 2–3 per cent.
- Individual consumption is difficult to raise as umeboshi can be eaten only in small quantities.
- Less high-priced umeboshi is bought for gifts as consumers cut costs due to economic concerns.
- Young Japanese are eating less umeboshi as they adopt more western foods (Japanese trade interviews, 2005).

A survey found that Japanese in their twenties expressed similar liking of umeboshi to those in their fifties (Fig. 6.3) (Kinzai Company Limited, 2003). However, young Japanese are replacing traditional vegetables and rice (umeboshi is mainly eaten with rice) with wheat, meat and dairy products, influenced by more buying power, media publicity for new and international foods, and travel abroad (USDA, 1995, pp. 3–4). As umeboshi is mainly eaten rice, this indicates consumption of both will decline.

Fig. 4.3: Japanese consumers liking of umeboshi, by age category



Source: 'Ume growers and processing', 2003, Industry classified review, Kinzai Company Limited, Japan

4.3.2 Market segments

Three different opinions on market segmentation were indicated by Japanese distributors.

The first grouped umeboshi consumers by attitude to quality and price, each segment representing about a third of the total market:

- A quality conscious market which buys high quality umeboshi, is mainly aged in the fifties, and buys umeboshi for personal use. Younger Japanese also buy high quality product but in smaller fruit size and quantities. Japanese manufacturers concentrate on the quality conscious segment with domestic product.
- A price-conscious market. This segment, which seeks low-priced product and buys umeboshi of Chinese origin, is growing, attributed by some to economic concerns.
- A market somewhere between these segments, influenced by both quality and price (Japanese trade interviews, 2005).

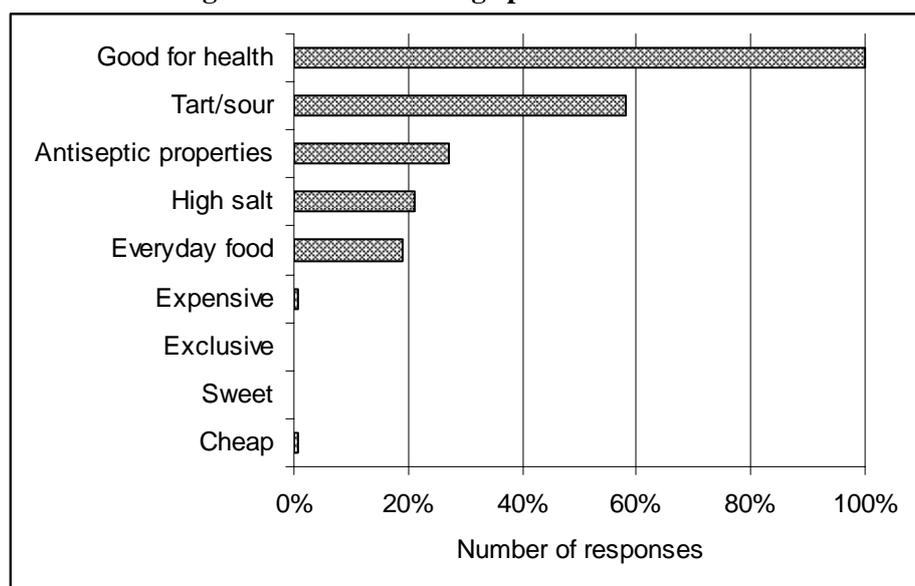
The second grouped consumers on whether they bought umeboshi for taste or health benefits. The latter segment is mainly weight-conscious young women seeking dietary fibre, and aging people wanting to maintain good health (Japanese trade interviews, 2005). Aging consumers are an increasingly important market due to Japan's low birth rate, with 30 per cent aged over 65 (Barber, 1998, p. 7).

The third identified three income levels buying the best quality they could afford. Wealthy people buy premium quality, salarymen average quality, and low earners low quality at low prices (Nguyen, 2003, pers. comm).

For centuries pickles were Japanese consumers' sole source of vegetables during winter in snow-prone regions. Pickles' long shelf life permits storage convenience and year-round consumption of seasonal foods (Terebelski & Ralph, 2003).

Now umeboshi is seen as a 'food', being part of a meal rather than a snack (Japanese trade interviews, 2005). A consumer survey found umeboshi was regarded as an everyday food by 19 per cent of respondents, and healthy by all (Fig. 4.4).

Fig. 4.4: Consumer image profile for umeboshi



Source: 'Ume growers and processing', 2003, Industry classified review, Kinzai Company Limited, Japan

Umeboshi is eaten at breakfast, as a pre-dinner appetiser, with other pickles as a snack in bars and restaurants, after meals such as sushi as a palate cleanser, and in the traditional Japanese tea ceremony. (Beppu, 2003, pers. comm.; Hayward S, 2003, pers. comm.). It has several leading uses:

As a health or functional food

Umeboshi is mostly used as a health food, being a 'must have' household item, like a medicine (Japanese trade interviews, 2005; Fig. 6.4). The vegetable-salt combination is an integral part of the Shinto religion, signifying the Gods' precious gifts to the people, and regarded as essential to good general health (Nguyen, 2000 p1; Terebelski & Ralph, 2003). Umeboshi has been a popular remedy for centuries, first mentioned as a medicinal food in Japan Ishinho, Japan's oldest medical book (Hean period, 794-1192), and often mentioned in Japanese natural health media and books. Umeboshi is claimed to:

- Stimulate digestion by the sour alkaline taste stimulating secretion of saliva and gastric juices
- Treat digestive disorders, from hyperacidity and indigestion to gastric ulcers, through the paradoxical alkalinising effect of umeboshi's high citric acid and salt levels
- Through its citric acid content, increase metabolism and calcium uptake; inhibit food poisoning, dysentery and cholera; and reduce fatigue by lowering accumulated lactic acid
- Through its pyric acid content enhance liver function, including breakdown of alcohol (umeboshi is a popular hangover remedy)
- Stabilise blood cholesterol and blood pressure
- Treat coughs, colds, parasites, and numerous other ailments (Big in Japan – umeboshi [Frances, 2004]; Food Integrity, 2001; Nguyen, 2000, p48; Umeta Ltd, undated).

Japanese consumers have been turning to traditional foods with assumed health benefits. One or two umeboshi with green tea are popular as a healthy start to the day, while the traditional Japanese breakfast includes umeboshi with other pickles, rice, miso soup and fish (Nguyen, 2000, p48; Porjes, 1998; Food Integrity, 2001; Yoshida, 2003, pers. comm.).

Since the 1980s a consumption trend towards natural and healthy foods has increased demand and prices for mume pickles (*Ume Growers and Processing*, 2003). Manufacturer research has established mume as high in fibre and vitamins and by promoting this to health conscious markets has revived consumer demand for umeboshi and other pickles (Nguyen, 2000 p4).

Umeboshi is also used as a macrobiotic food, and widely recommended on various macrobiotic websites to aid digestion. The macrobiotic diet, developed in Japan, is based on low fat, high fibre

foods, particularly whole grains and vegetables, with natural seasonings such as unrefined sea salt and rock salt (for their minerals and trace elements) and umeboshi vinegar, the brine produced when making umeboshi (Kingery, 2000; Wong, 2004).

As a food preservative

Consumers regard umeboshi as a preservative, particularly for rice, often using it in the popular boxed bento lunch ('hi-no-maru bento', named because a red umeboshi on a white rice bed looks like the Japanese flag, hi-no-maru); and in rice-ball, often used for lunch and picnics and sold in large and increasing quantities by convenience stores. Umeboshi is most popular in warmer months when contamination is more likely. Mume's food preserving function is so well-accepted that Japanese people take products such as katsuoume (mume seasoning) when travelling outside Japan (Nguyen, 2000, p17).

Research has identified that umeboshi contains benzaldehyde and organic acids which kill or inhibit bacterial growth (*Ume growers and processing*, 2003); umeboshi combined with perilla kills the bacteria *Escherichia coli*, a particular risk when eating raw fish; and eating umeboshi stimulates saliva production to produce the digestive enzymes catalase and peroxidase which kill *Vibrio parahaemolyticus*, found in raw fish and shellfish (Japan's leading foodborne disease – Food Law Internet Project, 2000), and are considered active against a carcinogenic enzyme. Umeboshi is preferred over other pickles for its lack of odour ('Big in Japan – umeboshi' [Frances, 2004]; Food Integrity 2003; Nguyen, 2000, pp. 17 & 19; Terebelski & Ralph, 2003; *Ume growers and processing*, 2003).

As a seasoning

Umeboshi is often eaten with rice in a set meal of pickles with tempura, rice, and soup; as a vegetable with everyday meals; with cooked vegetables (corn, broccoli, cauliflower); as puree spread on thick cucumber rounds in soy sauce for noodles and salads; in bean paste for noodles; in a dressing of finely chopped umeboshi mixed with soy sauce and sake or mirin (sweetened sake) on chicken, seafood or salad; in miso; as umeboshi paste spread on pork or chicken; in risotto; with fresh perilla in sushi rolls and handrolls; and cooked with fish to soften the bones, and with tempura to reduce fishy odour (Beppu, 2003; 1998; 'Big in Japan – umeboshi' [Frances, 2004]; Food Integrity 2003; Porjes, *Ume growers and processing* 2003; Umeta, undated).

Demand rose when umeboshi was repositioned as a healthy seasoned food rather than a preserved food in the 1970s, when manufacturers began substituting acids and alcohol to reduce salt content in response to consumer concerns (Nguyen, 2000, p. 5).

As a gift or souvenir

Umeboshi is a popular gift in Japan, particularly at the main gift-giving times of mid-summer ('ochugen') and year-end ('oseibo') which coincides with Christmas. Traditionally every Japanese is expected to give gifts to family members, friends and particularly business associates in appreciation of help and guidance that year. With the tightening economy of recent years, gift-givers have become more value-conscious, turning to lower priced practical gifts closer to the original oseibo concept of giving items necessary for daily life, known as '3 J' products, i.e. 'jimi' (simple); 'jitsuyoteki' (practical) and 'juryo' (heavy, substantial) (USDA, 1995, p.9). High quality umeboshi is also a popular gift for significant events such as funerals (Yanagawa, 2005, pers. comm.). Less expensive umeboshi is being bought as gifts due to economic concerns (Japanese trade interviews, 1995).

In mume-producing regions such as Wakayama Prefecture umeboshi is widely sold as a tourist souvenir through manufacturer and other outlets. Tourists buy lower-priced umeboshi of Chinese origin for gifts and high quality Japanese product as souvenirs (Japanese trade interviews, 2005).

4.3.3 Supply

The All Japan Tsukemono Federation of Co-operatives identified four key categories of supply:

- Nankou mume from Wakayama P. – the highest priced and regarded as best quality
- Domestic mume from other regions, including Nagano, Yamanashi and Gunma P.
- Imported semi-processed mume (shiroboshi) from China
- Imported processed umeboshi from China

Japanese umeboshi production is around 35 000 tonnes a year, from 70 000 tonnes of fresh domestic mume fruit. Production of umeboshi and umezuke (a minor pickle of mume in brine) grew slowly at an average 1.7 per cent a year from 1990 – 2000 (Table 4.3).

Table 4.3: Umeboshi and umezuke production, as proportions of total salt pickle category and total pickles (intermittent years)

Year	Production (tonnes)				
	Umeboshi & umezuke	% of total salt pickles	% of total pickles	Total salt pickles	Total pickles
1991	43 400	22%	4%	192 899	1 200 412
1995	37 113	19%	3%	193 348	1 096 838
1999	47 509	27%	4%	177 660	1 134 966
2004	36 623	35%	4%	105 370	1 032 873

Source: *Tsukemono-Japan Org.*, 2006, All Japan Tsukemono Federation of Co-operatives, Japan

While women still make umeboshi at home, demand is likely to trend towards commercial umeboshi:

- Only 33 of Japanese women in their twenties made tsukemono at home in 1999, compared with 52 per cent of women aged 40 to 60 (Nguyen, 2000, p. 19 – quoting the 1999 Annual Report on the Family Income and Expenditures Survey by the Statistical Bureau of Management and Co-ordination Agency)
- Consumers seek storable, portable and convenient food products with minimal preparation time (Trewin R, 2003, p. 27)

Manufacturers have experienced fruit shortages some years, including in 2005, and are increasingly competing with umeshu manufacturers, while the mume industry lacks resources for expansion. As with other pickle industries, domestic production of ingredients is expected to decline with urbanisation of traditional farming land, drift of younger Japanese from country to city, and fewer and aging farmers, and imports of ingredients to grow (Japanese trade interviews, 2005; Nguyen, 2000).

Fresh mume is not imported due to Japanese quarantine restrictions. A few manufacturers have been supplementing production from domestic fruit with semi-processed mume imported through trading companies (Japanese trade interviews, 2005). Umeboshi and pickling vegetables have been amongst Japan's leading food imports in recent years, as Japanese tsukemono manufacturers react to labour shortages, domestic price stabilisation programs and price competition from mass marketers by turning to lower-priced off-shore suppliers (Nguyen, 2000. p.4; Trewin R, 2003 p19).

In 2004 more than half of Japan's umeboshi supply was imported — 48 270 tonnes of dried salted mume for further processing, and 8200 tonnes of finished product. This represented about 183 000 tonnes of fresh mume, given that two kilograms of fruit produces around one kilogram of shiroboshi or umeboshi. Imports appear to have stabilised (Fig. 6.5).

From 2000–4 processed imports grew on average 70 per cent a year, replacing semi-processed product. Meanwhile, average annual import price fell by an average seven per cent a year for finished product and 13 per cent for semi-processed (Table 4.4).

Table 4.4: Japanese imports of processed mume, 2000-2005

Year	Processed mume			Semi-processed mume			Total
	Tonnes	Price/kg		Tonnes	Price/kg		Tonnes
		¥	A\$		¥	A\$	
2000	1 836	295	4.72	40 799	211	3.37	42 635
2001	4 109	284	4.54	42 805	168	2.69	46 914
2002	5 558	285	4.19	43 167	127	1.86	48 725
2003	5 482	238	3.09	39 177	109	1.42	44 659
2004	8 194	249	3.11	40 077	92	1.15	48 271
2005	9 634	314	3.74	35 716	84	1.01	45 350

Source: Japan Customs, 2006, *Trade statistics*

The statistics for semi-processed mume (Table 4.4) would include small volumes of salty plum and Chinese-style mume in brine imported for Chinese expatriates in Japan (Nagatomo, 2005; Yoshida, 2003).

Umeboshi made from domestically grown mume has remained at about the 40 000 tonne level in Japan from 1993 to 2005 (Table 4.5). However the total amount of umeboshi production has increased to over 80 000 tonnes due to an increase in imported finished and semi-finished mume from overseas.

Table 4.5: Total umeboshi supply to Japanese market, intermittent years

Year	Tonnes			
	Domestic production	Imports – finished mume	Imports - semi-processed mume	Total
1993	36 000		417	36 417
1995	37 113		23 918	61 031
1997	43 538		23 918	67 456
2001	43 351	4 109	40 077	85 938
2005	35 000	9 634	35 716	80 350

Sources: JETRO 2001a, 'Japanese Pickle Industry', in *JETRO Agro-Trade Handbook 2001*, Japan External Trade Organisation, Japan, pp. 4-22; MAFF 2004, *Production and Shipment of Loquats, Cherries and Mume apricots*, Ministry of Agriculture, Forestry and Fisheries, Japan; Nagatomo, 2005; Nguyen, 2000 p3

China is the leading overseas supplier of finished and semi-processed umeboshi. Exporting countries fell from 11 in 1994 to three in 2004 as China expanded supply and took market share, and intermittent suppliers had exited by 2004. Again, imports include some dried snacks (Table 4.6)

Table 4.6: Japanese imports of semi-processed and processed mume, 1994–2004

(biennially, by country of supply, volume and value per kilogram in A\$)

Country	1994		1996		1998		2000		2002		2004	
	T	\$/kg										
Semi-processed mume, not ready for consumption - Harmonised code 0812.90-490												
China	4 814	2.95	13 672	2.17	22 939	2.62	28 295	3.41	33 856	1.80	31 667	1.14
Taiwan	10 485	4.20	6 810	2.65	4 843	2.67	4 051	3.85	734	5.13	533	3.73
Thailand	39	4.97	17	2.53	99	1.91	220	2.46	103	1.36	27	1.26
Vietnam							43	3.62	5.4	5.22		
Democratic Republic of Korea	78	0.92	33	0.88			29	1.08	6	1.17		
Republic of Korea									0.02	1.27		
Argentina	156	3.00										
Indonesia							3.6	2.00				
Hong Kong									50			
Sub-total	15 571		20 532		27 881		32 660		34 755		32 228	

Country	1994		1996		1998		2000		2002		2004	
Processed mume in consumable form – Harmonised code 2008.99-100												
Country	T	\$/kg										
China	163	3.73	408	2.27	771	2.76	1 475	4.4	4 714	3.8	6 694	2.93
Republic of Korea			0		7	3.61	0.2	20.2	0	7.5		
Taiwan	71	4.35	71	3.07	188	4.36	62	12.7	186	11.9	142	8.21
Vietnam	4	2.85							47	5.8	8	5.09
Sub-total	239		479		967		1 538		4 947		6 844	
TOTAL	15 810		21 011		28 848		34 198		39 702		39 071	

Source: Japan Customs, 2006, *Trade statistics*

China's supply of dried salted mume grew rapidly from 4800 – 31 600 tonnes and from 31–98 per cent of imports share between 1994 and 2004, overtaking Taiwan as market leader, while its average price per kilogram fell from A\$2.95 to \$1.15. Meanwhile China's processed mume exports (mainly umeboshi) rose from 163 to 6695 tonnes, and its share of imports rose from 68 to 98 per cent, with average annual prices fluctuating between A\$2.75 and \$4.40 a kilogram. While total imports to Japan grew from 15 800 – 39 000 tonnes over that time, only China increased supply (Table 6.8). China supplies similar shiroboshi to Japanese domestic product, using similar processes, for Japanese importers to make up the final product to Japanese taste and flavour and package it to match specific market requirements (Nguyen, 2003). Quality of Chinese product has improved considerably (*Ume growers and processing*, 2003). China's expanding supply of finished product indicates increasing involvement by Japanese manufacturers in Chinese production. Most Chinese shiroboshi and umeboshi was used by three Japanese manufacturers in 2005, with 60 per cent of umeboshi sales from Wakayama Prefecture based on Chinese shiroboshi (Japanese trade interviews, 2003).

While Taiwan has remained the second largest supplier, its dried mume exports to Japan fell sharply from 10,485 tonnes in 1994 to 533 tonnes in 2004. In recent years it shipped up to 186 tonnes of umeboshi a year, averaging A\$4.30 – \$12.70 a kilogram. Its 2004 average price was A\$8.20 a kilogram, three times that of Chinese product (Table 6.8). Taiwan has supplied Japan since the 1960s, with volumes of 20,000 – 30,000 tonnes a year of shiroboshi, and 99 per cent of Japan's mume imports in the 1980s. However, as grower numbers declined and labour costs rose, Taiwanese manufacturers relocated to China which had a similar industry. Prices for imported Taiwanese umeboshi have stabilised due to lack of strong demand (Japanese trade interviews, 2005).

Thailand maintained annual export volumes of salted dried mume between 100 and 250 tonnes a year over the 2000 – 2004 period, usually at lower price than Chinese product (Table 6.8).

Vietnam and North and South Korea have supplied small, fluctuating and intermittent volumes of processed and semi-processed product in recent years. Prices of Korean product have been lower than China's. Vietnamese product was around A\$5.00 a kilogram for both categories (Table 6.8).

Argentina supplied 9.5 tonnes of umeboshi in 1989 at JP¥188 a kilogram and from 1990 to 1997 supplied small volumes of shiroboshi, peaking at 156 tonnes in 1994, at A\$10 to \$4 a kilogram CIF (Table 6.8). A group of Wakayama growers had planted the mume trees in Argentina for a new and counterseasonal source of supply. While fruit quality was considered acceptable, unrefrigerated freight caused the fruit to turn black en route to Japan, and as refrigerated containerisation was considered too expensive, imports did not proceed. A manufacturer suggested exporting the finished product could be more viable (Japanese trade interviews, 2003).

A manufacturer of pickles for supermarket chains used only Chinese mume in its umeboshi (a minor line) in 2005, and was satisfied with the supply and low prices (Yanagawa, 2005). A second manufacturer was satisfied with Chinese product at A\$9 – \$12 a kilogram landed price. However, a specialist umeboshi retailer seeking an alternative to domestic supply was reluctant to offer Chinese

imports because of consumer resistance due to food safety concerns. The Japanese umeboshi industry has concerns about Chinese supply, in particular:

- The recent rapid price fall could lead to reduced quality and supply, and less incentive for Chinese producers to grow mume, although any switch to more profitable crops has been slow because mume is easy to grow.
- Price of Chinese mume would rise as China's standard of living improves.
- Consumers resist Chinese produce because of concern about chemical residues.
- Production and product quality would decline with China's increasing industrialisation and lack of environmental concern and controls.
- Japanese manufacturers and retailers were over-reliant on Chinese product and sought an alternative supplier to spread the risk (Japanese trade trade interviews, 2005).

Some members of the All Japan Tsukemono Federation of Co-operatives expressed interest in an alternative source of supply to reduce risk, and considered visiting the Australian project at an early stage to assess the fresh fruit and its potential for umeboshi. However, interest cooled by 2006 due to heavy supply of Chinese product.

There is no seasonality for shiroboshi which is used over up to six months from July, and imports are year-round. Material cost and currency exchange rates are key factors for manufacturers (*Ume growers and processing*, 2003).

Several opportunities were suggested for Australian suppliers:

- Start by growing, sizing, grading and salting mume to produce shiroboshi to supply a Japanese manufacturer who already imports shiroboshi and knows how to produce a marketable product. The greatest opportunity would be for large sized fruit not available from currently supplying countries (Yoshida, 2003).
- Consumers would receive umeboshi of Australian origin more favourably than Chinese product.
- Manufacturers would be likely to use Australian product if Chinese supply fell.
- An alternative supply of Nankou could help stabilise the price of Japanese fruit.
- Counterseasonal production could be an advantage provided this suited the end product.
- If a poor Japanese crop, manufacturers could buy southern hemisphere mume without waiting until next year's harvest (the sole counterseasonal advantage for processed mume because of year round availability of salted product. (Japanese trade interviews, 2005)

4.3.4 Product profile

Umeboshi is made by the Shiozuke method, where the salted fruit is pressed then sundried. It is relatively easy to prepare and widely made in the home. Product differentiation is mainly on variety, flavour, salt content and packaging (Japanese retail audit, 2003).

Fig. 4.5: (a) Shiroboshi and (b) umeboshi



(a) Shiroboshi



(b) Umeboshi

There are two stages to making umeboshi. The fresh mume is salted and sun-dried to produce shiroboshi. Prior to retailing excess salt is rinsed off to produce the finished umeboshi, and

flavourings may be added. The process is described in more detail in Appendix C. Premium prices for finished umeboshi can reflect a high level of processing, with top quality umeboshi often undergoing several cycles of brining and sun-drying. Lower-priced product may receive only one cycle, often without sun or air drying (Yoshida, 2003). Shiroboshi for Japan was recommended as the most likely option for an Australian industry.

The most common products are natural umeboshi, which has no colourants or flavourings and is called shiroboshi ('shiro' meaning white), and seasoned umeboshi. Minor products include semi-dried umeboshi and grilled umeboshi which has chargrill marks, and manufacturers continually develop new products for the future. Demand has been growing for sachi (with bonito flake) and mitsu (honey) flavoured umeboshi, and green or dried seaweed is also popular. A sample product Nankome Mitsu umeboshi contained large Kishu Nankou mume, honey, fish sauce and fructose.

Flavourings are used to compensate for flavour lost when shiroboshi is rinsed to reduce salt content (Beppu, 2003, pers. comm.). The most popular seasoning is red perilla leaf (*Perilla ocymoides* L.– Brenner, 1995), with 50–100 g of perilla used per kilogram of umeboshi to make akaboshi ('ake' meaning red). Perilla, which gives a distinctive flavour, pink colouring, and antibacterial properties, is also called shiso, beefsteak plant and Japanese basil. Also used are oba, or green leaf perilla, and occasionally aka-jiso with purple-red leaves. Red shiso leaves should be fresh, red-purple in colour on both sides, with curled leaf tips, to ensure sufficient colour (ume.ume.net, 2003). Manufacturers promote use of perilla on labels and websites (Appendix B), and use artificial colouring only for some export product (Beppu, 2003; Hayward S, 2003). Some products are sweetened with stevia (Japanese retail audit, 2005).

The growing demand for 'nutritional balance', 'natural balance', and 'all natural' has placed increasing pressure on food processors to use natural additives and preservatives. Ikina, meaning no artificial preservatives, is common on labels (Barber, 1998 p19; Lin, 2000 p10; USDA, 2003b, p.12).

Regions specialise in certain pickles, the leading prefectures for mume pickles being Aomori P. for Umezuke and mume wrapped in perilla and pickled; Gunma P. for Karikarizuke (crunchy mume pickles); Kanagawa P. for umeboshi and koumezuke (small sized umeboshi); Yamanashi P. for Koshu koumezuke; and Wakayama P. for umeboshi (Tuskemono-Org., 2006). The highly regarded Mita and Odewara regions supply only their regional Kantou market (Yanagawa, 2005, pers. comm.).

To achieve a premium Australian product, producers were advised to work with a Wakayama-based processor, partner and horticulturist to ensure acceptable quality. The umeboshi industry and individual manufacturers provide overseas factories and new suppliers with technical aid via the Minabe Technical School in Nanbu, Wakayama P. The course is prominent in Japan's mume industry, and Australian suppliers could build a relationship with the school to introduce a work experience program between Australian and Japanese growers (mostly likely through translators or English-speaking teachers) (Japanese trade interviews, 2003; Yoshida, 2003)

Quality

A distributor estimated that top quality domestic umeboshi which retails at around A\$60.00 a kilogram and above represents approximately 20 per cent of total supply.

High quality umeboshi is large, with rich soft flesh, thin skin, rounded seeds, high flesh:seed ratio, the intrinsic flavour of umeboshi, and from certain cultivars. Salt content, duration of salting, and temperature are also considered important. The finished product should have good flesh quality, colour and lustre, and retain natural flavour and the citric acid, amino acid and salts which can be lost during processing (Japanese trade interviews, 2003; Nguyen, 2000, p. 90). The skin develops a natural red colouring and colour is not usually added. Demand has shifted towards a less sour product with lower salt (*Ume growers and processing*, 2003). Point of sale advertising, websites and catalogues focus on regional brand, salt content, added flavours and 'sourness' (Japanese retail audit, 2003). A manufacturer's brochure rated its umeboshi products by saltiness, sourness, sweetness, and 'umami', a

common Japanese term denoting a fifth taste sensation, a savoury taste imported by glutamate and ribonucleotides which occur naturally in many foods (Baoiouen brochure).

Domestic umeboshi is made from Japanese cultivars, including Nankou, *Shisage* (the largest sized fruit), *Origime*, *Shirokaga* and *You-rou* (Myers, 2003, pers. comm.; ume.ume net). Umeboshi from Nankou grown in Kishu is Japan's leading and best regarded mume, renowned for superior finished taste, soft texture and large fruit, and regarded as a luxury item and the highest grade umeboshi (Nguyen, 2000, p17). The leading brand Kishu Nankou Wakayama can retail at ten times the price for the lowest quality product (Yoshida, 2003).

Fruit size is important as the Japanese market pays a substantial premium for large umeboshi (Beppu, 2003). Size depends largely on variety, with mume x apricot hybrids such as Bungo providing larger fruit, and pruning can be used also to manipulate fruit size (Topp, 2003). An industry co-operative promotes 'small seed with a lot of meat' in its promotional brochure (JA Co-operative brochure). Very little large-sized umeboshi is sold outside Japan (Australian trade interviews, 2003). Small hard-textured low-priced umeboshi is used in Japanese convenience stores for riceball; in katsuoume (this seasoning from mume, perilla and bonito being a major use for imported mume); and for general household use (Beppu, 2003, pers. comm.; Nguyen, 2000 p17). Consumers are not necessarily concerned with fruit quality and size in umeboshi – while they expect Chinese fruit to be low priced, they would not presume it was high quality (Japanese trade interviews, 2005).

Regarding the project trial, manufacturers considered Nankou and Bungo the most likely cultivars to have the product taste and texture to meet the expectations of Japanese consumers. They warned that while mume could be grown in most places, different growing conditions to Japan's would not necessarily deliver the required eating quality. For example Nankou grown in China has different flavour and characteristics to Japanese Nankou, attributed to the differing climatic conditions. The All Japan Tsukemono Federation of Co-operatives and a large Japanese manufacturer who assessed samples of Nankou, Bungo, Ellching and Ianjy shiroboshi from the project trials confirmed the fruit characteristics were comparable to fruit being used in Japan (Ozake 2006, Yamane 2006).

Individual Japanese manufacturers strictly impose specifications for commonly imported bulk products, and ingredients are expected to meet their specific requirements for size, shape, texture, salting methods, quantity of salt and other additives, product yield, and other factors, without any foreign matter or residual agricultural chemicals. A manufacturer who uses shiroboshi from China and has developed infrastructure and logistics around this product would prefer Australian product to meet the same specifications (Japanese trade interviews, 2005).

Restaurant chains usually require food suppliers to meet rigorous specifications on product size, quality, uniformity and taste, and products to be safe, consistent in form and quality, and tailored to meet the needs of the Japanese food service customer (USDA, 1995, p. 6).

Manufacturers seek out inexpensive ingredients with stable quality and quantities and production and distribution efficiencies - opportunities for overseas suppliers of high quality ingredients (Nguyen, 2000, p. 97). As the Japanese taste is very different, and difficult to understand or meet, manufacturers would more likely buy semi-finished product to finish to taste in Japan (Nguyen, 2003, pers. comm.). Some companies send technicians to support their overseas factories, and the All Japan Tsukemono Federation of Co-operatives also provides technical support (Japanese trade interviews, 2005).

For umeboshi, Japanese importers would ask the cultivar, salting method, volume to be supplied, and whether the product complied with Japanese standards and specifications, and would want samples, and suppliers would be expected to comply (Nguyen, 2000, pp.97–8). Unless the sample is supplied exactly as required, buyers would doubt the supplier's ability to meet specifications for future orders (Myers, 2003, pers. comm.). Importers would be concerned the cultivars (preferably Japanese) and processing technologies used would produce a product acceptable to the Japanese consumer and to Japan's sophisticated marketing systems.

An umeboshi product acceptable to the Japanese market would need to meet:

- the specifications for fruit shape, size, colour, carton structure and other criteria specified by the Ministry of Agriculture, Forestry and Fisheries (MAFF)
- the codes of the applicable manufacturers' association, the All Japanese Tsukemono Federation of Co-operatives (Nguyen, 2003, pers. comm.)

Japanese manufacturers deliver quality, freshness and appearance to meet consumers' exacting standards through research, linking product development and modification to changing tastes, and improved technologies and value-adding, providing a strong competitive advantage over non-Japanese suppliers (Lin, 2002 p11; USDA, 200b).

If fruit analysis indicates Australian product is superior in the attributes in demand, this should be promoted to all buyers.

Salt content and shelf life

Salt is the main preservative for umeboshi. The salt content and duration of salting are considered important to quality and are promoted on labels. Salt type is used to value-add, and regarded as critical to the end product. Some manufacturers use natural salt for its bitter characteristic and umami flavours (ume ume.net, 2003), some prefer salt with low mineral content, others use sea salt for its high mineral content, particularly when promoting umeboshi as a natural or macrobiotic seasoning.

Salt content of food has been continually reduced as people perform less laborious jobs requiring less supplementary salt. The Ministry for Health and Welfare recommends a maximum 10g salt a day (Tsukemono-Japan Org., 2006). There is growing market resistance to high-salt tsukemono, with a shift to fresher lighter styles that have lower salt and bring out the flavour of their ingredients. For umeboshi, market demand is moving shifting towards low-salt 'gen-en umeboshi', so manufacturers have progressively reduced salt content, their product lines usually offering several choices of salt content from 3–20 per cent, and some manufacturers' websites promoting low salt content as 'suited to children and seniors', e.g. a Tokyo store's promoted umeboshi with 20 per cent salt as 'Granny's taste' (Japanese trade interviews, 2005; JETRO, 2001a; Nguyen, 2000, p.21). Japanese, particularly younger consumers, have been shifting to extra light pickles such as shiozuke (Nguyen, 2000, p.7).

One manufacturer reduced the salt content of shiroboshi from 20 – 24 per cent to a more palatable 8 – 10 per cent in finished umeboshi; another made umeboshi with 20 per cent salt and only reduced this to five per cent close to retailing because a low salt product would deteriorate rapidly if stored for long. For umeboshi with 10–11 per cent salt, a specialist retailer guaranteed six months shelf life at room temperature (Japanese trade interviews, 2005). Lower salt pickles are processed at low temperatures to prevent acid formation, maintain aroma and colour, and reduce the need for colourants (*Ume growers and processing*).

Retailers display umeboshi on counters and shelves and in chilled cabinets. Manufacturers use freezer vans and cold storage warehouses for low-salt pickles, while larger retailers manage display cabinet temperatures to maintain product quality and limit dates (Nguyen, 2002). Provedores have systems to maintain the cool chain for perishable goods, including vehicles and storage facilities for refrigerated foods. As chilling extends umeboshi shelf life indefinitely, there appears to be no counterseasonal opportunity for a fresher low salt Australian product (Nguyen, 2003, pers. comm.).

Shiroboshi can be shipped unchilled because it is very dry, while a 'wet' product such as mume in brine would need to be maintained at a constant 22–23°C (Japanese trade interviews).

Product differentiation appears to be mainly on size, cultivar, flavourings and packaging (Table 4.7).

Table 4.7: Umeboshi product audit from retail store observations and Internet advertisements, 2004-06

Product	¥	A\$	A\$/kg	Observed
Plastic lidded trays – small, 100–130g	3 000–5 000	36-60	\$36-60	Retail outlets, manufacturers' catalogues
Plastic lidded trays – medium, 250-350g	2 100–4 000	25-48	\$25–47	'
Plastic lidded trays – large, 450-800g	1 500–3 150	18-38	\$30–79	'
Very large Nankou fruit, sold loose, 100g	892	10.70	107.00	Speciality umeboshi store, Tokyo
Large and small pink Kishu Koume, loose, 100g	735	8.80	88.00	'
Large fruit in giftbox, 1.4kg	10,290	123	88.00	'
Small fruit in giftbox, 800g	6 300	75	94.05	'
In bamboo giftbox, 1.4kg	6 200	74	53.00	Manufacturer's outlet
In bamboo basket, 1.2kg	8 800	105	88.00	Manufacturer's catalogue
In two ceramic pots in wooden box wrapped with cloth, 1.2kg	7 350			'
MMB Ryujin Organic Umeboshi with perilla in plastic trays, kegs, jars				Quality Natural Foods website
18 umeboshi individually wrapped, in wooden box	3 600	43		Manufacturer's catalogue

Source: retail audit, complete details in Appendix B

Organic

To be labelled 'yuuki' (organic), foods must meet the Japan Agricultural Standard for Organics, i.e. not grown from seeds, shoots or crops produced using recombinant DNA techniques, no agricultural chemicals or fertilizers applied for three years before harvest, minimal additives, and 95 per cent of total product weight (except water and salt) must be organic (JETRO, 2004).

Food safety concerns had been driving demand for organic foods (USDA, 1995, p. 8). Recent demand has been stable but may rise — demand has been increasing in the USA, and Japan has similar consumption trends. Consumer education would increase consumer acceptance, demand, supply, and probably price. In Australian mume grown without sprays (for example in regions without fruit fly), has potential in Japan. While it would need equivalent visual quality to standard mume, a price premium is unlikely until the market defines the categories of 'organic', 'chemical-free', and 'conventional' and relieves current confusion amongst consumers (Japanese trade interviews, 2005).

The Japanese Agricultural Standard (JAS) permits display of the JAS mark on organic agricultural products, either domestic or certified by countries with equivalent systems to Japan. The process is:

- Imported product must be qualified by a foreign grading organisation registered with Japan's MAFF which manages approval of foreign manufacturers' plants to manufacture under JAS marks.
- Foreign manufacturers, production process supervisors (farmer producers) and sorters should be approved and authorised to self-qualify by a registered foreign certification organisation. They attach the JAS Mark to the export product, and provide a certificate.
- The importer, approved by a MAFF-registered approval/certification organisation, distributes the imported product, with JAS mark and certificate, in Japan (JETRO, undated, p. 16).

Food safety

A metropolitan consumer survey on attitudes to food safety found high levels of concern about food safety, food seasonings and processed fruits across all demographics. Following several serious food safety incidents MAFF has responded to public concern by establishing a Food Safety & Consumer Affairs Bureau to handle consumer concerns and risk management for food (MAFF, 2003, p150).

Consumers are also concerned about usage of fertiliser, post-harvest chemicals and ozone depleters (JETRO 2001b; USDA, 1995, p.7). Post-harvest fungicides have to be approved as a food additive, a lengthy and complicated process (USDA/FAS, 1994). Japanese umeboshi is considered low in chemicals because producers use very little spray (Fushimara, 2005).

Distributors noted considerable consumer resistance to umeboshi of Chinese origin, due to a poor reputation for Chinese agricultural products and chemical residue levels identified in imports from China. While Chinese factories supplying Japan have implemented quality assurance programs, trade opinions varied on how well this was managed. While one Japanese manufacturer using imported Chinese shiroboshi observed that many processing factories in China use fruit from their own plantations or contracted growers, and have complete records and traceability, a second doubted that reliable systems were in place. A third commented that because the price of Chinese mume has declined (to one-fifth over five years), Chinese farmers could no longer afford to spray chemicals on their fruit, making it 'practically organic'. However, for many consumers, lower price outweighs these concerns (Japanese trade interviews, 2005).

In 2002 the Ministry for Health Labour and Welfare reported increasing detection of unapproved chemicals or chemical residue levels in excess of the Food Sanitation Law in imports of Chinese vegetables. It has since begun the process of maximum residue limits for agricultural chemicals for foods and a 'positive list' system to prevent distribution of foods with chemicals above stipulated levels (Ito, 002). Mume has been added to the Codex Classification of Foods and Animal Feeds listing (proposed code FS 0250 – Japanese Apricot) – a preliminary step to establishing maximum residue levels for trade (Proposed draft revision of the Codex classification for foods and animal feeds, 2006, p. 4).

Older Japanese in particular have been seeking out low chemical foods, perceiving them as less of a health threat (Myers, 2003, pers. comm.). Japanese manufacturers have been using 'fresh' and 'natural' messages to appeal to health-conscious consumers' lack of trust in imported foods, and tsukemono manufacturers promote to buyers any extra measures of food hygiene, and the non-use of colorants and additives (JETRO, 2001a).

Consumers prefer umeboshi to have a rounded seed that they can suck. Sharp ended seeds have been occurring both in imported Chinese product and prized domestic cultivars such as Nankou (Hayward, 2004, Japanese trade interviews, 2005).

For umeboshi, some varieties including Nankou are allowed to tree-ripen then drop onto plastic nets on the ground to prevent hitting the ground and scarring. Fruit are collected every one or two days from the net.

Food processors have been demanding quality assurance procedures such as HAACP, and traceability to the point of origin (USDA, 2003b, p10). Following recent legislation umeboshi and other pickle industries have been implementing HACCP-based quality assurance programs, with MAFF subsidising manufacturers' modification costs, and manufacturers interviewed had HAACP programs, including grower spray programs (Japanese trade interviews, 2005).

Manufacturers and importers acknowledged Australia's clean green image and anticipated a positive market reaction to Australian umeboshi. An Australian-made Japanese-style food such as umeboshi, that was functional with low chemical input and residues, and promoted under Australia's clean green image, would have a competitive advantage in Japan (Myers, 2003, pers. comm.).

There are strict controls on manufacture and sale of foodstuffs, with regulations, standards and penalties over all aspects of domestic and imported processed packaged foods including ingredients and additives, hygiene, packaging, recycling, advertising, intellectual properties and food safety. Manufacturers are required to employ a full-time food sanitation administrator, and meet building standards (Appendix D). Australian food processors intending to export would need to ensure their

premises and processes complied with the Export Control (Processed Food) Orders administered by Australian Quarantine Inspection Service.

The main regulations are:

- The Japanese Agricultural Standard (JAS) which for specific foodstuffs regulates ingredients, additives, methods of preservation and use, and packaging materials
- The Processed Food Quality Representation Standard which applies to the entire process of packing a processed product in a retail container and selling it to a consumer
- The Food Sanitation Law over all foods for sale or other commercial purposes. This requires importers to submit a Notification Form of Food Importation to a Japanese quarantine office for consideration by the Ministry of Health and Welfare. Airport and seaport food sanitation inspectors inspect, approve, reject or discard the product (JETRO, 2004; Nguyen, 2000, p.91).

Packaging

Retail packaging for umeboshi is usually plastic lidded trays, although some retailers sell premium grade product from wooden barrels or ceramic bowls. Plastic bags of umeboshi in individual cellophane bags were observed in a manufacturer's store. Premium umeboshi, in particular, is arranged carefully and symmetrically (Hayward S, 2003; Japanese retail audit, 2005). Packaging needs to be sturdy to withstand considerable handling in the long distribution channels (Nguyen, 2000, p.97).

A variety of gift packaging was observed, including ceramic jars, wooden bowls and barrels, and the standard plastic lidded trays were often wrapped in wood, bamboo or cardboard giftboxes, sometimes over-wrapped with high quality paper or cloth (wrapping with a re-usable cloth is a traditional Japanese presentation – Y. Mizuta, pers. comm.). Examples include: a giftbox in a Kishu manufacturer's outlet consisted of two 600 g ceramic pots in a wooden box wrapped in a cloth at JP¥7350 (Senrian brochure); another Kishu giftpack in a wooden bowl and decorated with whole shiso leaves at JP¥5250 (A\$68.00) for 1kg; a wooden box of large premium quality pickles individually wrapped in quality paper; and giftboxes of assorted flavours (Japanese trade interviews, 2005).

Price for high quality umeboshi often doubles when giftboxed (Japanese retail survey, 2005). Japanese manufacturers invest heavily in packaging, using top quality design, printing and materials, as shoppers expect the wrapping to reflect product quality. Cost of gift packaging can be several times that of the contents (USDA 1994 pp.11-12).

Fig 4.6: (a) Umeboshi in a variety of packaging and (b) premium grade umeboshi



(a) Umeboshi in variety of packaging



(b) Premium umeboshi

The food service industry mainly uses one kilogram jars similar to those used by Australian restaurants (Hayward S, 2003). Restaurants are usually small with limited storage, so require smaller and convenient packaging (USDA, 1995).

Packaging needs to comply with Food Sanitation Law requirements on hygiene, safety and standards; the Measurement Law requiring accurate measurement of net contents; and the Law for Promotion of

Effective Utilisation Resources and The Containers and Packaging Recycling Law for waste recycling (Appendix D: Japanese laws and regulations for food and liquor). Consumer concern for the environment is growing (Myers, 2003, pers. comm.), and a Kishu manufacture advertised 'eco/biodegradable' packaging (Appendix B: Complete retail audit for mume products).

Labelling

Several regulations and standards regulate labelling of domestic and imported processed foods (Appendix D: Japanese laws and regulations for food and liquor).

The Food Sanitation Law requires foods sealed in wrapping or containers to display product name, best-before date or date of minimum durability (if to retain quality more than five days), additives, allergens, name and address of manufacturer or importer, preservation method, and a declaration if irradiated (Nguyen, 2000 p91). If health claims are made, recommendations, usage method, and a statement that the product is a food with health claims is required. Labelling must be in Japanese language, accurate, legible, easy to read and understand, and readily visible without opening the package. Additives to sweeten, colour or preserve must be declared by substance name and category.

MAFF's Quality Labelling Standard for Processed Foods requires labels for umeboshi and other foods to list in a readily visible location on the container or packaging the product name, ingredients, weight of net contents, best-before date or date of minimum durability, preservation method, name and address of importer, and country of origin (this may be a commonly known geographic place for agricultural products) (MAFF, 2000b; MAFF, 2000c). Organic foods meeting the JAS standards can be labelled 'organic' and carry the Organic JAS Mark (JETRO, undated).

The Nutrition Improvement Law requires labels in Japanese language, listing the main nutritional ingredients and calories by volume, ingredients to be eligible, and volumes conforming to standard values. For certain ingredients, high content (for example vitamins) or low content (for example fat), may be mentioned. JETRO recommends labels be translated in Japan to ensure compliance with Japanese labelling standards (JETRO, 2003, p.16).

Branding and place of origin

There are numerous brands of umeboshi, with manufacturer or regional branding.

The dominant brand, sought by quality markets, and strongly promoted, is the regional brand 'Nankou Kishu Wakayama', i.e. Nankou cultivar grown in Minaegawa-mura, Kishu region, Wakayama Prefecture. This form of marketing appellation, similar to regional French wines, is common for Japanese agricultural products (Beppu, 2003, pers. comm.).

Consumers buying health foods and wealthier people buying high quality umeboshi are particularly concerned with a trusted brand (Nguyen, 2003, pers. comm.). The 'Kishu' brand signifies an important gift for significant events such as funerals (Yanagawa, 2005).

The market regards high quality umeboshi as Japanese, middle quality as Japanese or Taiwanese, and low quality/low price as of Chinese origin (Japanese trade interviews, 2005).

Some Japanese manufacturers have been using shiroboshi from China, completing the processing in Japan, and labelling the final umeboshi 'Made in Japan', which conceals the Chinese origin. As a result Japanese consumers have not become accustomed to the standard of Chinese product (Japanese trade interviews, 2005). Japanese-branded product exported to Australia and elsewhere is often of Chinese origin (Hayward S, 2003). Some Japanese manufacturers have relocated the entire umeboshi process to China following new labelling laws requiring transparency of country of origin for the main ingredients (Nguyen, 2003, pers. comm.).

Opinions varied as to likely market acceptance of Australian umeboshi. Wholesalers of fresh mume believed Japanese consumers seek domestic origin for traditional foods, especially premium lines, and

for umeboshi would prefer domestic mume of a particular quality, and probably not Australian fruit. A specialist retailer expected consumers would accept Australian umeboshi over Chinese product. An umeboshi manufacturer considered the Japanese consumer was not concerned about country of origin, only about taste, cost and quality, and that his supermarket customers were satisfied with the quality and lower price of product originating in China (Japanese trade interviews, 2005).

Australian brands have only been retailed in a few luxury stores in Japan. A foreign brand might find distribution for foods produced in the traditional country of origin, for example camembert cheese from France, but not for Japanese-style foods. Therefore an Australian branded umeboshi is unlikely to access distribution channels in Japan. It was suggested a 95 per cent finished product (including premium lines) be supplied to a repacker/distributor in Japan to package under a Japanese brand (Myers, 2003, pers. comm.). However, a trading company observed that umeboshi labelled as of Australian origin would have a competitive advantage over Chinese product given the safe and low chemical image of Australian foods, particularly if certified organic (Japanese trade interviews, 2005).

Brand names are less important for products produced for commercial use (Trevin, 2003, p.26). Wholesalers and retailers have been buying large volumes of quality-assured product, at negotiated prices, for retail under their own house brand (USDA, 1995). This indicates supplying Australian umeboshi as a catering pack of processed product under a Japanese house brand to food service businesses through a wholesaler or agent (Myers, 2003, pers. comm.).

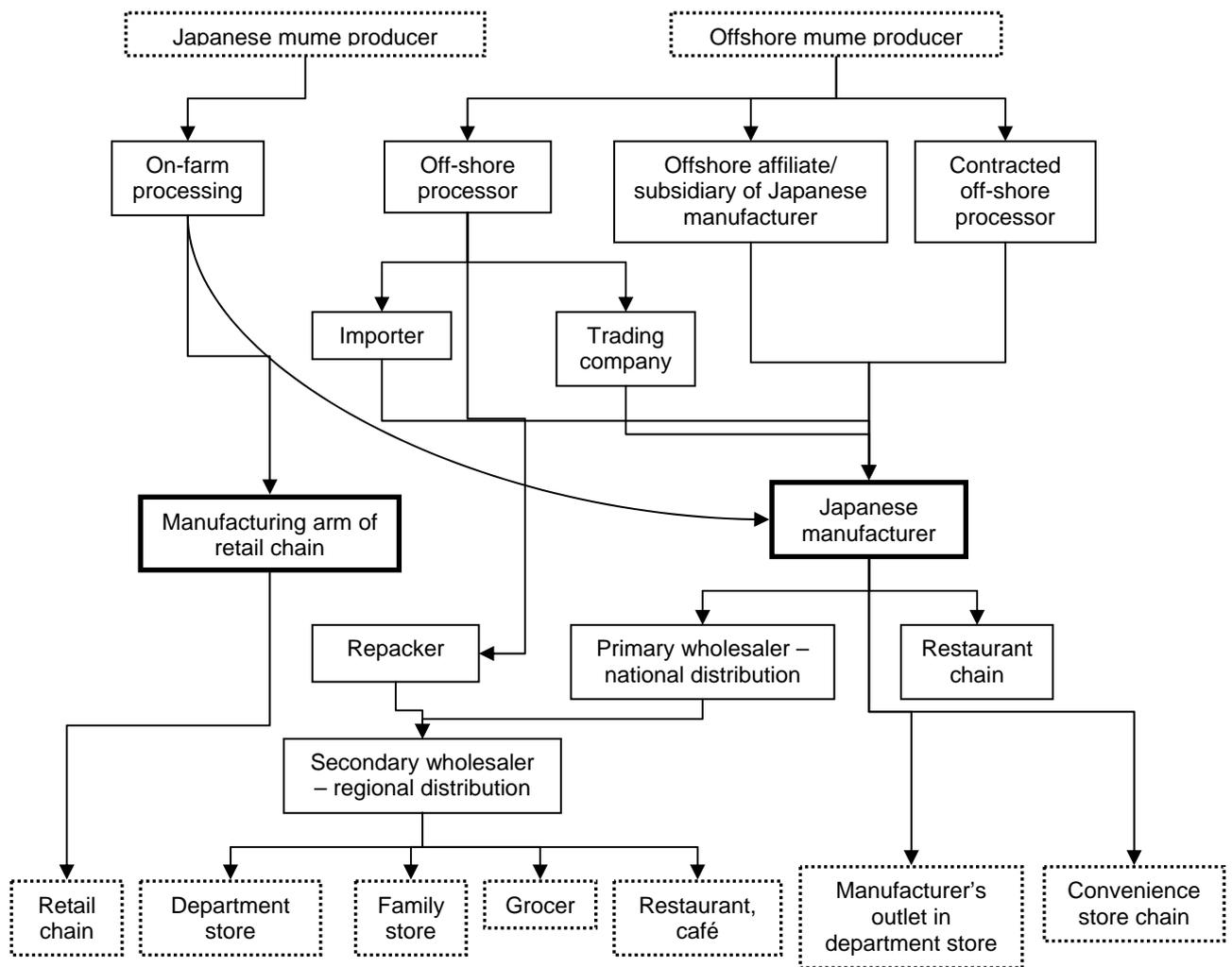
In summary the research findings provide several indications for an Australian product:

- initially supply Japanese manufacturers with shiroboshi from *the* Nankou cultivar, high quality salt, and similar processes, including sun-drying, to Japanese producers
- provide branded finished quality standardised product in a catering pack under a Japanese house brand to food service businesses through a wholesaler or agent
- provide unbranded finished high quality product to a repacker for packaging and distribution
- use production systems, for example organic, low chemical and/or environmental management and quality assurance programs that can be promoted in Japan.

4.3.5 Distribution

Distribution of umeboshi has been increasingly shifting from conventional to direct channels (Fig 4.5), supported by the emergence of mass merchandising and increased competition (*Kansai in Focus: Living with Ume in Minabegawa Village*, 1997).

Fig. 4.7: Japanese distribution channels for umeboshi



Source: Japanese trade interviews, 2005

Sales are 50 per cent through wholesalers and 20 per cent through major manufacturers, department stores and supermarkets (*Ume growers and processing*, 2003).

Grower/processors

Mume growers usually produce shiroboshi on farm, either for co-operatives or manufacturers or to finish as umeboshi in their on-farm processing plants, packaged under either their own labels or private labels for other distributors. Some sell only direct through mail order (Hayward S, 2003; Japanese trade interviews, 2005). Kishu growers processed around 80 per cent of fruit into umeboshi (*Kansai in Focus: Living with Ume in Minabegawa Village*, Kippo News, 1997).

Industry organisations

Many mume producers belong to regional grower organisations, for example the Wakayama Prefecture Ume Growers Association, and co-operatives such as the JA Agricultural Corporation which in the Kishu region operates an umeboshi factory using product from grower members (Japanese trade interviews, 2005).

The All Japan Tsukemono Federation of Co-operatives is a national organisation of 44 prefectural co-operatives and 1500 Japanese manufacturers and wholesalers of more than one million tonnes of tsukemono a year, including 35 000 tonnes of umeboshi. The federation supports and represents contributing businesses and organisations, its activities including providing and funding technical advisors and academics to advise producers and manufacturers, and helping set the mume price each

season (Japanese trade interviews, 2005). Its mission is to preserve traditional tsukemono, develop products, modernise manufacturing, and educate consumers on the benefits of tsukemono in their diet (Tsukemono-Japan Org., 2006).

Manufacturers, repackers

Most umeboshi manufacturers are located amidst the Kishu mume industry. Numbers grew to around 250 in recent years as growers and outside businesses moved into processing, resulting in strong competition and increased product differentiation (*Ume growers and processing*, 2003). Up to 150 members of the All Japan Tsukemono Federation of Co-operatives produced umeboshi in 2005. Manufacturers produce umeboshi in retail trays and gift packs under house brands or by contract to large pickle manufacturers, specialist retailers and distributors in the Tokyo region and elsewhere (Hayward S, 2003, pers. comm.; Japanese trade interviews, 2005; Myers, 2003, pers. comm.; Yanagawa, 2005, pers. comm.). Large manufacturers have sophisticated plants that comply with sanitation and environmental legislation, which may not be viable for smaller producers (*Ume growers and processing*, 2003).

Tsukemono manufacturers often manage distribution, including deliveries, orders, merchandising (display and price-tagging in the stores), collecting payment, accepting returns, organising promotions for new products, and provided sales training to retailers' employees (Nguyen, 2000, p.21).

Several Japanese repackers handle imported umeboshi (Yoshida, 2003). Repackers package and brand a finished product for retail, usually handle distribution, and may import the product, and are the recommended option for Australian suppliers (Myers, 2003, pers. comm.).

Importers and trading companies

Trading companies import shiroboshi for manufacturer clients, with three companies handling around 90 per cent of Chinese product (Japanese trade interviews, 2005).

Trading companies purchase ingredients to specification for most food manufacturers, typically introducing the manufacturer to new product samples; manage logistics and food safety; and bear currency exchange risk. They act as the legal importer, often with just-in-time delivery systems to avoid the high cost of storing inventory, and handle Customs clearing, warehousing, inventory finance and other import functions, usually through an import division but sometimes through importers, wholesalers or other trading companies. Trading companies usually on-sell to wholesalers or distributors rather than handle distribution (Lin, 2000 p.5; JETRO, 2001d, p.28; Nguyen, 2000, p.21; USDA, 1995, p.12; USDA, 2003b, p.5).

Wholesalers

Like other tsukemono, umeboshi is distributed through specialist and general wholesalers, often through dedicated pickle divisions in Tokyo and Osaka wholesale markets. Wholesalers often specialise in a single line or from one manufacturer, managing domestic distribution, transportation, and settlement of payment (JETRO, 2001a; Japanese trade interviews, 2005; Nguyen, 2000 p.21; USDA, 1995, p.10).

Distribution to retailers and food service, particularly for perishable foods, is usually through two or three tiers of national and local wholesalers. Primary wholesalers buy from trading companies, manufacturers or directly from overseas suppliers, and redistribute, usually nationally, to trading companies, co-operatives, retailers, restaurants, and also to secondary wholesalers; and some have manufacturing operations. Secondary wholesalers supply regional small to medium stores with a high level of service, stocking shelves, pricing items, extending credit, offering rebates, and providing just-in-time delivery of fresh products to stores lacking in storage facilities. Supermarkets order pickles from manufacturers or wholesalers for daily delivery with other perishables (Nguyen, 2000, p.21; Trewin, 2003, p.23; USDA, 1995, p.10).

The multi-layered distribution system is considered cumbersome, inefficient and costly, with numerous vehicles making small deliveries while hampered by persistent labour and driver shortages and road congestion. To avoid this, some national and regional retail and convenience store chains have centralised their distribution, using regional distribution centres and warehouses and a few large wholesalers to handle all transactions with other distributors (Barber, 1998, p.2.2; USDA, 1995).

Distributors are mostly risk-averse, preferring lower-cost sources of proven products to entirely new lines, largely because they accept return of unsold goods and bear the risk of new product failure (USDA, 1995, p.10).

Retailers

Umeboshi is retailed widely through department stores, supermarkets, convenience stores, specialist retailers, and manufacturers' factory shops, as well as food bazaars, fish markets, the Internet, and tourist and other outlets (Hayward S, 2003; Japanese retail audit, 2005). More than 30 per cent of sales have become direct in recent years as manufacturers establish internet/mail order sales and factory retail outlets, tied to credit companies and courier services, allowing for better margins, development of branding and loyal customers, and consumer research (*Ume Growers and Processing*, 2003).

Japan's national, regional and local retail chains have also been reducing distribution costs through various strategies. National chains buy domestic product, import directly through overseas subsidiaries, have internal distribution systems, seek low-cost sources for house labels, and negotiate directly with suppliers for bulk prices for products such as pickles. Regional chains and medium sized supermarkets have been moving to direct purchasing; some have formed joint ventures for better purchasing power; and some have aligned with large supermarkets instead of buying through wholesale markets. Food retailers prefer favoured brands and locally manufactured products, and carefully screen and select suppliers for new items (JETRO, 2001a; Lin, 2003, p.8; USDA, 1995).

Family-owned grocery stores have a diverse product range requiring frequent delivery of small orders of perishable foods, including umeboshi and other lighter style lower-salt pickles (Lin, 2003, p.7; Trevin, 2003, p.23; USDA, 1995, pp.10–11). They are often tied to domestic manufacturers through financial, equity or marketing arrangements. Numbers of small to medium retailers – mainly small privately owned grocery, produce, specialty food and department stores – have fallen in recent years due to competitive lower pricing by national retailers (Barber, 1998, p.5).

The convenience store sector has been expanding strongly. The major convenience store chains are all subsidiaries of large national retail chains, for example 7-Eleven/Ito-Yokado, Lawsons's/Daiei, FamilyMart/Seiyu and Mini-Stop/Jusco, and share their powerful purchasing systems and efficient distribution channels (Barber, 1998, p.6; pp.22–3). Because of extended opening hours, up to 24 hours a day, the stores attract gatherings of young Japanese, the main consumers of takeaway meals which include the popular rice-ball with umeboshi (Irie, 2001; Nguyen, 2000 p.5; USDA, 1995). Chains require standardised product, and a young Australian industry would struggle to meet their extremely strict product specifications (Japanese trade interviews, 2005).

For umeboshi, wholesale prices depend on transaction size, with primary wholesalers paying around 65 per cent and secondary wholesalers around 70 per cent of final retail price. Profit margins are typically 25–30 per cent for supermarkets and department stores and around 20 per cent for other retailers (Nguyen, 2000, p.21).

Food service sector

A very large food service industry has developed in recent years, with more than 350 000 restaurants, as well as fast food outlets, hotels and other businesses. Several trends indicate continuing growth:

- More consumers eating out due to rising disposable incomes, more women working outside the home, shrinking nuclear family size, more single person households, and increasing leisure time

- Consumers switching from high class specialty restaurants to lower-priced neighbourhood restaurants with traditional Japanese dishes, in response to the tightened economy
- Larger more professional restaurants replacing numerous small operations
- Young consumers buying pre-prepared and inexpensive meals in fast food and noodle restaurants. (Barber, 1998 p8; Lin, 2003; USDA, 1994; USDA, 1995 p6).

Most distribution has been by national and regional wholesalers, trading companies and caterers, giving access to a range of manufacturers, and information on new food materials. However, distribution is becoming more direct, and many restaurant chain operators supply all their outlets through in-house merchandise distribution systems or corporate subsidiaries. Some large restaurants import directly, expecting suppliers to meet their specifications for consistent size and quality at constant prices, and several large food service companies have developed manufacturing divisions in overseas food producing locations to reduce labour, shipping and tariff costs (JETRO, 2001d, p.30; Lin, 2000, p.7; Trewin, 2003, p28; USDA, 1995, p.11).

Internet/E-commerce

The Internet has enabled more vertically integrated distribution for umeboshi, with grower/processors, manufacturers and distributors retailing direct through the Internet and mail order; and manufacturers also selling through catalogues and their own stores (Japanese trade interviews, 2005; *Ume growers and processing*, 2003). Websites allow consumers to compare product and price, which could give Australian suppliers an advantage (Myers, 2003, pers. comm.).

Food manufacturers and supermarket and restaurant chains have been increasingly sourcing ingredients directly through business-to-business e-commerce to reduce costs, and e-commerce suppliers have formed trading alliances with the Japan Food Service Association (an organisation of restaurant operators) and the Japan Self-Service Association (an organisation of mass-volume retailers). Some websites enable suppliers to compete on price, quality and delivery arrangements for a range of foodstuffs (Lin, 2000, p.13).

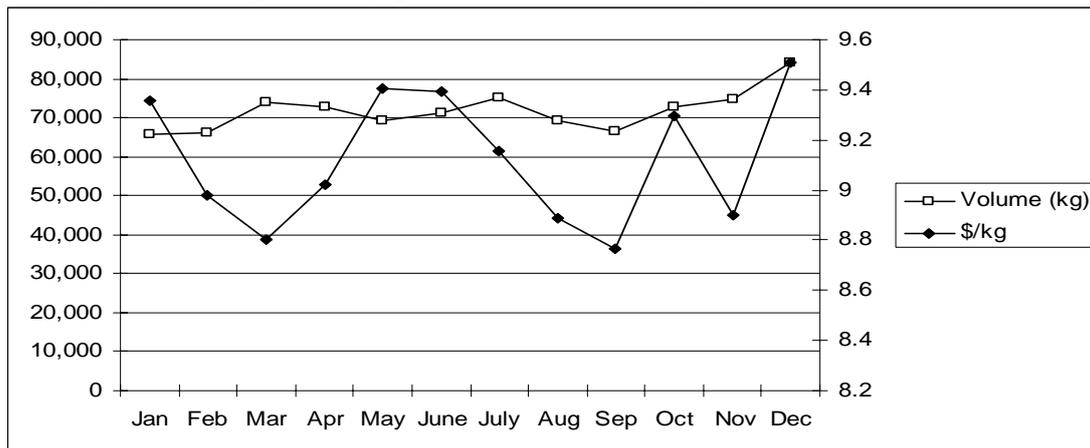
4.3.6 Pricing

In 2005 retail prices for product loose or in plastic trays were observed from A\$25.00 – \$107.00 a kilogram across a range of manufacturers' outlets, supermarkets and convenience stores (Japanese retail audit, 2005).

High-grade product – 20 per cent of total supply – retailed at around JP¥5000 (A\$60) a kilogram in 2005 (Japanese trade interviews, 2005). The most expensive product seen was very large Nankou umeboshi from Kishu retailing at A\$107 a kilogram loose in a Tokyo speciality store. Gift boxes were retailing at A\$53 – \$93 a kilogram (Japanese retail audit, 2003). Brands with large fruit receive price premiums of 200 – 300 per cent, while the lowest prices are for imported small hard mume (Beppu, 2003). If for gifts, the more expensive the better (Nguyen, 2003). Japanese and Australian prices have been similar for like grades (Hayward S, 2003).

Umeboshi retail price is typically twice the wholesale price, which can be around five times cost of production (Japanese trade interviews, 2005). The average monthly wholesale price for umeboshi ranged from A\$8.75 – 9.50 a kilogram in Tokyo in 2004 (Fig. 4.6).

Fig. 4.8: Average monthly price for umeboshi, Tokyo Wholesale Markets, 2004



In 2005 Chinese shiroboshi was imported at around A\$1.10 – \$1.60 a kilogram, including first grade product at A\$1.25 a kilogram. Supermarkets priced Chinese umeboshi below domestic product because of consumer concern about China’s poor reputation for quality and chemical residues, and to meet consumer expectation and demand for lower prices. It was assumed these consumers would not expect high quality at these low prices. Australian product could not compete in this category (Japanese trade interviews, 2005).

From 2000–4 the average annual import price for semi-processed umeboshi fell from A\$3.37 to \$1.15 a kilogram (averaging 13 per cent decline per annum) while finished umeboshi prices dropped from A\$4.70 to \$3.10 (an average annual decline of seven per cent) (Table 6.8). This reflected a dramatic fall in China’s fresh mume prices from 2000–5 as a five per cent expansion in plantings bore fruit, with farmgate prices per kilogram of A\$0.90 in 2000, A\$0.30 in 2003 and only A\$0.17 in 2004. As plantings continue to mature and increase fruit volumes, prices are expected to fall further, and a Japanese producer association expressed concern that the low prices threatened their industry’s future viability (Japanese trade interviews, 2005).

Price for fresh domestic fruit averaged JP¥500 (A\$6.00) a kilogram in 2005 (Japanese trade interviews, 2005), while during the poor 2003 harvest, Japanese manufacturers paid around JP¥600 a kilogram (A\$8.80) farmgate price plus transport (Hayward S, 2003). Growers may withhold semi-processed umeboshi for up to two years in case of supply shortages and higher prices, with manufacturers absorbing and smoothing fluctuations of JP¥800 – 1700 a kilogram (A\$9.60–\$20.00) rather than pass them onto consumers. As a result manufacturers have been seeking more constant supply (*Ume growers and processing*, 2003).

Manufacturer receive margins of around 50–60 per cent more from direct internet sales than wholesalers, indicating a continuing shift to direct distribution (*Ume growers and processing*, 2003).

In general, Japanese food manufacturers have usually adhered to posted (fixed) prices for branded foods and use advertising and publicity to reinforce established brands or persuade trial of new products, a system which favours larger businesses. These fixed prices exclude delivery costs, and the wholesaler has to absorb any fluctuations in distribution costs and may be expected to fund discounts or rebates under any special retail offers (Trewin, 2003, p28). However, progressive government deregulation of retailing has given retail chains more power over pricing decisions, with larger retailers driving down retail prices to win market share, reducing costs through managing their own distribution, direct purchasing, buying private labels for imported products, developing and retailing their own products at around 20 per cent discount on national brand prices, and discounting name brands to compete with discounters (Barber, 1998, pp. 4-5; USDA, 1994).

Meanwhile the recession had caused grocery shoppers to become more price-conscious, breaking the market’s ‘snob cycle’; retail chains and discount stores have been providing more car-parking facilities at suburban shopping centres, enabling consumers to shop around for lower prices; overseas

travel has alerted consumers to comparatively low prices outside Japan; and discount pricing has become more mainstream. These trends indicate Japanese consumers will increasingly expect value for money, trade some degree of quality for lower prices, and be increasingly receptive to the lower-priced imports from China and elsewhere, which bypass long and costly traditional distribution systems (Barber, 1998, p.8; USDA, 1995; Nguyen, 2003, pers. comm.).

Japanese buyers require ‘value’, based on cost plus quality plus special promotional characteristics that can be used to differentiate a product from its competition (Barber, 1998). Manufacturers using imported ingredients are exposed to volatile international prices and volumes; however, as market prices and demand tend to be stable they require stable prices from suppliers (Nguyen, 2000, p97).

4.3.7 Promotion

Key attributes promoted are fruit cultivar, flavourings, place of origin, form of processing, and health benefits including vitamins, minerals and low salt content.

Manufacturer outlets and specialist stores provide samples for tasting, and their staff promote taste, food safety, moderate salt content, and/or natural mume flavour, according to the customer’s interest. Price cards and other point of sale material in supermarkets and convenience stores usually feature brand and price and sometimes salt content. Product labels promote regional brands, cultivars, salt content, duration of processing, flavourings, vitamin and fibre content, and organic production. Some manufacturers have product brochures and websites with detailed information and photographs for each product. Various industry and other brochures and numerous websites provide the history of mume and umeboshi, medicinal uses, recipes for home preparation and other information (retail audit, Appendix B).

Food and health books and magazines have for centuries recommended umeboshi as a beneficial food and folk medicine (‘Big in Japan – umeboshi’ [Frances, 2004]). Japanese consumers are very trend-conscious, and strongly influenced by television, magazines and newspapers (Lin, 2000, p.11).

Umeboshi of Chinese origin has been promoted with stories of famous Chinese queens eating umeboshi over the centuries, to distract from its poor quality image (Japanese trade interviews, 2005).

Major production regions promote umeboshi and the mume harvest to attract visitors seeking souvenirs. The Kishu region, whose natural spas attract Japanese tourists, promotes umeboshi through tourist brochures, maps, billboards the Wakayama Prefecture Mume Museum, and several manufacturer retail outlets. A large factory provided coach tours with viewing windows to the factory, juice bar, large retail store for mume products, video, and brochures. The Wakayama prefectural government operated the Wakayama Kishu Kan store in Tokyo’s Ginza shopping district, to promote and sell regional products included umeboshi (Complete retail audit for mume products — Appendix B).

Fig. 4.9: (a) Umeboshi billboard, Kishu, and (b) Speciality umeboshi store with tasting counter, Tokyo



(a) Umeboshi billboard, Kishu



(b) Speciality umeboshi store with tasting counter, Tokyo

To maintain consumer interest in umeboshi and other tsukemono, the Japanese pickle industry runs promotional events such as national and regional pickle festivals. The 21st day of each month is promoted as a national Pickle Day by the All Japanese Tsukemono Federation of Co-operatives, and at tsukemono festivals across Japan each region promotes its local style, in specially designed packaging, for gifts and travel souvenirs (Nguyen, 2000, p.4).

Australian suppliers could introduce their products and brands to buyers at food trade fairs such as the annual Foodex Japan, Japan's largest food and beverage trade show; the biennial Hotels & Foodex Kansai (organised by Japan Management Association); and natural foods exhibitions (Myers, 2003, pers. comm.).

4.3.8 Market access and barriers to entry

Manufacturers have been unable to import fresh mume (Japanese trade interviews, 2005). For imports from any country, Japanese Quarantine, which administers the Plant Protection Law through MAFF's Plant Protection Division, would require disinfestation data supporting a treatment against insects of concern, and development of market access, a process that would take several years (Parnell, 2006). Fresh stonefruit imports are prohibited from all Australian states due to *Cydia Pomonella* (Codling moth) and from mainland states because of *Ceratitis capitata* (Mediterranean fruit fly) and *Dacus tryoni* (Queensland fruit fly) (Anderson, 2003). A Japanese research project on shipping of high quality mature-green mume (when fruit fly attack is unlikely) indicates manufacturers hopes to import fresh green mume (Research projects for mume — Appendix A).

When questioned on the market potential for fresh Australian mume (if a disinfestation treatment was developed to ship fresh mume to Japan), wholesale market agents predicted consumers might not consider it fresh after the sea voyage; shipping costs would make it unviable; and demand would be low for counterseasonal fruit as Japanese consumers expect mume in June, and anticipate it during the off-season. They recommended the fruit be processed in Australia (Japanese trade interviews, 2005). If treatments were developed for fresh mume imports, Australian product could not compete on price against low priced fruit from countries other than Japan.

Market access has been restricted to salted mume. While pickled mume is not subject to the same constraints as fresh fruit, Japanese Quarantine may deem mume pickled in brine as fresh, depending on the concentration of salt or degree of pickling, and require inspection, so imports should be referred to its Plant Protection Station in advance (JETRO, 2004).

There are no apparent non-quarantine barriers. Pickled mume is subject to tariffs which in 2005 were 12 per cent for members of the World Trade Organisation (Appendix E).

However, Australian exporters would face non-trade barriers. Japan's huge food processing industry includes a very large and sophisticated agricultural processing industry with strong management, modern technology, vast distribution networks and established brands, producing growing volumes of finished consumer-ready product, often from imported intermediate foods, giving the domestic industry a strong advantage over new entrants (USDA, 1995, p2, p10). The main entry barriers facing Australian product would be the dominant 'Nankou Kishu Wakayama' brand and higher production and transport costs than Chinese and probably Japanese producers (Japanese trade interviews, 2005; Yoshida, 2003).

Also Japan has a high and complex level of agricultural protection, and imports can be impeded by numerous government regulations for agricultural production, processing and trade (Barber, 1998, p6). Special trade links with selected countries, and non-tariff measures subject to interpretation, can be used to favour one supplying country over another. For foods, the main barriers to foreign firms have been from business practices rather than formal restrictions from government regulations, unlike some industry sectors (Trewin, 2003, p38, p64).

4.3.9 Market positioning

The research indicated several opportunities for Australian umeboshi to compete:

On food safety

- As a functional food with low chemical input and residues, promoting Australia's clean green image, and aimed at female shoppers (Myers, 2003, pers. comm.)
- As organic, or grown without sprays, for example in regions without fruit fly (Myers, 2003, pers. comm.)
- As of Australian origin for a more favourable consumer reaction than Chinese product (Japanese trade interviews, 2005)
- On Australia's strong food safety image. This has succeeded for Australian wines in Japan. It would avoid competing directly with product of Japanese or Chinese origin and shift the consumer's focus from the fact that this was not Japanese Kishu mume (Japanese trade interviews, 2005)

On quality:

- Emphasise product attributes including preferred cultivars, large size, and high quality salt

On price:

- as a higher-priced higher-quality alternative to Chinese product, between the high Japanese end and the low Chinese end, and aiming at the top end of imports or second grade domestic. There is no mid-range product since Taiwan production shifted to China (Japanese trade interviews, 2005).
- as lower priced than its Japanese equivalent (Myers, 2003, pers. comm.).

Several options were suggested:

- an unbranded semi-processed product for a small to medium Japanese manufacturer to finish, brand and distribute, allowing the necessary exchange of technical information
- a finished but unbranded product in bulk to a repacker or manufacturer to package, brand and distribute under their house label by building a relationship with the distributor, allowing transfer of knowledge while retaining the maximum value-adding in Australia
- a finished product for the food service sector where brands are less important, being not seen by the consumer
- a volume finished product, through partnering with a Japanese supermarket chain seeking quality and price, a strategy that has swung Japanese retailers to Tasmanian beef
- a volume finished product for importers who understand consumer tastes, for example large trading companies with large clients, or small to medium size Japanese trading companies for smaller supply arrangements
- a counterseasonal product, provided this suited the end product
- an alternative supply source to reduce risk for example in poor Japanese or Chinese seasons
- advertised on a Japanese language website to alert distributors to lower prices
- starting in a regional market to acquire experience and build market awareness and distribution (Japanese trade interviews, 2005; Myers, 2003; pers. comm.; Nagatomo, 2005).

Ideally a Japanese manufacturer will already import mume and know how to produce a marketable product (Yoshida, 2003).

A young Australian industry is unlikely to meet the stringent specifications of a large supermarket chain (Japanese trade interviews, 2005).

4.4 Key products - Umeshu

Umeshu is a mume liqueur with a light sweet and sour taste and around 15 per cent alcohol content. It has been a traditional beverage in Japan for many centuries (Choya products, 2006).

Umeshu is a mume liqueur with a light sweet and sour taste and around 15 per cent alcohol content.

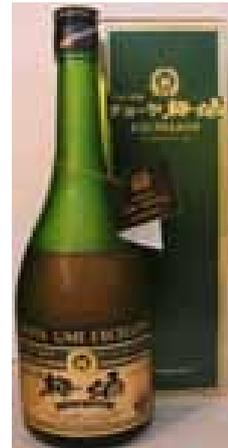
Fig. 4.10: (a) Bottled umeshu, (b) Umeshu in cartons and (c) premium umeshu



(a) Bottled umeshu



(b) Umeshu in cartons



(c) Premium umeshu

4.4.1 Market size and demand

Umeshu is widely consumed across Japan. While production and trade statistics could not be located, the umeshu industry estimates a market size around 62 million litres of umeshu produced from 25 million tonnes of Japanese fruit (Japanese trade interviews, 2005), as well as more than 11 million litres of umeshu mixed with soda (Japanese Liquor Manufacturers Association listing, 2004). The market value is calculated at \$774 million, based on prices of around A\$12 for a 750ml bottle observed in supermarkets and convenience stores in 2005 (Japanese retail audit). There is also a substantial export market to the USA, Europe, Australia and elsewhere, often to supply the better Japanese restaurants (Japanese trade interviews, 2005).

Sales soared in 2003 (Mercian, 2003), and production has expanded in response to continuing strong demand, with several contributing factors:

- media articles about umeshu's growing popularity, raising awareness in consumers and manufacturers
- increased competition, including independent retailers and internet sales after deregulation of Japan's liquor retailing which previously confined umeshu sales to manufacturers' outlets. For example a liquor store had doubling its umeshu sales each month, and another had umeshu outselling everyday drinks of beer and shochu ('Lucrative industry', 2005, *Shuhan News*, 1 May, trans. Y. Mizuta).
- Japanese companies developing export markets (Japanese trade interviews, 2005)
- consumer promotions in liquor stores and restaurants
- consumers drinking umeshu not only as a traditional aperitif but as a wine, and also as a liqueur mixed with soda and other drinks
- consumers moving from cocktails to low priced drinks (*Mercian Corporation*, 2003).

Potential for further market growth through retailers such as supermarkets and convenience store chains which constantly seek new food and drink products was being constrained by lack of fruit supply (Japanese trade interviews, 2005). Despite product life cycles often being short in Japan, umeshu was expected to endure because of its long tradition.

Umeshu is used as a relaxing drink, health drink (assumed to stimulate the appetite and treat indigestion and diarrhoea) and tonic. It is usually drunk straight, on ice, with hot or cold water, or with soda — often as an aperitif, but increasingly throughout the meal. Leading manufacturer Choya Umeshu's website also suggests serving umeshu chilled as a wine; or mixed with tonic water, fruit juice, beer, red wine or sports drinks. Also umeshu is used in gelatin desserts often served at formal dinner parties and retailed as confectionary (Nguyen, 2000, p48; Porjes, 1998).

An emerging market of women of all ages prefers sweet low alcohol drinks such as umeshu, with a strongest demand from young women attracted to umeshu's similarity to grape and sweetened fruit wines, and healthy reputation (Alcohol Industry News, May, 2005; JETRO wine p.1, p.21).

4.4.2 Supply

A large domestic umeshu industry has developed since Choya Umeshu commercialised production of this traditional liqueur in 1959. More than 85 manufacturers produced umeshu in 2004, led by major liquor manufacturers Choya, Mercian, Godo Shusei, Gekkeikan, Suntory and Asahi, with strong growth in recent years expected to continue as small shochu and sake brewers add umeshu to their product lines (Japanese trade interviews, 2005).

However, a substantial proportion of the 5000 tonnes of fresh mume retailed in Japan is used to make umeshu in the home, with Japanese law permitting home production of fruit-based alcoholic liqueurs where fruit is added to spirits distilled under licence.

Manufacturers require fresh mume — freezing damages the fibre and makes it unsuitable for umeshu. Due to quarantine prohibitions on fresh imports, Japanese manufacturers have been restricted to domestic supply, using around 25 000 tonnes a year. Growing markets and product led to some fruit shortages in 2005 amid concerns that the fruit industry lacks the resources to expand production sufficiently to meet demand (Japanese trade interviews, 2005). There were minor imports of umeshu from China and Taiwan, and some Japanese companies have been considering off-shore production to access fresh fruit so as to expand their production and markets (Japanese trade interviews, 2005).

4.4.3 Product profile

Although often marketed as a wine, under Japan's Liquor Tax Law umeshu is defined as a fruit liqueur — a beverage made from an alcoholic beverage and sugar or other commodities, with fruit as the primary flavouring ingredient, and an extract content of two per cent or greater. The category includes bottled and canned cocktails. The European Union definition for liqueur is any alcoholic beverage with an alcohol content of at least 15 per cent and a sugar content of at least 100 grams per litre (JETRO, 2003 pp.19-21).

Various product labels describe their contents as 'rich', 'mild', 'light', 'soft', 'sweet', 'not sweet', 'sour', 'less sour', 'spicy', 'refreshing', 'natural' and 'fruity', with aroma described as 'distinctive', 'deep' and 'ume' (Japan Liquor Manufacturing Association).

Preferred cultivars include Nankou, *Koshiro*, *Shirakaga*, *Benisashi*, *Bauyubai* and *NokyoBungo*, and products may be made from single varieties or blends. Premium umeshu is from the highest quality mume, preferably with the thin skin and rich soft-textured flesh produced in Wakayama P. (Nguyen, 2000, p.16), and 'Kishu' and 'Nankou' are often promoted on bottle labels (Japan Liquor Manufacturing Association; Japanese trade interviews, 2005). A tree could be ten years old before it produced this quality (Yoshida, 2003).

Umeshu is usually differentiated by either place of origin of the fruit, for example Choya's '100 per cent Japanese Ume', or lower pricing, with regional brands promoted in domestic regional markets that appreciate them, such as Choya's 'domestic Kishu plums' in its local Kansai region (Yanagawa, 2005).

Labels often describe the sugar used, mostly granulated cane sugar, brown sugar, or various rock sugars that include a highly refined sugar called korizato (Japan Liquor Manufacturing Association; Yoshizuka, undated).

Also promoted are flavourings, which include honey, perilla (which gives a pink colour), green tea, apple vinegar, mirin, vegetable extract, and 'Chinese herbs'. Some companies promote that they have

not used preservatives, additives or acidifiers, for example Choya labels advised its ‘all-natural’ umeshu contained only natural levels of acid (mainly citric), potassium and iron, and no added preservatives (Japan Liquor Manufacturing Association; Japanese retail audit, 2005). The Food Sanitation Law provides regulations, specifications and standards on additives for alcoholic retail products, including imports (JETRO, 2003, p.15; Nguyen, 2000, p. 91).

The leading products are wine-type bottles of clear umeshu and jars that contain with several fruit. Increasing competition has led to numerous brands and product variations, including umeshu with honey, citrus or soda, and Ume Sour, with shochu (Table 4.8; Table B.1). In 2005 the Japan Liquor Manufacturing Association listed 85 umeshu products; a second restaurant sold 30 types of umeshu under 100 brands; and liquor stores had numerous brands, for example 40 in one store (‘Lucrative industry’, 2005, *Shuhan News*, 1 May, trans. Y. Mizuta). Some businesses, including a restaurant and a liquor retailer, have developed house brands. An Australian umeshu for export to Japan would need to meet the specifications of the appropriate Japanese manufacturer organisation and the Japanese code of manufacture, although the manufacturer would have more flexibility and product options (Noble, 2004, pers. comm.).

A competitive Australian umeshu was considered feasible because Australian agriculture has similar climate and a reputation for high standards very good fundamentals, all of which would influence fruit quality (Japanese trade interviews, 2005).

There is future potential for organic umeshu although a price premium would depend on resolution of current market confusion between the current ‘organic’, ‘chemical-free’, and ‘conventional’ and education of consumers to accept and pay more for organic product (Japanese trade interviews, 2005).

Table 4.8: Umeshu product audit from retail store observations and Internet advertisements

Product and description from labels/websites	JPY¥	A\$	A\$/L	Outlet
Choya umeshu – Liquor only, 750 ml bottle	930-1080	\$11.15–12.90	\$15.00–17.00	Supermarkets
Choya umeshu – Liquor only, 360 ml	550	\$6.60	\$18.30	Supermarkets
Choya Kishu – ‘The standard Umeshu’, 12–16% fruit; 15% alcohol; 430, 700 and 1 600 ml jars				Choya website
Choya umeshu – Liquor with fruit, 750 ml jar	1 800	\$21.55	\$28.70	Supermarket/ discount store
Choya Plum – ‘Plum wine’ for USA market (also sold in Australia), 13.5% alcohol; 750 ml bottle				Choya website
Choya Plum – ‘Plum wine’ for European market. 5L carton (4% fruit); 10% alcohol; 100, 750, 1 000 ml bottles				Choya website
Mercian 2 L – cardboard box	1 029	\$12.3-0	\$6.20	Supermarket
Asahi umeshu –760 ml bottle	870	\$10.4	\$13.70	Supermarket
Kadotani bunjiro shoten – 360 ml bottle	880	\$10.50	\$29.20	Shuhan News
Shiyozu toraya – 500 ml bottle	840	\$10.00	\$20.00	Shuhan News
Hakutsuru Premium Sake Plum Wine – ‘Refreshing semi-sweet, sour taste and well-matured aroma’, 750 ml bottle				Hakatsuru website
Kikkoman Plum Wine – ‘Manjo’ brand; 750 ml & 1 500 L bottles				Kikkoman website
Suntory Umeshu de Brandy VSOP –brandy and plum wine, 14% alcohol; 500 ml bottle	880			
A range of Choya products including ‘herb umeshu with perilla leaf’ (red coloured), a blend with German sparkling wine, and a mix with carbonated soda. Premium products are aged 12 years. Alcohol content was 9-17%; low alcohol and less sugar promoted. Bottle sizes were 47–1500 ml; tetrapacks 500–1800 ml.				Choya website

Source: Japanese retail audit, 2005; manufacturers’ websites (full details in Appendix B)

Packaging

Umeshu is retailed in a wide range of wine and other shaped bottles, jars, paper cartons, and cans, with gift-boxing for premium quality products (Table 4.8; Table B.1). An Australian manufacturer could use bottle design and colour to attract the attention of the market segment of young Japanese adults in their 20s and 30s drinking in casual dining bars, particularly women, and provide mini-sized bottles along with full-size bottles for the home user market (JETRO, 2003, p.24).

The Law for Promotion of Sorted Collection and Recycling of Containers and Packages requires recyclable packaging, and Japanese liquor importers and distributors to recycle all glass, plastic and paper packaging (JETRO, 2001c, p.14).

Labelling

Labelling of liquor products must be, in Japanese language, and include the type of product (including the words 'spirits' or 'liqueur'; a list of food additives; alcohol content; volume of net contents; whether carbonated; country of origin; name and address of importer and distributor (including rebottling plant) (for example 'imported for'); and a statement prohibiting consumption by minors, such as 'You must be 20 to drink alcoholic beverage'). Unlabelled bottles cannot be displayed, sold, or used commercially (JETRO, 2003, p.18; USDA 2003a p.21).

Manufacturers label umeshu as 'plum wine' outside Japan because of its similar alcohol content to wine, and because mume is unknown in western countries. In Japan it is marketed as 'umeshu' (Japanese trade interviews, 2005).

Liqueurs may be voluntarily labelled 'organic' if they conform to organic standards based on the Liquor Business Association Law, with documentation that the product conforms to defined manufacturing method standards for liquors made from processed organic agricultural products. This is administered by the Liquor Tax and Industry Division, National Tax Agency (JETRO, 2003).

Branding

There are nine major brands, led by Choya Umeshu, and numerous minor brands (Yanagawa, 2005). The lack of a clearly dominant brand indicates lower resistance for Australian umeshu than for umeboshi (Japanese trade interviews, 2005).

Given that Australian food products have a reputation of quality in Japan, Australian suppliers could add value in Japan by developing Australian brand value, including having 'Australian umeshu' on the front label (Japanese trade interviews, 2005). The most successful strategy for establishing overseas brands in Japan has been to start with a small volume of business, work with an importer to build awareness, and gradually develop a market share (JETRO, 2003, p.24).

Liquor production, importation and distribution have to comply with the various laws, regulations and standards for alcohol and foods (detailed in Appendix D).

In summary the research findings indicate several strategies for an Australian product:

- Japanese branding would be needed to access retail outlets
- Product could be supplied under house brands for restaurants and pub chains
- A different product could be developed to avoid direct competition.

4.4.4 Distribution

Like other liquors, umeshu is distributed widely through a number of channels. Until 2003 liquor retailers were required to hold a sales licence under the Liquor Tax Law, with around 146 000 liquor retail outlets licensed in 2002. Since deregulation of the general liquor retailer system in 2003 there

has been a rapid expansion of distribution, resulting in intense competition in the previously stable liquor market (JETRO, 2003 pp.22–23). Several levels distribute liquor, including umeshu:

Manufacturers

Following deregulation of distribution, leading brewing companies began adding wines and spirits to their range and building strategic alliances and acquisitions inside and outside Japan (JETRO, 2003 pp. 22-23). This included umeshu, with numerous small shochu and sake brewers adding umeshu to their product ranges. By 2004 there were more than 85 umeshu manufacturers. Many are located in the Kansai region (30 per cent in Kishu) and 18 per cent in Kagoshima, a renowned shochu producing region (Japan Liquor Manufacturing Association listing; Yanagawa, 2005, pers. comm.).

The leading manufacturers and exporters of umeshu are Choya Umeshu which produces some 50 drinks including umeshu, ume wine, and grape wine, supplying approximately half the domestic market for umeshu; Mercian, who make grape and fruit wines, various liqueurs, and shochu and other spirits, and Kikkoman, a global manufacturer of food and drinks.

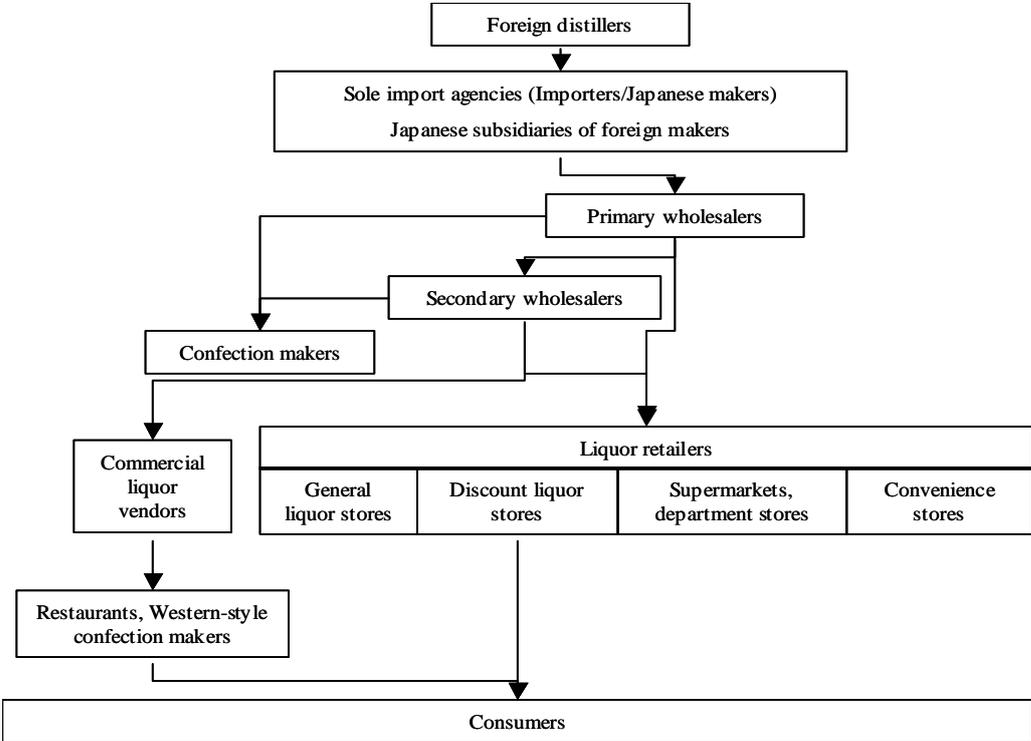
Liquor manufacturers are increasingly turning to direct sales by Internet and E-commerce, often at a discount to store prices (JETRO, 2001c, p.3), and Choya’s website advertises an extensive product list.

Importers

Liquor is usually imported by sole import agencies or Japanese subsidiaries of foreign manufacturers. Some large Japanese umeshu manufacturers, including Asahi Breweries, Mercian Corporation and Kikkoman Corporation, are also major importers of liquor for domestic distribution. Department stores and large discount stores also import wine directly for their own retail outlets. While importers generally supply specialist wholesalers, some dedicated wine importers sell directly to the consumer through mail order and websites (JETRO, 1998, p.3).

Liquor generally continues to be imported through conventional channels (Fig. 4.7).

Fig 4.11: Japanese distribution of imported liquor



Source: JETRO guide for exporting foods to Japan –Rum and Spirits, Japan External Trade Organisation, Tokyo, Japan, p.23

Trading companies

Trading companies source products for distributors and ingredients for manufacturers such as spirits for umeshu manufacture and bulk wine for blending with domestic product (Japanese trade interviews, 2005; JETRO, 1998, p.3). An Australian-based sake manufacturer established its Japanese market base through trading companies for some years before supplying retail chains directly (Brammal, 2003, pers. comm.).

Wholesalers

Importers and most liquor manufacturers supply primary and secondary liquor wholesalers, usually general or specialist agencies or chartered agencies who use large sales networks to service retailers, and handle all transportation, payments and compliance with liquor licensing laws (USDA 2003a, p.18; JETRO, 2003 pp.22-23).

Australian suppliers could consider the 'omiyage takuhai' (home delivery) system used by Japanese to order wine when travelling overseas for a Japanese based distributor to deliver on their return (Japanese trade interviews, 2005).

Retailers

Umeshu and umeshu mixes are widely retailed, outlets including liquor, department, convenience and discount stores, supermarkets and airport duty free stores. Some liquor stores have begun to specialise in umeshu with wide ranges of brands and products ('Lucrative industry', 2003, *Shuhan News*, 1 May, trans. Y. Mizuta). Umeshu is also sold and promoted through manufacturer retail outlets in mume producing regions and through Wakayama Prefecture's promotional store in Tokyo (Japanese retail audit, 2005).

The previous licensing system matched liquor manufacturers to liquor retailers, promoting enduring trade relationships (Trewin, 2003, p26). By 2003 supermarkets, convenience stores, discount stores, drug stores, service stations, video rental stores, home delivery services, pizza delivery chains and many other retailers were selling liquor, with small bottles and cans distributed mostly through liquor stores, general merchandisers and convenience stores (JETRO, 2003).

Food service

Restaurants serve umeshu as an aperitif, and increasingly after the meal. In 2005 Tokyo restaurant Sannen Buta Zou specialised in umeshu, offering 55 products including a house umeshu. The Izakaya (Japanese Pub) restaurant chain, which produced a private brand of umeshu, was suggested as a potential outlet for Australian product (Japanese trade interviews, 2005).

4.4.5 Pricing

In 2005 prices for standard umeshu without fruit were around A\$6 a litre for paper cartons, A\$14–17 a litre for 750 ml bottles; and A\$18–30 for 360 ml bottles. Umeshu with fruit was around A\$29 a litre (Table 6.10). For an Osaka retailer, the best selling umeshu was around A\$17.90 for 720ml (A\$25 a litre) ('Lucrative industry', 2003, *Shuhan News*, 1 May, trans. Y. Mizuta). Umeshu prices have been supported by strong and growing demand, and providing Japanese retailers and restaurants with more attractive margins than other traditional liquors (Japanese trade interviews, 2005).

In comparison, the most popular of the new low-priced grape wines retailed at around JP¥500 (A\$6) for a 750 ml bottle. Consumers pay substantial premiums for wine if for a gift rather than personal use, with gift-packs retailing at JP¥3000–4000 a bottle (A\$37–48).

Japanese liquor manufacturers have generally posted prices (set prices which are not negotiable except for occasional regional discounts), leaving wholesalers to manage variable delivery costs and

fluctuating demand from retailers, and could ask wholesalers to discount goods under special retail offers (Trewin, 2003). However, major retailers have begun to discount name brands of liquors to compete with discount liquor stores.

It was assumed an Australia industry would have lower production costs than Japan if using local fruit, alcohol and sugar, although sea freight costs would reduce this advantage in the Japanese market (Japanese trade interviews, 2005).

4.4.6 Promotion

Promotions, including store tastings, restaurant promotions, events, displays, advertising on manufacturer and distributor websites, and positive media articles have attracted new consumers and increased individual consumption as a wine type drink as well as the traditional aperitif ('Lucrative industry', 2003, *Shuhan News*, 1 May, trans. Y. Mizuta).

Japanese manufacturers have reinforced umeshu's healthy image by promoting its potassium and calcium content and traditional medicinal uses.

4.4.7 Market access and barriers to entry

Umeshu imports would not incur customs duty, being subject to the lowest applicable tariff for liqueurs which is a temporary tariff of 'duty free'.

Under a 2006 revision of liquor tax laws, umeshu is taxed according to base and alcohol content:

- For umeshu based on shochu, tax is JP¥200 per litre up to 20% alcohol, with an additional JP¥10 for every 1% over 20%.
- For umeshu based on white liquor (pure liquor), tax is JP¥120 per litre up to 12%, and additional JP¥10 for each additional 1% over 12%.

Like foods, liquor imports require notification submitted to Japanese Quarantine describing the product with a production process chart, ingredient composition sheet, and other information legally required for processed foods (JETRO, 2003).

An Australian manufactured product will not be subject to Australian excise if exported (Sullivan, 2006).

4.4.8 Market positioning

The findings indicate a number of positioning strategies available to an Australian umeshu:

- as a high quality product from preferred cultivars such as Nankou and Bungo in quality conscious markets seeking quality, given that the Australian climate and growing conditions are expected to deliver similar fruit quality to that produced in Japan
- as an Australian branded product with 'Australian Umeshu' on the front label to signify Australia's reputation for quality and food safety to health conscious markets
- as a certified organic product
- as an Australian souvenir, purchased in Japan before holiday in Australia
- as a new differentiated Australian product requiring a new category, a strategy which has succeeded for an Australian sake-based cocktail (Brammal, 2003).

4.5 Other products

A potential new Australian industry was advised to spread its risk across several products and also byproducts such as fertiliser and stockfeed. Distributors warned that most products would struggle to compete against low-priced China product which has replaced other Australian products such as peach juice (Japanese trade interviews, 2005).

Fig. 4.12. A sample of the wide range of mume products sold in Japan



(a) Ume snacks, sweets and desserts



(b) Ume wine



(c) Dried salted mume snacks



(d) Ume-flavoured potato crisps



(e) Ume liqueur



(f) Ume jam

Despite declining umeboshi consumption, mume remains a popular fruit in Japan, particularly with pregnant women, and widely accepted as a health food regardless of the taste. Demand for mume products has boomed due to new products (Fig. 4.8) and promotion of mume's health benefits. A number of minor products were evident in Japan in 2006.

Other mume pickles

Other minor mume pickles include umezuke (fresh mume preserved in brine) and seasoned umezuke (a similar process to seasoned umeboshi) (Nguyen, 2000 p.3, p.6; JETRO 2000a).

Umezuke is made from the smaller firmer fruit with thick skin produced in cool regions. Fruit is used at a greener stage than for umeboshi, soaked in brine for 10–30 days, and colouring with perilla or artificial colourants (*Ume growers and processing*, 2003).

Dried mume

This otsumami ('nibbles') market for whole dried sweetened mume is small but growing. In 2005 it was roughly estimated at around 24 000 tonnes, value A\$180 million, given that a dried fruit manufacturer with approximately 10 per cent market share handles around 2400 tons of dried mume a year to achieve A\$18 million sales.

Japan's main mume snack is Karikori Ume, a crunchy semi-dried, low-salt and sweetened whole fruit. A sample contained 'plum', salt, brewery vinegar, monosodium glutamate, alcohol and citric acid according to its label. 'Crunchy Karikori Ume' was priced at JP¥2310 (A\$28) for a 900 g giftbox in a manufacturer's outlet in Kishu (Senrian brochure).

Dried salted and sweetened mume products are mainly supplied from Okinawa, China and Taiwan. Overseas production has recently shifted from Taiwan to Southern China (Kantong region) where mume production is increasing. There are no apparent supply shortages – a Taiwanese supplier could readily increase supply to meet increased Japanese demand.

The standard dried mume is the highly dried and salted Chinese salty plum consumed in Australia. Imports are from China and Taiwan, mainly for Chinese expatriates. A product sample had been sweetened with brown sugar, another had been dipped in Chinese sake, and none contained artificial colouring. Salty plums are often retailed singly at JP¥20-30 (A\$0.23-\$0.36) a piece, the typical sale being 10 pieces for JP¥300 (A\$3.60). Japanese consumers traditionally have not eaten dried mume except in Okinawa where a manufacturer has been supplying Japanese shops. The main market is assumed to be ethnic Chinese living in Japan, using it as a confectionery or 'sucking candy'.

A newer product, Kanro, has been developed in Japan for the Japanese market and is supplied from Taiwan and China. Kanro is a dried mume fruit with lighter sweeter taste and less salt (10-18 per cent) than salty plum. The label on a Chinese sample listed 84 per cent mume, 12 per cent salt, 1 per cent citric acid, 2 per cent sugar, 0.4 per cent sweetener (aspartame) and 0.004 per cent vanilla extract. The most popular form has smaller sized fruit with the seed. A more expensive product had larger fruit and no seed – a sample was labelled as 'dried ume without seeds', with a recommendation for eating when 'driving, travelling and following sport'.

Samples had been sweetened with aspartame which meets Japanese food standards. Like in Australia, Japanese Customs have been seizing products through store and import recalls due to additives approved for use in China but not legal in Japan. These included saccharine, considered carcinogenic, and sulphur dioxide added to some dried fruits during processing. Maximum residue limits vary by product.

There are many steps to producing these products – one label detailed a process of picking, grading for size, applying salt, drying, de-stoning, desalting, drying, sizing, adding of flavours, packaging, use of metal detector, storage and transport. The samples were in small snackpacks, for example 31 g, as the consumer does not eat the fruit continuously but sucks one or two for some time.

Distributors focussing on Japanese consumers have identified an early market segment of female high school students using the dried fruits as a breath freshener, and for the seedless product young women who dislike spitting out a seed. Because of the strong demand and ready sales they have been seeking more supply. It was assumed the market would accept higher prices for product with good flavour. While health food stores were seeking high quality products such as these, manufacturers were having difficulty gauging their requirements. Distributors were using media to raise awareness of dried mume's health benefits in potential Japanese consumers.

Whole dried fruits are popular, reasons including lack of fresh fruit, the long shelf life and concentrated nutrition of dried fruits, and perceived health benefits from consuming the fruits for example blueberries for eyesight, dry eyes and eyestrain; cherries for joints, and mume for the blood. Also Japanese consumers influenced by the world trend of concern with obesity (and its associated insurance premiums) have been switching from foods such as candy and chocolate confectionary and consuming increasing quantities of dried mume and other healthier lower calorie foods. Markets for 'sticky' products such as fruit bars have not been established in Japan.

Dried mume is often sold at regional sightseeing spots across Japan where older consumers, including tourists, are prepared to buy imported product because of the low prices. As Japanese custom requires buying a large number of souvenirs for friends and neighbours whenever travelling, souvenirs need to be reasonably priced and good value, so these inexpensive souvenirs are popular. Souvenir foods are often imported, even when sold in famous production regions.

The Taiwan farmgate price for dried mume for snacks has been around JP¥50-60 (A\$0.60-0.72) a kilogram. Dried mume was being landed from China at A\$12 a kilogram for first grade and A\$9 for lower grade. One importer paid around JP¥600 (A\$7.20) a kilogram CIF landed in Osaka, which he onsold at wholesale prices of ¥1 200-1 500 (A\$14-18) a kilogram. Imports from Australian and other World Trade Organisation members would incur a 12 per cent tariff (Appendix E).

In 2005 dried mume snacks were being imported by trading companies and distributed by wholesalers or repackers specialising in dried fruits. A specialist wholesaler offered a large range of dried fruits from around the world, sourced through Japanese trading companies. Another wholesaler sold dried mume to repackers, mostly to supply retailers of umeboshi. A third imported 20–30 tonnes a year of dried salted and sweetened mume in 10 kilogram bulk packs from Taiwan for a repacker who produces snackpacks for convenience stores.

Savoury mume snackfoods

Mume is used to flavour snackfoods such as shrimp crackers and potato crisps sold through outlets such as convenience stores. An Osaka manufacturer produces O'zack (seasoned potato crisp) in a 75 g pack with a potato and sweet potato base flavoured with Kishu mume salt seasoning (the brine byproduct from umeboshi). A Kishu factory produced Ume Senbei (ume rice cracker) in a 180 g pack using starch flavoured with prawn, squid and ume extract (Japanese retail audit, 2005). Mume has also been used in Calbee Foods' Potato Chips Ume-wasabi and Kappa Ebisen Umezukushi extruded snacks (FoodInfoNet, 2004). Demand for these products has been increasing, particularly from women.

Sweet ume

Mume is used in a number of desserts and confectionery.

Ume jelly is a popular summer dessert, usually made from high grade Nankou fruit soaked in syrup and set in jelly. It is not a common product, and usually retailed through expensive supermarkets and some department stores. Ume jelly was advertised for ¥1365 (A\$16.60) for six portions in a manufacturer's brochure (Japanese retail audit, 2005). Another popular dessert is umeshu jelly, made from umeshu, gelatin, lemon juice and water (Hakutusuru Plum Wine, 2004).

Ume Hitotsubu is a small cake made from mume and starch. A sample manufactured in Wakayama Prefecture was made entirely from imported Chinese ingredients, and sweetened with stevia (Japanese retail audit, 2005).

Sweet ume, made by soaking mume fruit in honey and sugar was advertised at ¥1680 (A\$20) for 450 g in a manufacturer's brochure which recommended it in cocktails and cakes (Senrian brochure). Ume jam is made either from fresh fruit or from the fruit remaining after manufacturer of umeshu and mume juice. A 200 g plastic sauce bottle of jam, recommended for use with bread, yoghurt and cake, was advertised at ¥525 (A\$6.40) (Senrian brochure).

Ume candy, described as 'candy with sugar' was priced at ¥315 (A\$3.85) for 25 pieces (Senrian brochure). A product sample was a hard boiled sweet with specks of mume dispersed throughout. Japanese Plum toffee, sold in Asian stores in Australia, is similar to the Chinese form, with a cut-down fruit and seed encased in toffee.

A specialist manufacturer and retailer who supplied the high end of the market with a wide range of premium brand mume sweets used only Kishu branded fruit, and was unlikely to use imported fruit.

Ume juice

Ume juice is a popular and refreshing product sold in cans and bottles under several brands. A process described in a JA Co-operative consumer brochure recommending layering frozen mume with sugar to extract the juice and produce a cordial to mix with cold water or soda (Appendix C). The label on a 190g can of mume juice listed the ingredients as 10 per cent fruit juice, fructose, glucose, acidifier and fragrance, and recommended shaking slightly before drinking to mix precipitated matter (Japan Sangaria Beverage Co. sample). A bottle of Honey and Ume Juice, labelled as having no artificial sweeteners, and 'even children can drink', retailed at ¥1050 (A\$12.80) for 720 ml (Senrian brochure).

Ume wine

Several liquor manufacturers produce a fermented ume wine, similar in appearance to white wine with a distinctive mume flavour. Product labels revealed: a fresh, sour and sweet flavour suited to Japanese, Western and Chinese food, seven per cent alcohol, no preservatives or acidifiers, and a recommendation to store the unopened wine at 5–7°C (Choya ume wine); ‘sweetened fruit wine’, from 100 per cent Kishu *Nankome*, with no artificial flavouring or colouring (Osaka and Kishu samples), and 10 per cent alcohol, and preservatives (Kishu Monogatari ume wine).

Choya Ume wine in a Tokyo department store was priced at ¥550 (A\$6.60) for a 360 ml bottle and Kishu Monogatari Plum Wine in a discount store was ¥750 (\$9.00) for 720 ml. The price ceiling for fruit wines is around ¥1800 (\$21.50) a 750ml bottle, with the Japanese wine market driven by quality and affordability, expecting top quality but only at a certain price. Ume wine westernises a manufacturer’s product range, wine being a western drink in Japan which has no real tradition of fruit wines, and is retailed beside umeshu (Tejima, 2004, pers. comm.).

Ume sour

A large trading company imports around 70 tonnes of mume juice concentrate a year from Taiwan to a specification of 65 per cent Brix at around A\$7.70 a kilogram. The company pioneered mume juice in Taiwan and has imported from there for 10 – 15 years. It also buys out of grade Wakayama fruit at ¥100 (A\$1.20) a kilogram for juice production. While China has few suppliers of concentrate, this company had recently imported some lower priced Chinese product. The juice is wholesaled to the Izakaya hotel chain to make Ume Sour, an alcoholic aerated drink of mume juice mixed with shochu.

Ume seasonings

A wide range of mume products is used to flavour cooking and salads (see Table 2.1 and Appendix B).

Katsuoume is made from umeboshi and bonito, and used as a sprinkle.

Ume paste, from umeboshi and usually perilla leaf (often from factory seconds of umeboshi), is increasingly popular in dips, sauces, sushi and other dishes.

Ume sauce is widely used in cooking and with fresh vegetables and salads. A sample, labelled Ume Bishio in Japanese and ‘Ume Cooking – Japanese Apricot’ in English, was made from mume, sugar and salt, and recommended with sandwiches, spaghetti and fish sausages, with a 130 g plastic tub retailing at ¥300 (A\$3.60) in a Tokyo store. A plastic squeeze bottle of ‘Neri Ume’ consisted mainly of Kishu ume, salt, fish source, kelp and stevia, at ¥300 (A\$3.60) for 180 g in a Wakayama factory outlet, the label recommending it with sushi, rice ball and chicken.

A bottle of ume mayonnaise retailed at ¥600 (A\$6) for 200 g.

The term ‘ume vinegar’ is used for both vinegar-based products and the flavoured brine from shiroboshi production. A recipe for ume vinegar from green mume, combu (thick dry kelp), and rice vinegar was recommended for cooking. The label on another product at JP¥525 for 720 ml claimed it would remove the odour of fish being cooked (manufacturers’ brochures; JA Co-operative brochure; Japanese retail audit).

Ume tea

Tea flavoured with mume is widely sold in Japan. Ume and Kelp tea (advertised in a manufacturer’s brochure at JP¥525 (A\$6.40) for 100g; was promoted for use in cooking.

Medicinal products

Mume is used a wide range of health products including tablets, drinks, extracts and concentrates.

Ume concentrate is made by boiling down hard green fruit – 1 kilogram of fruit gives 20 grams of concentrate – to drink with water and honey or sugar (JA Co-operative brochure; *Natural Food – Baineku Ekisu*, undated). Mume extract is produced by expressing the juice and boiling it down for two days, a 65 g jar of ‘plum extract’ being priced at JP¥1 575 (A\$19.20) in a manufacturer’s brochure. Recent research trials have suggested that mume extract may thin the blood and act against cancer (Japanese trade interviews, 2005).

Byproducts of manufacture

Green fruit removed from umeshu is bagged and retailed mainly to flavour soda drinks, while Chinese consumers add it to rice sake. Some residual fruit is fed to cattle at an Osaka property for ‘Ume beef’ – this is marketed regionally under strict branding and quality control, to assure consumers concerned about mad cow disease and some incidents of meat being mislabelled (‘Cows fed “ume” called plum of beef’, 2002).

It is unlikely an Australian industry could be built on any of these minor products given the ample supply and competitive prices from China and Taiwan.

5. Market attractiveness and competitiveness for key products

5.1 Methods

In order to identify the most likely market for a new mume industry, critical market factors identified in the market research were used to determine the most attractive markets for an Australian industry in those markets with the key products (salty plum, umeboshi and umeshu in the Australian market and umeboshi and umeshu in the Japanese market). Factors from the SWOT analysis (details in Appendix F) were used to gauge the likely business competitive strengths of an Australian industry.

These critical factors were compiled under these headings for the Australian market (Table 5.1) and the Japanese market (Table 5.2), and scored from 1 to 5. For market attractiveness, a score of 5 represents the greatest market opportunity, and for competitive position, a score of 5 represents a strong competitive advantage. The scores were weighted using scales developed from industry opinion and compared using a Market Attractiveness:Competitive position matrix (Fig. 5.1) which is based on the strategic business-planning grid developed by General Electric (Kotler and Armstrong, 1996). In Figure 5.1 the circle size is proportional to the annual sales.

5.2 Results and discussion

Salty plum, umeboshi and umeshu were considered on the attractiveness of their current Australian markets and prospects for expanding the market, acquiring a share of the existing market, or both. On the Australian domestic market umeshu ranked higher than umeboshi and salty plum for both market attractiveness and business competitiveness (Table 5.1).

Table 5.1: Australian domestic market attractiveness and likely competitiveness factors for salty plum, umeboshi and umeshu

SIGNIFICANT FACTORS	Salty plum – Australia			Umeboshi - Australia			Umeshu - Australia		
	Score	Weighting	Result	Score	Weighting	Result	Score	Weighting	Result
MARKET ATTRACTIVENESS									
Macro market factors									
Market size	1	5	5	1	5	5	1	5	5
Market growth rate positive?	1	5	5	1	5	5	2	5	10
Trade factors									
Access to distribution channels	2	5	10	2	5	10	3	5	15
Attractive pricing and margins / profitability with Australian product	1	10	10	3	10	30	3	10	30
Not satisfied with current supply / incentive to change	1	10	10	1	10	10	1	10	10
Competition (different import countries / importers / wholesalers)	1	10	10	2	10	20	3	10	30
Consumer factors									
Low loyalty to existing brands/ country of origin (risk Australian product rejected)	2	10	20	2	10	20	2	10	20
Quality opportunities (appearance, size, flavour, consistency, safety, variety, etc.)	4	5	20	2	5	10	3	5	15
Existence of consumer segments	4	5	20	3	5	15	4	5	20
Ethnicity not important	2	10	20	1	10	10	3	10	30
'Cross-over' trend	2	5	10	1	5	5	3	5	15

SIGNIFICANT FACTORS	Salty plum – Australia			Umeboshi - Australia			Umeshu - Australia		
	Score	Weighting	Result	Score	Weighting	Result	Score	Weighting	Result
Opportunities to package, label, brand	5	5	25	3	5	15	2	5	10
TOTAL			165			155			210
BUSINESS COMPETITIVENESS									
Cost & price competitive	1	5	5	3	5	15	4	5	20
Processing plants, technical skills in place	2	5	10	1	5	5	4	5	20
Can supply required quality, volume and consistency	4	5	20	4	5	20	4	5	15
TOTAL			35			40			55
<i>Total weightings</i>		100			100			100	

Umeboshi and umeshu were considered on the attractiveness of the current Japanese markets and prospects for expanding those market, acquiring a share of the existing markets, or both. Salty plum was not included in this analysis because it is not a significant product in the Japanese market. Using this analysis umeshu ranked higher than umeboshi for market attractiveness and business competitiveness (Table 5.2).

Developing traditional Japanese products (such as umeshu or umeboshi) for export from Australia to Japan is not a simple task but has occurred for crops such as ginger, wasabi, Udon noodles and sake (see details in Appendix G). The lessons learnt in these industries can be usefully applied to mume.

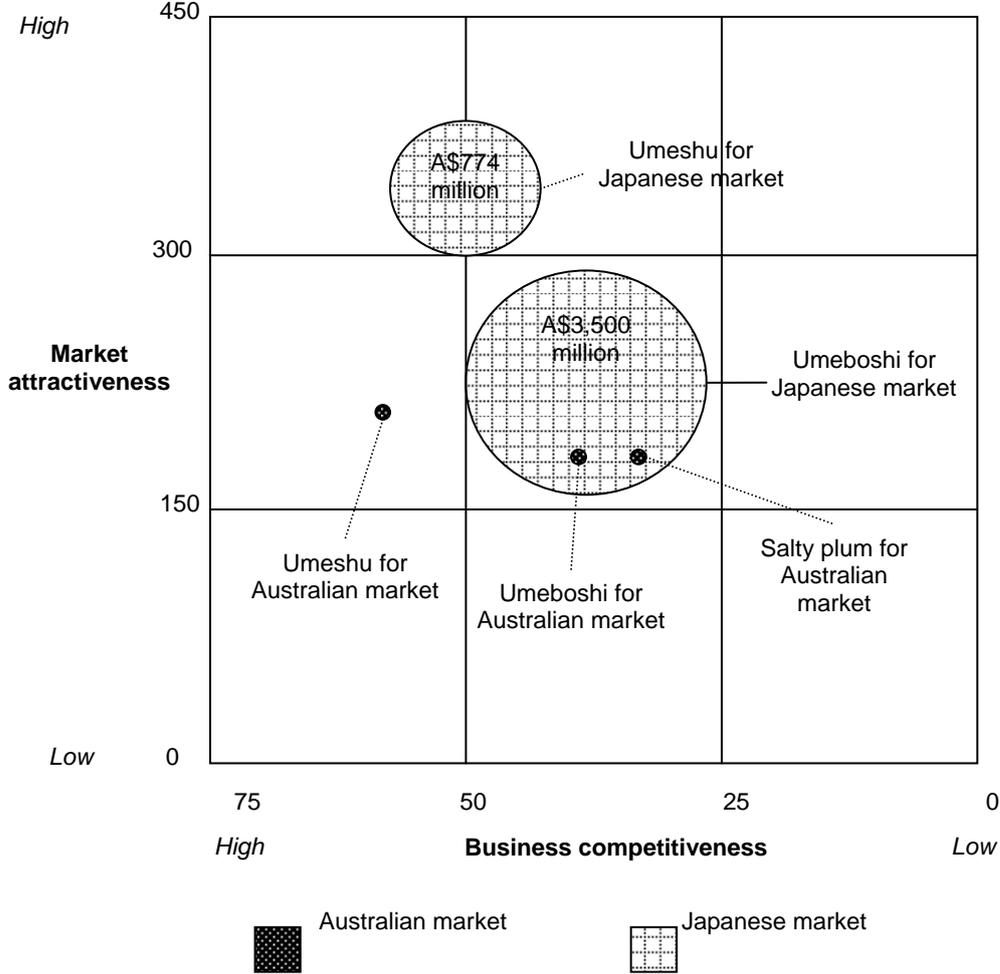
Table 5.2: Japanese export market attractiveness and likely competitiveness factors for umeboshi and umeshu

SIGNIFICANT FACTORS	Umeboshi – Japan			Umeshu – Japan		
	Score	Weighting	Result	Score	Weighting	Result
MARKET ATTRACTIVENESS						
Macro market factors						
Market size	5	5	25	5	5	25
Market growth rate positive?	1	5	5	5	5	25
Trade factors						
Access to distribution channels	2	5	10	4	5	20
Attractive pricing and margins / profitability with Australian product	4	10	40	3	10	30
Not satisfied with current supply / incentive to change	3	10	30	4	10	40
Competition (different import countries / importers / wholesalers)	2	10	20	3	10	30
Consumer factors						
Low loyalty to existing brands/ country of origin (risk Australian product rejected)	2	10	20	4	10	40
Quality opportunities (appearance, size, flavour, consistency, safety, variety, etc.)	5	5	25	5	5	25
Existence of consumer segments	4	5	20	5	5	25
Ethnicity not important	2	10	20	4	10	40
‘Cross-over’ trend	1	5	5	4	5	20
Opportunities to package, label, brand	3	5	15	3	5	15
TOTAL			23			33
AUSTRALIAN COMPETITIVENESS						
Cost & price competitive	2	5	10	3	5	15
Processing plants, technical skills in place	2	5	10	4	5	20
Can supply required quality, volume and consistency	3	5	15	4	5	20
TOTAL			35			50
<i>Total weightings</i>		100			100	

The matrix (Fig. 5.1) depicts the health of the markets investigated for each key product and whether Australian producers would have the strength to develop a competitive position in those markets.

For the domestic market the matrix indicates that markets for all three products are minor and of average attractiveness, and that only umeshu is likely to have sufficient competitive strength to establish a small market share.

Fig 5.1: Market attractiveness:competitive position matrix for salty plum, umeboshi and umeshu



For the Japanese market it indicates a particularly attractive market for umeshu, with very large volumes and prospective growth, and suggests that an Australian industry would have reasonable competitive strength as the market grows. It also indicates a very large but stable Japanese umeboshi market where an Australian industry would lack the strength to take any significant market share. These results indicate that the industry should invest in developing an umeshu industry using the Australian market as a platform to enter the Japanese market.

6. Mume cultivar evaluation in a temperate region - Applethorpe Research Station

The mume agronomic evaluations were conducted by a series of replicated and observational trials planted at DPI&F research stations and at grower properties. This section describes the statistical and observational trials conducted at Applethorpe Research Station (ARS) which is located in a temperate fruit growing region where high-chill crops such as apple, pear and cherry are grown.

6.1 Methods

6.1.1 ARS Replicated trial

A mume cultivar trial was planted in May 2004 at Applethorpe Research Station which is located near Stanthorpe, Queensland at 28.62° S latitude and 151.95° E longitude and at an elevation of 872m above sea level. The trial trees were propagated by budding onto Daching seedling rootstock and consisted of the cultivars Bungo, Daching, Ellching, Ianjy and Nankou. Trial design was a randomised complete block with single tree plots and 10 replications. Planting distances were 4m between rows and 2m between trees within the row. Standard irrigation, spray and fertilising practices for stonefruit were applied. Trees were trained to a vase shape.

Data was analysed using the residual maximum likelihood function of Genstat with rows, replicates within rows and trees within replicates considered as blocking factors. Where this model resulted in negative estimates of variance components the appropriate terms were dropped from the blocking model and data reanalysed with the simpler model. The model including rows and trees within rows was used in the analysis of the variables harvest date and girths. For all other variables the final model considered variation between trees as the only random factor.

6.1.2 ARS Observational trial

The original quarantine trees were planted under hail netting at ARS in 1999. There was one tree of each of the 5 cultivars Bungo, Daching, Ellching, Ianjy and Nankou and they were propagated on Buck plum rootstock. Trees were planted in the ARS germplasm block at spacings of 4m between rows and 3m between trees within the row. Trees were pruned, thinned, irrigated, fertilised and sprayed as per standard stonefruit recommendations. Observations on flowering and fruiting characteristics of these trees were recorded from 1999 to 2005.

6.2 Results and discussion

6.2.1 ARS Replicated trial

The trees planted in the ARS trial differed in size, as measured by 2005 girth in the first winter after planting (Table 6.1). The two temperate zone derived cultivars, Bungo and Nankou were significantly smaller than the three sub-tropical zone derived cultivars, Daching, Ellching and Ianjy when measured in 2005 and 2006. Growth rate from 2005 to 2006 was similar for all cultivars except Bungo which grew at a significantly faster rate.

Table 6.1. Trunk girths of five mume cultivars planted in 2004 at Applethorpe Research Station

Cultivar	2005 girth (mm)	2006 girth (mm)	% girth increase 2005-2006
Bungo	91 d	194 b	116 a
Daching	122 bc	219 a	82 b
Ellching	131 ab	236 a	81 b
Ianjy	140 a	244 a	75 b
Nankou	108 c	191 b	78 b

Numbers in columns followed by the same letter are not significantly different at the $P \leq 0.05$ level.

The first small crop was harvested from this trial in December 2005 (Table 6.2). All cultivars except Daching produced fruit as second leaf trees. In this respect the mumes appear similar to other stonefruit crops such as peach, plum and apricot which also produce light crops as second leaf trees.

Bungo and Ianjy were more precocious as judged by number of bearing trees but it would be unwise to make too many comparisons on the cropping of these second leaf trees. The real test of cultivar yielding potential at this trial site will be obtained during the third to fifth leaf trees occurring in 2006 to 2008.

Table 6.2. First fruit harvest data from second leaf mume cultivars in 2005

Cultivar	No of fruit bearing trees (maximum of 10)	Harvest date	Average fruit weight (g)	Yield per tree (kg)	Yield per butt CSA (g/sqmm)
Bungo	8	6 Dec	35 a	3.2 a	0.59 a
Ellching	2	15 Dec	25 b	1.0 ab	0.08 ab
Ianjy	6	13 Dec	18 c	1.6 ab	0.11 b
Nankou	3	9 Dec	23 b	0.5 b	0.06 b

Numbers in columns followed by the same letter are not significantly different at the $P \leq 0.05$ level

The replicated field trial is now 2-years old and has not yet produced crops on mature trees. Further observations on these trees is required from 2006-2009 in order to make firm varietal recommendations.

6.2.2 ARS Observational trial

Ellching consistently flowered earliest of all the cultivars with a full bloom date averaging 12 July (Table 6.3). At this time of year frosts are common on the Granite Belt and this may partly explain the low yield (yield rating 2) of Ellching. The low yield of Ellching may also be related to a dearth of bee activity to facilitate pollination at this time of year. Bee hives are not introduced onto the ARS research station until late July or August. All other cultivars produced moderate (rating 5) to heavy (rating 9) yields.

The late July to early August full flower dates for these cultivars mean that they would be exposed to freezing temperatures during bloom at ARS and at many other temperate fruit growing regions. This would normally be expected to severely reduce yield. The fact that moderate to heavy yields were observed on these trees may be related to protection provided by the hail netting. The randomised trial at ARS is planted without netting protection and so it will be of interest to observe the yield of these trees when they mature. The early flowering time of these mume cultivars must be considered as a commercial risk if planting in a frost prone location.

We expected that the Japanese cultivars Bungo and Nankou would have a higher chilling requirement than the Taiwan cultivars Daching, Ellching and Ianjy and would therefore flower later. This was true for Bungo but not for Nankou. The earlier than expected flowering of Nankou may be related to the unthrifty growth of this single observed tree. Further information on flowering time of Nankou will be

obtained from the replicated trial in future years. Bungo, while flowering the latest of all five mume cultivars, is still an early flowering cultivar when compared to other high-chill peach or apricot cultivars at ARS.

Table 6.3. Mean yields, flowering and harvest dates of five mume cultivars at ARS from 1999-2005

Cultivar	Years of data	First flower date	Full flower date	Harvest date	Yield (1, low to 9, high scale)
Bungo	3	31 Jul	9 Aug	10 Dec	6
Daching	3	19 Jul	6 Aug	28 Dec	9
Ellching	1	2 Jul	12 Jul	21 Dec	2
Ianjy	2	10 Jul	25 Jul	28 Dec	9
Nankou	2	13 Jul	25 Jul	12 Dec	6

The temperate zone cultivars Nankou and Bungo, which are the ones expected to be best adapted to ARS climatic conditions, ripened in mid December prior to the subtropical cultivars (Table 6.3). The single Nankou tree used for these observational trials did not grow as vigorously as the other four cultivars (observation only). We consider this to be an artefact due to a poor bud union of Nankou on the Buck plum rootstock; the Nankou trees propagated on mume rootstock in the replicated trial grew well compared to the other temperate cultivar Bungo (Table 6.1).

All cultivars produced clingstone fruit with a yellow-green skin colour and yellow-green flesh but the amount of red blush on the skin varied between cultivars (Table 6.4). Fruit from all cultivars was highly acidic to taste, low in juice and had some bitterness in the skin. Bungo produced the largest fruit and Daching produced the smallest. The fruit size of Ellching (Table 6.4) can not be considered representative of this cultivar because of the very light crop. With a regular crop load Ellching is expected to be similar in size to Daching.

Table 6.4. Fruit characteristics of the 5 mume cultivars evaluated at ARS from 1999-2005

Cultivar	Bungo	Daching	Ellching	Ianjy	Nankou
Mean Weight (g)	45	16	27	20	26
Minimum diameter (mm)	41	-	-	30	30
Maximum diameter (mm)	49	-	-	35	40
TSS (%)	12	8	10	11	10
Amount of red blush (%)	10	0	0	30	30
Shape	Oblong	Ovate	Ovate	Round	oblong

The characteristics of the five mume cultivars based on the original observation trees differed significantly (Fig. 6.1) but the fact that these observations are based on single trees for each cultivar preclude certainty in making cultivar recommendations.

Figure 6.1. Summary descriptions and photographs of the five mume cultivars under trial at Applethorpe Research Station

<p>Bungo Originated in Japan, may have been crossed with apricot, adapted to temperate locations. Fruit ripened in December at Applethorpe, Queensland. Trial fruit was medium to large (45mm diameter) with yellow skin, oblong shape, yellow flesh, acid, and sugar content of 11%. Trial tree sets moderate crop.</p>	
<p>Dahching Originated in Taiwan and adapted to the sub-tropics. Fruit ripened in October at Nambour, and December at Applethorpe. Trial fruit was small size with green-yellow skin, ovate shape, slight pubescence, orange flesh, clingstone, very acid, and sugar content of 11%. Trial tree is vigorous, spreading, and sets heavy crops which will require fruit thinning to increase fruit size.</p>	
<p>Ellching Originated in Taiwan and adapted to the sub-tropics. Fruit ripened in October at Nambour, and December at Applethorpe. Trial fruit was small size (30mm diameter), green-yellow skin, ovate shape, slight pubescence, orange flesh, clingstone, very acid, sugar content of 10%. Trial tree is vigorous and sets heavy crops.</p>	
<p>Ianjy Sourced from Taiwan but origin uncertain. Fruit ripen in similar period to Ellching. Trial fruit was small size, green-yellow skin with slight red blush, round shape, slight pubescence, yellow flesh, clingstone, very acid. Trial tree is vigorous with spreading habit.</p>	
<p>Nankou Originated in Japan, adapted to temperate regions. Fruit ripened in early December at Applethorpe, Queensland. Trial fruit was medium size, skin was light green and may develop some red blush with pubescence (fuzz). Tree is of medium vigour and spreading. Considered a high quality cultivar in Japan.</p>	

The temperate-zone Japanese cultivars Nankou and Bungo produced moderate crops of fruit on the initial observation trees at Applethorpe Research Station despite flowering at a time when frosts commonly occurred. Nankou is considered as the premium cultivar for quality in Japan and will be readily accepted for commercial manufacturing.

7. Mume cultivar evaluations at Maroochy Research Station and at grower properties

The mume agronomic evaluations were conducted by a series of replicated and observational trials planted at DPI&F research stations and at grower properties. This section describes the statistical and observational trials conducted at the sub-tropical location of Maroochy Research Station and the observational trials established at grower properties.

7.1 Methods

7.1.1 MRS Replicated Trial

A replicated mume cultivar and rootstock trial was planted in February 2005 at Maroochy Research Station which is located at Nambour, Queensland at 26.64° S latitude and 152.94° E longitude and at an elevation of 33m above sea level. The trial trees were propagated by budding onto seedling mume and peach rootstocks Okinawa and Flordaguard. The scion cultivars were Daching, Ellching and Ianjy. Trial design was a randomised complete block with single tree plots and 6 replications. Planting distances were 4m between rows and 3 m between trees within the row. Standard irrigation, spray and fertilising practices for stonefruit were applied. Trees were trained to a vase shape.

Data were analysed using the residual maximum likelihood function in Genstat and pairwise comparisons of the treatment combinations were made using the protected least significant difference procedure at $P \leq 0.05$. The data was initially analysed including blocks as a random effect but, in all analyses, variance component estimates for blocks were negative so the blocking term was dropped from the model used for the analysis.

7.1.2 MRS Observational Trial

The mume variety observational trial consisted of single trees of the cultivars Daching, Ellching, Nankou and Bungo on buck plum rootstock planted at MRS in 1999. Trees were planted at 2m spacings along the row. Trees were irrigated, sprayed and fertilised using standard stonefruit schedules.

7.1.3 Pollination Experiments

Pollen was collected from the 5 cultivars and its viability was tested by in vitro germination on petri dishes containing 1% agar and 15% sucrose. Pollen tube growth was scored after 4 hours at 25 C using 6 replicates of 100 pollen grain fields (Galleta, 1983).

Field pollination tests were conducted on Ellching and Daching trees at MRS in 2004. Fruit set per metre of branch length was measured on branches that had been open pollinated (no cover on the branch), self pollinated (branch covered with insect-proof mesh and pollen of the candidate variety applied twice weekly), or cross pollinated (branch covered with mesh and Ellching pollen applied to Daching flowers or vice versa). Treatments were randomly allocated to three branches on a single tree of each cultivar.

7.1.4 Grower Trials

During the project budwood and grafted trees was sent to evaluators in Queensland, NSW and Victoria. Two of these plantings were of commercial tree numbers (over 100 trees) and represent the first commercial plantings of mume cultivars in Australia.

7.2 Results and discussion

7.2.1 MRS Replicated Trial

At time of writing this report the trees in this trial had completed one growing season. All the trees on mume stock were growing well but many of the trees on peach rootstock had died due to incompatibility. The first small crop of fruit is expected during summer 2006.

Peach rootstock was trialled against mume rootstock because of the relative ease of obtaining virus-tested peach seedling rootstock in Australia compared to the difficulty for nurseries to obtain any mume rootstock. We anticipated that there may be an agronomic advantage in using peach rootstock because of smaller tree size and increased precocity of peach over mume stock. In this trial both Okinawa and Flordaguard peach seedling rootstocks were planted. Ellching on Flordaguard stock was planted instead of Ellching on Okinawa due to poor nursery bud-take of Ellching on Okinawa and a consequent lack of trees on this combination for field planting.

Mume rootstock for the scion cultivars Ellching and Daching was significantly superior to peach rootstock in terms of tree survival but for the Ianjy scion cultivar the lower tree survival on peach was not significant (Table 7.1). The incompatible scion-rootstock combination that lead to the death of many of the peach rootstock trees indicates that peach rootstock should not be used in commercial mume plantations.

Table 7.1. Growth and fruit set means for three mume scion cultivars on mume and peach seedling rootstocks after one season of field growth

Scion-rootstock combination	Girth 2006 (mm)	Survival proportion mean	Mean no of fruit set 2006
Daching-Mume	92 a	0.83 ab	2.4 c
Ianjy-Mume	101 a	1.0 a	12.5 bc
Ellching-Mume	87 a	1.0 a	2.2 c
Daching-Okinawa	135 a	0.17 c	96.0 a
Ianjy-Okinawa	108 a	0.83 ab	28.0 b
Ellching-Flordaguard	39 b	0.40 bc	9.5 bc

Numbers in columns followed by the same letter are not significantly different at the $P \leq 0.05$ level.

Greater numbers of fruit were set on peach rootstock compared to equivalent scions on mume rootstock but with the difference being significant only for Daching (Table 7.1). The increased precocity of mume scions on peach versus mume rootstock is of no practical value due to the risk of rootstock-scion incompatibility and subsequent tree deaths when peach rootstock is used (Fig. 7.1).

Fig. 7.1 Snapped graft union resulting from incompatibility of Ellching mume scion propagated on Flordaguard peach rootstock



7.2.2 MRS Observational Trial

The temperate zone cultivars Nankou and Bungo did not produce fruit at MRS. They received insufficient chilling to break dormancy and the trees grew little past their original planting size.

The subtropical cultivars Daching and Ellching produced fruit at MRS each year from 2001 to 2005. The trees flowered with or slightly before 100 chill unit peach cultivars such as Flordaprince and Okinawa (data not shown). Both Ellching and Daching produced high yields of small fruit (Table 7.2). Trees were not thinned because of a requirement to obtain maximum quantity of seed for use in propagation. It is anticipated that fruit size could be significantly increased with the practice of fruit thinning.

Single trees of each cultivar were used for this observation trial. The Daching tree was less vigorous than Ellching and may have suffered from competition and shading within the tree row. The one week earlier ripening of Daching may be an artifact of this competition. The replicated trial planted at MRS will provide conclusive data regarding the comparison of the cultivars.

Table 7.2. Fruit and tree characteristics observed on single trees of Daching and Ellching at Nambour from 2002-2005

Characteristic (averaged over 3 years of observation)	Daching	Ellching
Estimated chill requirement (chill units)	100	100
Harvest date	8 Oct	15 Oct
Fruit development period (days)	89	96
Yield ^z	9	9
Skin colour	Yellow-green	Yellow-green
Amount of red blush (%)	0	0
Fruit weight (g)	15	16
Total soluble solids (%)	11	10
Shape	ovate	Round to ovate
Flesh colour	Yellow	Yellow
Flavour	Tart	Tart
Firmness ^z	7	7
Juiciness ^z	3	5
Fuzz ^z	7	8
Stone freedom	Cling	Cling

^z Rated on a 1 (least desirable) to 9 (most desirable) scale, where most desirable was high yield, high firmness, high juiciness and low fuzz.

7.2.3 Pollination Experiments

All five cultivars produced viable pollen ranging from 36.1% to 64.5% viability (Table 7.3). In the absence of specific cross-incompatibilities it should therefore be possible to use any of these cultivars for cross pollination if the bloom periods overlap sufficiently.

Table 7.3. Pollen viability of five mume cultivars

Cultivar	Pollen germination (%)
Ianjy	64.5 a
Ellching	54.5 ab
Bungo	54.0 b
Nankou	50.9 b
Daching	36.1 c

Numbers in columns followed by the same letter are not significantly different at the $P \leq 0.05$ level

Ellching and Daching are largely self-incompatible, with a fruit set of 0.4 fruit per metre (Table 7.4). Commercial production of these cultivars will therefore require provision of suitable polleniser cultivars and pollinating insects. Daching and Ellching are cross-compatible. The low fruit set obtained from using Daching to pollinate Ellching may be a reflection of the lower viability of the Daching pollen (Table 7.3) combined with the lower pollination efficiency of hand versus bee pollination. The open pollinated fruit sets for both cultivars would be adequate for commercial fruit production.

Table 7.4. Fruit set per metre of branch on the mume cultivars Daching and Ellching following three methods of pollination

Pollination method ^z	Daching	Ellching
Open pollinated	15.6	8.9
Cross pollinated	8.9	1.3
Self pollinated	0.4	0.4

^z Open pollination (no covering on branches), cross pollination (covered branches and application of Ellching pollen onto Daching and vice versa), and self pollination (covered branches and application of self pollen by hand). Means are based on 3 replications within each cultivar.

7.2.4 Grower Trials

Grower trials were established at temperate and subtropical sites in Queensland, New South Wales and Victoria (Table 7.5). The observation trials consisted of 1 or 2 trees per variety and the semi-commercial trials consisted of 100 or more trees.

Table 7.5. Location of grower trials planted during the project

Location	State	Latitude (°S)	Type of trial	Remarks
Malanda	Queensland	17.20	Semi-commercial	Sub-tropical and elevated site
Pozieres	Queensland	28.35	Semi-commercial	Temperate and elevated site
Bangalow	New South Wales	28.38	Observation	Sub-tropical, coastal
Sydney Hills	New South Wales	33.55	Observation	Temperate
Ballarat	Victoria	37.36	Observation	Temperate

In July 2005 a semi-commercial block of 100 mume trees (cultivars Nankou and Bungo) was planted at Pozieres north west of Stanthorpe on the Granite Belt. A major hail storm that caused in excess of \$1M of damage to hail netting and crops occurred in this region in October 2005 and destroyed the trees. This grower is still interested in pursuing mume as a new crop and intends to grow them under hail netting.

The trial planted in 2004 at Malanda is the first commercial planting of mume cultivars in Australia. In total there are 131 trees of the cultivars Daching (60), Ellching (60) and Ianjy (11). Daching is reported by the grower as the best performer based on its evenness of flowering, tree growth and initial fruit set. Approximately 100 fruit per tree were set on the 2-year old trees in 2006. Fruit from this planting will be sold to Asian Foods Australia Pty Ltd in Cairns.

Initial observation of tree maintenance requirements indicates that the mume trees will have a similar or slightly lower cost of production to plum or apricot crops. The Malanda grower is harvesting fruit at the mature green ripe stage for use by our industry partner in producing dried, salty plums. There has therefore been less application of chemicals needed for control of the soft rots that occur with mature harvested apricot and plum. The mume trees have also been left un-thinned thus reducing another cost of production compared to plum or apricot. If the industry is to develop in Australia a more detailed evaluation of production costs would be useful and registration of chemicals for use specifically on mume would be required.

The planting of the Malanda grower trial and the establishment of a commercial linkage between the grower and an Australian manufacturing company is a significant outcome of this project and represents the start of Australia's mume industry.

8. Implications and recommendations

Our market research has identified Japan as the largest market for mume products and the three most valuable mume products in Japan as umeboshi, umeshu and salty plum. The following information about these products should be considered in developing recommendations for mume industry development in Australia.

Umeboshi

- Umeboshi is the world's leading mume product.
- Japan is the only significant market. It offers very limited prospects for an Australian product:
 - Some manufacturers and distributors have expressed interest in umeboshi from Australia for health-conscious market segments such as young women and the aging, positioned between domestic and Chinese product. Product could be supplied as finished umeboshi or semi-processed shiroboshi. Japanese Quarantine does not permit fresh stonefruit imports from Australia. They would require Nankou cultivar, high quality, Japanese processes, low chemical residues, preferably organic production, and Japanese branding although they would promote the Australian origin to imply food safety. Australian suppliers would need to work with the Japanese trade to develop marketable quality.
 - With experience, Australian processors could aim at food service, the only growing sector selling umeboshi. It would probably accept an Australian branded product.
 - However, Chinese supply is continually improving, with improving quality; falling prices; lowering concern about chemical residues by Japanese consumers; and Japanese manufacturers providing technical support and premium cultivars. This will present increasing barriers to an Australian product.
- There are very small niche markets in countries with Japanese populations and tourists, including Australia, consuming umeboshi imported from Japan and increasingly China.
- The stable Australian market consumed approximately 3.25 tonnes of umeboshi, valued at \$130 500 in 2004.
- Australia has a small emerging health-conscious market buying Japanese umeboshi as a health food. Distributors are seeking more reliable supply, and would require organic product.
- Australia also has a small stable market of tourist hotels seeking lower-priced umeboshi for Japanese guests and not using current imports because of price. However, an Australian product is likely to compete with growing imports of inexpensive Chinese umeboshi.

Umeshu

- The only large market for umeshu is Japan.
 - The Japanese market was estimated at 62 million litres of umeshu with a retail value of approximately \$774 million. There were supply shortages in 2005 as Quarantine prohibitions on imports of fresh mume cause umeshu manufacturers to rely on the stable domestic fresh fruit industry.
 - Key market segments are young people, particularly women, drinking at home and in bars and restaurants.
 - Strong competition is resulting in a proliferation of brands, products, ingredients, packaging and mixes.
 - There may be opportunities for Australian umeshu to be exported to Japan using preferred cultivars such as Nankou and Bungo, and under Japanese brands to access distribution. However, while barriers to entry are relatively low, pricing is competitive and will fall further if China becomes a significant supplier.

- There are small secondary markets in countries with ethnic Japanese populations and Japanese restaurants and bars, including Australia. Japanese manufacturers are considering developing umeshu production in Australia to supply these markets.
 - The Australian market for imported umeshu was 6060 litres with an estimated value of \$121 000 in 2003. This market is growing due to Japanese manufacturer promotions. Retailers experienced supply shortages in 2006.
 - Key market segments are Japanese residents, Chinese, and increasingly Australians. Current markets prefer Japanese product over emerging 'green plum wine' imports from China.
 - The Japanese manufacturers would use Australian ingredients, including mume cultivars preferred in the Japanese market, such as Nankou and Bungo.
 - As a liqueur, an Australian produced umeshu would incur significant excise tax if sold in the Australian market, but not if exported.
 - As umeshu production requires fresh fruit, and Australian quarantine prohibit imports of fresh stonefruit, manufacturers would have to rely on fresh domestic mume.

Salty plum

- The main markets for salty plum are China and Taiwan, with small niches of mainly Chinese people in other countries.
- An Australian salty plum is unlikely to be price-competitive in any significant export market.
 - The Australian domestic market was estimated at 25–30 tonnes with a market value of \$325,000–390,000 in 2004, and is stable or declining.
 - Key segments are older Chinese, visiting Asian students and small numbers of children and adults in northern Australia. Current supply is dominated by low priced Chinese product, with little differentiation in product or packaging.
 - There may be a minor opportunity for a lighter sweeter less salty product in the Chinese and Australian markets. However, this is likely to face early competition from similar product emerging from China and Taiwan with lower costs of production than an Australian industry.

Other products

- Mume is used in a wide range of other products.
 - Japanese manufacturers recommend a new industry develop a number of products to reduce market risk.
 - Australian manufacturers expect mume to be a useful processing fruit for Australian and export markets.
 - However, manufacturers can use semi-processed juice and pulp, which can be imported to Japan and Australia at very low prices from China without the quarantine barriers to fresh fruit.

Implications for industry

- A new Australian industry will need to supply Australian-based processors who have existing markets, with umeshu the most likely initial product, and the opportunity for supply contracts.
- As producer experience and production grow, there is potential to supply semi-processed or processed umeboshi to Japan. This will require salting and drying to be done on-farm or in factories close to the orchards.
- Rather than depend on one product, develop several other products to spread the risk, using quality attributes such as cultivar to differentiate from potential competition from China (for example Nankou based juice).
- Efficient production, manufacturing and distribution systems will be needed to minimise costs
- There are opportunities to build strategic relationships with the Japanese mume and umeboshi industry through the All Japan Tsukemono Federation of Co-operatives and umeshu manufacturers. This will allow opportunities to supply umeboshi or shiroboshi to be progressed, and access the expertise in production and processing needed to produce equivalent quality to Japanese processors.
- The ability to supply fresh fruit to Australian-based manufacturers will be Australia's greatest competitive advantage.
- Supplying the Japanese market will require extensive communication and co-operation with importers.
- The high-chill cultivars Nankou and Bungo appear suitable for trialling in temperate fruit growing regions and the low-chill cultivars Daching, Ellching and Ianjy appear suited for trial in sub-tropical regions of Australia. All cultivars flower early compared to local standard peach cultivars and so growers need to select orchard sites to minimise the risk of freeze damage during flowering and early fruit development.

Recommendations for industry

We have identified that the current Australian domestic market for mume products is small but that there is potential for the domestic umeshu market to expand. In Japan the consumption of umeshu and umeshu-based drinks has increased and there may also be opportunities for an Australian product in this market. China produces large quantities of mume fruit and processed mume products and will be a cheaper source of product than Australia. In order to compete, Australian product will need to be differentiated on the basis of its safe food reputation and use of premium cultivars. Mume production and manufacture should proceed cautiously until the full extent of this competitive threat is determined. Future development of Australian mume industry will need to occur with strong linkages to Japanese companies who have expertise in mume product manufacturing and fully developed supply chains for current markets. The following points are a summary of recommendations for mume industry development.

- Initially support umeshu production as it is in the greatest demand, with growing markets, a requirement for large volumes of fruit of all grades, the opportunity for supply contracts with producers, and Japanese manufacturers interested in establishing production in Australia.
- Commence umeshu production using the premium cultivars Nankou and Bungo but investigate the umeshu quality from the Taiwan cultivars Daching, Ellching and Ianjy.

- Progress preliminary interest from the Japanese umeboshi industry by developing strategic partnerships with manufacturers and distributors. Start by supplying semi-processed umeboshi into market niches such as the health-conscious, while accessing technical support and market knowledge. Start by supplying semi-processed or unbranded finished umeboshi to Japanese manufacturers or repackers to access retail distribution in Japan. As production increases, supply branded finished umeboshi to food service establishments in Japan
- Use production systems and quality assurance that can be promoted to markets concerned with food safety, for example organic or low chemical, and protection of the environment.
- Build a processing industry around products that require fresh fruit to avoid competing directly with frozen or pureed ingredients from China.
- Maintain good communications with Japanese importers to maintain supply, and monitor the competitive situation and market demand.
- As production increases, develop a product mix that uses all fruit to improve farm profitability and support grading.
- Use the Japanese market in Australia to test-market products for export to Japanese consumers.

9. Glossary

Japanese apricot – Japanese term for *Prunus mume*.

Japanese plum – Japanese term used for *Prunus mume*, although a different species, *Prunus salicina* Lindley (Subhadrabandhu, Thailand).

Japanese plum wine – Western term for umeshu

Katsuoume –a seasoning from umeboshi and bonito.

Mume – from the scientific name *Prunus mume*, and used in this report to describe the fruit and products from it.

Salty plum – salted dried mume fruit, with added sweeteners, and often colouring and flavouring.

Shiroboshi – Japanese term for mume that has been pickled and sun-dried ready for final processing into umeboshi.

Shiso – perilla

Tsukemono – pickled vegetables (Japan).

Ume (also **ume plum**) – Japanese term for *Prunus mume* trees, fruit and products.

Umeboshi – Japanese term for mume fruit pickled in brine and sun-dried (ume=mume fruit, bo=salt, shi =shiso leaves), and prepared for consumption

Umeshu - pronounced ‘oomayshu’, shu meaning liquor or sake) –a liqueur made from mume fruit or juice in white spirit, and often called ‘Japanese Plum Wine’.

10. Appendices

Appendix A: Research projects for mume

The following examples from more than 100 abstracts on the Listing of Useful Plants of the World website (Silverplatter) and various Internet sites indicate strong industry interest in validating mume's reputed medicinal properties, improving the quality and transport of the fruit, and new product development. Details include some information from abstracts.

Medical research projects

Chuda, Y, Ono, H et al, 1999, 'Mumefural, citric acid derivative improving blood fluidity from fruit-juice concentrate of Japanese apricot (*Prunus mume* Sieb. et Zucc)', Journal of Agricultural and Food Chemistry 47(3): 828–831, National Food Research Institute, 2-1-2 Kannondai, Tsukuba, Ibaraki, 305-8642, Japan. This project investigated two compounds in the fruit which, in conjunction with its citric and malic acid (demonstrated in previous research to have antimicrobial, antibacterial and antioxidative activity), increase the fluidity of human blood through increased red blood cell.

Dogasaki, C, Murakami, H, Nishijima, M, Yamamoto, K & Miyazaki, T 1992, 'Antimutagenic activities of hexane extracts of the fruit extract and the kernels of *Prunus mume* Sieb. et Zucc. Yakugaku Zasshi 112(8), pp. 577–584, Faculty of Environmental Health, Azabu University, Kanagawa, Japan. The project investigated the anticancer potential of the fatty acids oleic acid, linoleic acid and linolenic in mume fruit and oleic acid and linoleic acid in the kernel.

Dogasaki, C, Nishijima, M et al, 1996, 'Immunochemical characterization of alkaline-soluble polysaccharide, P-1, from the kernels of *Prunus mume* SIEB. et ZUCC', Yakugaku Zasshi 112 (8), pp. 577-584, Faculty of Environmental Health Science, Azabu University, Kanagawa, Japan

Kim, BJ, Kim, JH, Kim, HP & Heo, MY 1997, 'Biological screening of 100 plant extracts for cosmetic use (II); anti-oxidative activity and free radical scavenging activity', International Journal of Cosmetic Science 19(6), pp. 299-307, Coreana Cosmetics Co. Ltd., Cheonan, South Korea. This project identified mume's activity as a free radical scavenger to counter aging and degenerative diseases such as cancer.

Lee, TH, Paik, JM, Hwang, WI, 'Effect of *Prunus Mume* Extract on the Growth Rate of Animal Leukemic Cells (L1210, P388) and Human Colon Cancer Cells (HRT-18, HCT-48, HT-29), Korea University Medical Journal 25(1), pp. 365-374, Korea.

Otsuka T, Tsukamoto T, Tanaka H, Inada K, Utsunomiya H, Mizoshita T, Kumagai T, Katsuyama T, Miki K & Tatematsu M., 2005, 'Suppressive effects of fruit-juice concentrate of *Prunus mume* Sieb. et Zucc (Japanese apricot, Ume) on *Helicobacter pylori*-induced glandular stomach lesions in Mongolian gerbils', Division of Oncological Pathology, Aichi Cancer Center Research Institute, Nagoya, Japan, <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=16235996&dopt=Abstract>, viewed 10 July 2006

Shirasaka, N, Kurematsu, A et al 1999, 'Isolation and characterization of antioxidative compounds from Ume (mume) liqueur', Nippon Shokuhin Kagaku Kogaku Kaishi 46(12), pp. 792-798, Department of Food Science and Nutrition, Faculty of Agriculture, Kinki University, Nara, Japan

Other projects

Asami, I & Aoyagi M 1997, 'Studies on the shipping of high quality mature-green Japanese apricot (mume, *Prunus mume* Sieb. et Zucc) fruits II: Effects of permeable plastic film pouch packaging on the freshness of fruits', Research Bulletin of the Aichi ken Agricultural Research Center (29): pp. 231–237, Japan.

Fang, TT and Lee, LH 1991, 'Investigation on characteristics of Japanese apricot cultivars (*Prunus mume* Sieb. et Zucc.) in Taiwan', Journal of the Agricultural Association of China New Series (156): pp. 69–82.

Hakoda, N, Toyoda R et al. 1998, 'Morphological characteristics of the interspecific hybrids between Japanese apricot (*Prunus mume*) and Plum (*P. salicina*)', Journal of the Japanese Society for Horticultural Science 67(5), pp. 708-714. Faculty of Agriculture., Tokyo University of Agriculture, Japan.

Ina, H, Yamada, K et al. 1999, 'Isolation of benzyl glucoside and chlorogenic acids from the fruits of *Prunus mume*', Natural Medicines. April 53(2), pp. 109-110, School of Pharmacy, Tokyo University of Pharmacy and Life Science, Tokyo, Japan.

Jung, GT, Lee, GJ et al 1992, 'Studies on the production of spirit vinegar from maesil (*Prunus mume*)', Research Reports of the Rural Development Administration Suweon 34(2 Farm Manager. Agr. Eng. Seric. Farm Pr): pp. 65–69, Chonbuk Provincial Rural, Dev. Administration, Iri, North Korea.

Koyakumar, T 1997, 'Effects of temperature and ethylene removing agents on respiration of mature-green mume (*Prunus mume* Sieb. et Zucc.) fruit held under air and controlled atmospheres', Journal of the Japanese Society for Horticultural Science 66(2), pp. 409–418, Rengo Co. Ltd., Osaka, Japan.

Liu, J, Zhang, Q, et al 2000, 'Analysis of nutritional component of the pollens of *Prunus salicina* and *Prunus mume*', Acta Nutrimenta Sinica, March 22(1), pp. 92–94, Bioengineering College, Fujian Normal University, Fuzhou, China

Nakamura, A & Takayasiki, Y 1997, 'Process of inversion of sugar in mume liqueur', Nippon Shokuhin Kagaku Kogaku Kaishi 44(4), pp. 310–314, Faculty of Home Economics, Tokyo Kasei Gakuin University, Tokyo, Japan

Park, KH & Ju, SE, 'Characteristics of *Prunus mume* vinegar during parallel complex fermentation', Department of Food Science & Technology, Chung-Ang University, Ansong, South Korea; and Suh, BR, Seoil Farm Co., 389-3 hwabongri Iljukmyun, Ansong, South Korea

Appendix B: Complete retail audit for mume products

Table B.1: Complete retail audit for mume products

Description	Size	Retail price \$	Manufacturer, Importer
Salty plum (Australia)			
Get description			Manufacturer Asian Foods Australia, observed Asian Foods, Cairns
Red and white coloured, acrylic boxes	100g	1.95	In Chinese language, several stores
'Sweet cured preserved' (orange colour)	160g	1.70	From Taiwan, repacked by importer Chiun Shing Trading, Sydney, observed Everspring Supermarket, Haymarket, Sydney
'Sweet Red Plums'	100g	4.95	Manufactured in China; importer Wah Lien Trading, Melbourne, observed Everspring Supermarket, Haymarket, Sydney
Eaglobe 'Cured Prunes': 'Pickled plum', with white, red or orange powdery coating	75g	1.95–2.00	Manufactured in Taiwan; importer New Eastland; Melbourne; observed several stores
Guang Xin Salty Plums, 'low salt', foil pack	80g	1.70	Manufacturer CXC, China; importer Heng Fai; observed OK Supermarket, Ashfield, Sydney
'Red prune' in acrylic box	90g	1.80	Imported by Grand Continental Food; observed several stores
Oriental Delicacies, 'Sweet white plums', white coating	200g	2.99	Imported from Taiwan by Ly Trading; observed several stores
'Red salty plum' dark brown-orange colour.	500g	14.75	Imported from Taiwan; observed several stores
'Salty plums', brown colouring	80g	3.20	Manufactured by Koon Wah Food & Preserved Fruit, Hong Kong; imported by Ly Trading; observed several stores
Wang Mui Dried Plum, brown colour	250g	3.20	Product of Singapore, imported by New Eastland; observed Great Eastern Trading, Melbourne
Yu Shan Sweet Cured Prune, brown colour	Not listed		Imported from Taiwan; observed Asian Foods Australia, Cairns
Bright red coating, in plastic bag	300g		Imported by Wing Heng; observed Yuen's, Fortitude Valley, Brisbane
Xi Muoi Do Red Plum, red coating	90g	1.30	Manufactured by Siang Si Mooi, China; imported by Hoa Trading; observed Great Eastern Trading, Melbourne
Salty plum, soft dried salted sweetened fruit with white powdery coating	300g		Imported from Vietnam (private sample)
Mume confectionary (Australia)			
'Black Plum Candy', molasses toffee with salty plum (5)	110g	2.35	Manufactured by Cheng Chia Chen Foods, Taiwan; imported by Chen Foods Wei Hwa Int'l Trading P/L; observed in various Sydney stores
Pineapple and Plum Toffee	160g	1.60	Imported from Taiwan by Wei Hwa; observed in various Sydney and Melbourne stores
Jade Mountain Toffee with salty plum (10)		2.00–2.70	Manufactured by Yu Shan, Taiwan; observed in various Sydney and Melbourne stores
Toffee with salty plum		5.20	Manufactured in Japan; observed Great Eastern Trading, Melbourne
Pickled plums, Chinese style (Australia)			
Xiang Zi Bridge Salted Plum in brine - 'prune, salt, water', nutritional panel.	340g	1.30	Imported from China by Ly Trading; observed OK Supermarket, Ashfield, Sydney
Pun Chun Salted Plum in brine	360g	4.75	Manufactured in Hong Kong; observed Miracle Supermarket, Chatswood, Sydney
Umeboshi and ume paste (Australia)			
With perilla (pink colour), in jar	1kg	43.50	Imported by Jun Pacific; observed Asian Foods Australia, Cairns

Shiakiku Pickled plums, red colouring	100g	4.00	Imported by Jun Pacific; observed Thai Kee IGA, Haymarket, Sydney
Shiakiku Pickled plums, natural colour	100g	5.40	Imported by Jun Pacific; observed Thai Kee IGA, Haymarket, Sydney
A&O Prepared plum (Shiso-iri)'	80g	3.50	Imported by Daiwa Food; observed in Japanese store, Cairns
Nanki ume no sama, 'King of Plum'	180g	8.90	Imported from Japan by Suzuran; observed in Great Eastern Trading, Melbourne
Neri Ume umeboshi	120g jar	9.70	Imported from Japan by Japan Food Corporation
AJI, 'Ume-hot', plastic jar, reusable cap	160g	6.50	Imported from Shin Shin by Juiyama
ANA Pickled Plums	250g	7.50	'Product of Japan', imported by Jun Pacific; observed in various stores
Spiral Foods Umeboshi Salted Plums'			Imported from Japan by Spiral Foods; observed in David Jones, Melbourne and Sydney and health food stores, Sydney
Spiral Foods 'Kosher' plums	150g	7.10	Imported from Japan by Spiral Foods; observed Macro, Bondi Junction, Sydney
Macro Wholefoods Umeboshi	150g	7.10	Imported from Japan by Spiral Foods; ; observed Macro, Bondi Junction, Sydney
Kaneku Neri-ume Shiso-Iri – prepared plum paste	300g	14.20	Imported by Daiwa Food; observed in Daiwa store, Elsternwick, Melbourne
Plastic bag of ume	500g	14.5	Imported by Daiwa Food; observed in Daiwa store, Elsternwick, Melbourne
Mikakuto Sannen Uni	120g jar	4.20	
Mutenka Asada Hiboshiume	1kg jars	23.50	Imported from Japan; observed in Tokyo Food Mart, Sydney
Japanese language brand	800g	13.40	Manufacturer Maruyou Tokoyuo Tsubo, China; observed in Tokyo Food Mart, Sydney
Umeboshi puree	150g	9.50	Imported from Japan by Spiral Foods; observed in O'Sullivan's Health Foods, Northbridge, Sydney
Nanki Kishu, very large fruit, all-Japanese label	200g	21	Imported from Japan by Jun Pacific; observed in Korean grocery, Bondi Junction, Sydney
'Fragrant style'	1kg	47	Manufactured by Shiso-Koubii, Japan
Neri Ume Shi Soiri Kaneru Paste		15.00	Imported from Thailand; observed in Tokyo Food Mart, Sydney
'Neri Ume Shisoiri Kaneku Br' Plum paste	300g	17	Manufactured by Kenuko Ltd, Japan; imported by Jun Corporation; observed in observed at Fine Foods Australia, Sydney 2004
Umeboshi and ume paste (Japan)			
100% Kishu ume, Kishu ume salt, perilla			Manufactured by House Shokuhin Co., sample from Japan
10% salt, perilla, bamboo basket, giftwrapped	1.2kg	105	In Umeta brochure, Kishu
In microwaveable plastic tray, giftwrapped	1kg	43	
In large plastic tray	1.3-1.8kg	54-72	
In wooden box	700g	43	
In 'eco package' (biodegradable)	800g	32	
Umeta Akane, red perilla. 10% salt, 5 months shelf life, medium sourness, 'umami'			
Umeta 'Ikina', no artificial preservatives, 8% salt, 5 months shelf life, more sour			
Umeta 'Mitsu', honey, 8% salt, 5 months shelf life, 'sweeter'			
Umeta 'Assari', 5% salt ('less salty'), 3 months shelf life			

Umeta 'Sachi', bonito flavour, 11% salt, 3 months shelf life, 'more umami'			
Umeta 'Muku', 'salty and sour', 20% salt, 3 years shelf life			
Umeboshi, plastic tray	150g	6.00	
Umeboshi, plastic tray	1kg	43.00	
Umeboshi, 12% salt, plastic tray	300g	15.60	
'Grilled umeboshi for tea', grill marks, in pouch	300g	18.00	
Very large Nankou <i>loose</i>	100g	10.70	Kishu and North Japan regional brands; in Umehachi store, Tokyo
Large and small pink Kishu Koume <i>loose</i>	100g	8.80	
Large fruit in giftbox	1.4kg	123.20	
Small fruit in giftbox	800g	75.40	
In plastic tray	1kg	95.50	
In bamboo giftbox	1.4kg	74.20	
18 umeboshi, single wrapped, wooden box			Umeta, in Umeta factory outlet
Umeboshi, sealed plastic bag with wire tie	300g		Sample from Japan
MMB Ryujin Organic Umeboshi Plums, 'handmade, Yuuki (organic) grown with yuuki red shiso	6oz glass jar; 1–4kg trays		Advertised on Quality Natural Foods website
Ume Hitotsubu, umeboshi in individual cellophane packs, from 'all Chinese ingredients'	300g		Manufactured by Baiouen Co., Ltd. Wakayama P.; observed in Umeta factory outlet
Umeshu (Australia)			
Choya, wine bottle, no fruit	750ml	15–25	Manufactured by Choya Umeshu, imported by Jun Pacific and Japan Food Corporation; observed in Sydney outlets Woolworths Liquor, Northbridge; Burlingtons and ,Chinatown Cellars, Haymarket; Daiwa store, Glenhuntley, Melbourne
'Choya Kishu-Umesh', large jar with fruit	750ml	23.75–50.00	
Mercian Tetrapak	2L	21.00	Imported by Jun Pacific; observed Chinatown Cellars, Sydney
Mercian, in wine bottle	600ml	20	
Kikkoman, in wine bottle	760ml	17	Imported from USA by Japan Food Corporation; observed Chinatown Cellars, Sydney
God Forest Plum Wine, 10% alcohol, wine bottle	750ml	\$14.99	Imported from China; observed Chinatown Cellars, Sydney
Umeshu (Japan)			
Choya Umeshu EXCELLENT, 'The Premium Umeshu' Nankou ume, brandy, 'aged slowly', 14% alcohol	750ml		Choya sample
Choya umeshu (liquor only) in wine bottle	750ml bottle	\$11–13	Observed in Japanese supermarkets
Choya umeshu (liquor only), wide-necked bottle	360ml	\$6.60	Observed in Japanese supermarkets
Choya umeshu with fruit, wide-necked bottle	750ml	\$21.55	Observed in supermarkets and discount stores
Mercian Tetrapak	2L	\$12.30	Observed in supermarket
Asahi umeshu	760ml bottle	\$10.40	Observed in supermarket
Kadotani bunjiro shoten	360ml bottle	\$10.50	In newspaper article
Shiyozu toraya	500ml bottle	\$10.00	In newspaper article
Choya Kishu – 'The standard Umeshu' with 12–16% whole fruit; 15% alcohol, wide-necked bottle	430, 700 & 1600ml		Advertised on Choya website

Choya Plum – ‘Plum wine for USA market’ 13.5% alcohol (as sold in Australia), wine bottle	750ml		
Choya Plum – ‘Plum wine’ for European market, 4% fruit, 10% alcohol	5L carton, 100ml–1L bottles		
Choya Umeshu Akashiso herb, with perilla leaf, 7-20% fruit, 12% alcohol	47–750ml bottles		
Choya Dento – ‘The premium Umeshu’, aged 12 years; 15% alcohol	47 & 700ml		
Choya Royal – ‘Umeshu with German sparkling wine’, 9% alcohol	200 & 750ml		
Choya Umeshu Sarari – ‘lower alcohol’ (10%) and sugar	100–1.8L boxes, 300ml bottle		
Choya Umesshu – ‘Carbonated soda and umeshu’; 4% alcohol	135ml can; 450ml bottle		
Kishu nanko umeshu, 13% alcohol	720ml	16.80	In Umeta brochure
Hakatsuru Premium Sake Plum Wine	750ml bottle		Advertised on Hakatsuru website
Suntory Umeshu de Brandy V.S.O.P. Brandy, umeshu (100% domestic plums), 14% alcohol	500ml bottle		Advertised on Suntory website
Kishu Monogatari Plum Wine, 100% Kishu <i>Nankome</i>	720ml		Manufactured by Kinotsukasa shuzo Co. Ltd, observed in Tokyo department store
Kikkoman Plum Wine – ‘Manjo’ brand;	750–1.5L bottles		Advertised on Kikkoman website
Ume wine			
Choya Ume Wine (amabile), 100% Nankou ume, wine bottle, cellophane wrapper	360ml		Manufactured by Choya Umeshu Co. Ltd, Japan
Hyakuyaku plum wine, giftboxed	720ml		Sample from Japan
Ume juice (Australia, Japan)			
Kishu nanko ume juice	720ml		Sampled in Japan
Ume juice in glass bottle	720ml	22.10	In Umeta brochure
Plum juice with green tea	300ml bottle		Manufactured in Korea; observed at Fine Foods Australia, Sydney 2004
Ice Cool plum juice	Various		Manufactured in Singapore; observed at Fine Foods Australia, Sydney 2004
Ume seasonings (Japan)			
‘Ume Bishio’, plastic lidded tub	130g		Manufactured by Inoguchi shokuhin kogyo Co.; observed in Wakayama Prefecture store, Tokyo
‘Neri Ume’, Kishu ume paste, squeeze bottle,	180g		Manufactured by Umeta, observed in Umeta retail outlet
‘Ume ponzu’, from bonito, kelp and citrus	180ml		Advertised in Umeta brochure
Ume dressing	300g jar		Observed in Wakayama Prefecture store, Tokyo
Ume with bonito and sesame, 9% salt	600g	8.60	Observed in Wakayama Prefecture store, Tokyo
Ume mayonnaise, ‘no chemical additives’	500g	7.20	Advertised in manufacturer’s brochure
Ume vinegar, pack of 30 x 10g sachets	300g	22.60	Advertised in Umeta brochure
Ume salt	500g		Advertised in Umeta brochure
Sweet ume (Japan)			
Ume cookies, in plastic bag with tie	600g		In Umeta brochure
Ume jam ‘for toast, cake’	230g jar	2.80	In Umeta brochure

Ume Hitotsubu dessert			Observed in Umeta retail outlet
Snackfoods (Australia and Japan)			
Kamio Karikori Ume, individual cellophane packets	160g	8.25	Manufactured by Kamio Shokuhin Kogyo Co Ltd, Japan; imported by Jun Pacific Corporation; observed in Asian Foods, Cairns
Ume Senbei 'Ume rice cracker', prawn, squid	180g bag		Observed in Umeta retail outlet
Sticky rice cake with mume pieces, gift boxed		14.40	Sample from Japan
Health products (Japan)			
Ume extract, 150 capsules		11.30	In Umeta brochure
Ume extract, 'no sugar or salt'	120g jar	30.00	In Umeta brochure
Ohsawa Oindo Ume, concentrated syrup from fresh mume, 30 times concentration, no salt			Gold Mine Natural Foods website
Ume kikurage, dark brown coloured tree fungus			Advertised on manufacturer's websites
Mikoku medical concentrates			
Umeboshi tablets (umetsubu)			
Other products (Japan)			
Plum Candy, individual cellophane bags			Manufactured by Suppai Man, sample from Japan
Umesho, Umeboshi & Choya teas			Manufacturers' website
Ohsawa Oindo Organic Ko-Ume – tiny mume for use 'on rice porridge for breakfast'			Gold Mine Natural Foods website
Li hing mui sour. Salty plum cocktail mix			Manufacturer's website, Hawaii

Appendix C: Processing procedures for selected mume products

Umeboshi

Umeboshi is processed commercially in Japan, and also often made in the home.

Tsukemono (pickle) is classified by type of pickle, place of origin, and method used to preserve the raw product. Umeboshi is made by the Shiozuke method – the fruit is salted in an earthenware jar or ceramic container under pressure from a wooden lid and heavy stone, or in a modern ‘pickle press’, then sundried. Seasoned umeboshi is preserved in a solution with mume vinegar or citric acid. (ume.ume.net, 2003; Nguyen, 2000, p.6; Terebelski & Ralph, 2003).

Umeboshi is produced commercially in two stages — shiroboshi and umeboshi.

Producing shiroboshi is a relatively simple standardised process where the freshly picked fruit is washed, graded and salted to extract the juice to form brine, often on the farm.

Fruit is picked at about 80 per cent ripeness, with yellow colour and good aroma. Some cultivars with medium or large sized fruit, such as Nankou, may be harvested when fully ripe, often by allowing the fruit to drop naturally into a plastic net placed under the tree to avoid hitting the ground and scarring, and collecting and processing daily to maintain quality (Beppu, 2003, pers. comm.; Nguyen, 2000, p.90). Soaking in water accelerates ripening (JA Agricultural Corporation brochure).

Fruit is harvested, graded, washed, soaked in water (usually in a barrel), and salted in the one day to avoid over-ripening and softening. It is layered with salt and weighted to immerse the fruit in brine for two weeks or more, with 40 g salt to 170 g fruit for a 20 per cent salt concentration. The mume-flavoured brine is drawn off and sold as a seasoning, while the salted fruit is sundried to become shiroboshi, and graded and packed, usually in barrels, for sale or to be stored for as long as two years (*Ume growers and processing*, 2003).

A large Wakayama fruit producer adds freshly picked fruit each day to a brine mixture in large (2x2x2 metre) plastic-lined in-ground concrete tanks. When full the liner is folded over the surface, wooden planks laid across, and around eight eight-kilogram weights placed on the planks to compress the upper layers of fruit. This pickled fruit may remain in the tank until February. When ready for delivery to umeboshi manufacturers, the salted fruit is spread on trays to absorb dew overnight, and sundried in a glasshouse for three to five days, being turned at least three times a day for uniform drying. The sun-drying, known as doyoboshi, produces shiroboshi. The dried fruit is packed in plastic bags in 10 kilogramscartons for delivery to manufacturers.

The process and duration of each stage vary with the manufacturer. For example, some manufacturers return the fruit to the brine at night, others do not. Around 10 kilograms of shiroboshi are produced from 20 kilograms of fruit. Chinese shiroboshi usually has 55 to 60 per cent moisture content. Low humidity can hamper achieving correct dryness, and duration of salting and temperature can be difficult to manage in climates different to Japan’s (Japanese trade interviews, 2005; Nguyen, 2003).

Manufacturers use domestic and imported salt, paying around A\$310 a tonne for imported salt in 2005. It was said that imported salt is dissolved in water to remove any dust, and renamed ‘Japanese salt’, which sells at a premium. Some suppliers have developed special salts for umeboshi, such as a plastic bag of ume salt retailing at JP¥450 for 500 g in an umeboshi store (Japanese retail audit, 2005). Until Japan joined the World Trade Organisation, most manufacturers used Australian salt, and many still do. Australian speciality salts, such as natural sea salt, are suitable for umeboshi, and have a price advantage over Japanese salt (Japanese trade interviews, 2005).

Shiroboshi is usually transported to the manufacturer in plastic bags in cartons or plastic lidded pails. Some Chinese product is imported in 12 kilogram wooden boxes (Japanese trade interviews, 2005).

For the final product umeboshi, shiroboshi undergoes a more complex and varied process, including removal of foreign matter and rinsing off excess salt to achieve final salt content. It may be marinated in seasonings from three months to three years, then dried off in shade, measured and packaged. Highest quality umeboshi is made in wooden barrels (*Ume growers and processing*).

Flavourings are used to compensate for flavour lost when shiroboshi is rinsed to reduce salt content (Beppu, 2003, pers. comm.). The most popular seasoning is red perilla leaf (*Perilla ocymoides L.* – Brenner, 1995), with 50–100 g of perilla used per kilogram of umeboshi to make akaboshi ('ake' meaning red). Perilla, which gives a distinctive flavour, pink colouring, and antibacterial properties, is also called shiso, beefsteak plant and Japanese basil. Also used are oba, or green leaf perilla, and occasionally aka-jiso with purple-red leaves. Red shiso leaves should be fresh, red-purple in colour on both sides, with curled leaf tips, to ensure sufficient colour (ume.ume.net, 2003). Manufacturers promote use of perilla on labels and websites (Appendix D), and use artificial colouring only for some export product (Beppu, 2003; Hayward S, 2003). Some products are sweetened with stevia (Japanese retail audit, 2005).

Pickling equipment should be sterilised before use, and Japanese manufacturers use baskets and nets to keep the product clean and off the floor (Nguyen, 2000, p. 90). Some manufacturers have implemented HACCP based quality assurance and waste management systems (*Ume growers and processing*, 2003). There is some automation of processing, with dedicated processing at each stage of manufacture, including measuring, packaging, labelling and adding flavourings. Automation can result in around 10 per cent product loss, so expensive fruit is often processed manually to ensure 100 per cent first grade product. Human judgement is required also because the rate of processing varies across the fruit. A manufacturer estimated production costs (labour and materials) to be similar for 20 kilograms of mume fruit and 10 kilograms of umeboshi (Japanese trade interviews, 2003).

Fig. C.1: Commercial production of umeboshi



There is some variation of ingredients, as indicated in these recipes. Recipes have been converted around 1kg of mume fruit.

Product samples for this project: (Recipe provided by All Japan Tsukemono Federation of Co-operatives) Mume fruit was washed and soaked in tap water for 24 hours. Using 1kg fruit and 100g crystallised salt, the fruit was placed in a plastic dish layered generously with salt and a thick layer of

salt on top. A lid and weight were applied, pushing the fruit down into the brine as it formed, until the fruit was immersed in brine. The fruit was stored for a month, then placed on plastic trays and sundried for 3-4 days, being turned over once a day, and returned nightly to the fruit-flavoured brine. Samples were made using green and ripe Ellching and Daching, and ripe Nankou, Ianjy *and* Bungo.

Recipe used in RIRDC 2000 project: 1kg mume fruit, 180g salt and 50cc shochu were used for natural colour Kanto-type umeboshi, and red perilla leaves added for a pink Akajiso Umeboshi version. Reducing salt content from 18 per cent to 10–15 per cent retained quality but flavour was more sour (Nguyen, 2000 pp.48-9)

Consumer recipe from Ume Guide book: Using 1kg fruit to 180g salt, leave the fruit in the brine for about 20 days, then dry evenly in the sun for 3-4 days. (If mould appears, add 1 cup vinegar to 10kg fruit). For umeboshi with shiso, layer 1kg shiroboshi with 500g whole shiso leaves, and sun-dry when the fruit turns purple. For flavoured umeboshi, soak 4kg shiroboshi in water for 7-12 hours to reduce the salt content; make a syrup of 1-1.3kg sugar, 300ml mirin, 200ml vinegar, 200ml sake, 200ml soy sauce and 300ml plum vinegar (300ml); add 500ml of vidashijirui (a soup of bonito and seaweed); boil; and add 150ml shochu. Leave for four days then remove the finished umeboshi and layer it in a jar with broken-up pieces of dried bonito and chopped shiso leaf (translated by Y. Mizuta).

Consumer recipe from Ume.ume.net website

Wash 1kg mume fruit, soak in water overnight at around 22°C to reduce bitterness, remove the peduncle and dry gently on absorbent paper with a clean towel. Avoid bruising. Using 180–200g natural salt, mix half the salt with the fruit, and cover the bottom of the container with a handful of the remaining salt. Layer fruit and salt, with a thick layer of salt on top, and the fruit packed tightly together with no spaces. On the lid, place a stone two to three times the fruit weight, cover with plastic film or paper to exclude insects, and store in a dark cool well-ventilated place. After one week drain off excess brine ('mume vinegar') leaving sufficient vinegar to completely cover the fruit and prevent contamination, and remove half the stone weight.

For "shiso soaked umeboshi", drain and set aside the brine from the pickled fruit, and add 100g of Shiso leaves and 20g natural salt per kilogram of pickles. Wash the shiso leaves, wipe dry, remove from the plant, place in a bowl, add two-thirds of the salt, mix lightly, and squeeze gently to produce a thick purple solution which should be discarded. Do not add water or wash hands after squeezing. Spread out the leaves, place in a bowl, add remaining salt, and squeeze again. Spread open the shiso leaves, place in a bowl, add sufficient brine to wet the leaves, and squeeze the leaves again to give a purple-red colour. Place the opened shiso leaves onto the fruit one by one, as flat as possible for good contact and add the now purple mume vinegar. Replace the lid, add a stone half the weight used to produce the pickles, cover with plastic or paper, and store a dark cool place for two to three weeks.

Start drying when several days of sunshine are expected. For the first three days, during the day spread the fruit onto a mesh surface to dry and drain, with each fruit separated, and at night return it to the mume vinegar. For the next three days, spread the fruit at night for contact with the dew and by day return to the vinegar. Avoid rain on the fruit. Drying increases flavour, storability and colour, and is aided by the alternation of brine and sun over each day and night period (ume.ume website, translated by K. Beppu).

Umeshu

Umeshu has been made traditionally in the home for centuries. Commercial production began in Japan in the 20th century. Trade interviews described the following process.

Umeshu is made by steeping whole mume fruit in alcohol and sugar to extract the flavour. This liquor is stored for at least a few months to mature, while high quality umeshu may be aged for 19 years and more, sometimes in wooden barrels (Japan Liquor Manufacturing Association listing). On bottling, the fruit is usually removed, and some manufacturers retail it for flavouring drinks. Some umeshu is bottled in wide-necked jars with several fruit. While products vary, a typical recipe uses one kilogram

fruit, half a kilogram sugar and one litre of shochu to produce 2.3 litres of umeshu, the main production costs being fresh fruit, ethanol, sugar and bottles (Japanese trade interviews, 2005).

Traditionally, fresh mume fruit for umeshu are harvested at an immature stage, with the skin still green but the seed surface brown, although some manufacturers have been using ripe fruit. A large manufacturer receives the fruit in 20 kilogram open-weave plastic trays to keep it cool and dry, and processes it within 24 hours of harvest. Fruit quality for umeshu production is assessed primarily on fruit flavour, followed by smell, acidity, large size (if to be retained in the finished product) and thin skin. A major manufacturer has three fruit grades – ‘Excellent’ (Shu); ‘Good’ (YW), and ‘Poor’ (GAI — with black spots and scratches) (Beppu, 2003; Japanese trade interviews, 2005; Koichiro, I., 2005).

The traditional umeshu base is shochu, a clear Japanese spirit with around 35 per cent alcohol, made from barley, sweet potato, rice or buckwheat inoculated with aspergillus or ‘koji mould’, fermented and distilled. Sake, brandy, rum (for example ‘brown sugar rum’ from cane juice), cassis, other spirits and oats (‘mugi’) are also used (The Japan Liquor Manufacturing Association). Rum is a popular drink base with young Japanese, in bars and at home, and is often mixed with fruit juice and carbonated water (JETRO, 2003, p2.1).

Product samples for this project. These were made on a recipe of 1kg fruit, 0.5kg granulated sugar and 1L sugar cane ethanol (25 per cent alcohol) provided by a Japanese manufacturer. The fruit was washed and soaked overnight, then pricked half a dozen times with a thin metal skewer, layered in a glass jar with the sugar, and ethanol added. The jar was turned regularly to dissolve the sugar and keep the fruit in contact with the alcohol. The sealed jar was stored in a dark cupboard for several months. Samples were made using green and ripe Ellching and Daching, and ripe Nankou, Ianjy and Bungo. A second set of samples was made from ripe Ellching, Daching and Ianjy using shochu instead of ethanol.

Recipe used in RIRDC 2000 project: 1kg of fruit was cleaned, soaked overnight in tap water, drained, pricked five or six times with a strong, thick toothpick, and placed in a jar. 0.5kg crystal sugar and 1.2ml Japanese shochu (25 per cent alcohol) were added and the jar was sealed and stored in a dark cool place for three months (Nguyen, 2000 p49-50).

Consumer recipe in producers’ co-operative brochure: Rinse 1kg green mume fruit, layer in a jar with 1-1.5kg sugar and add 1.8L white liquor. Store in cool dark place, moving jar occasionally, and remove the fruit after one month. The fruit can be used for jam (JA Co-operative brochure, translated by Y. Mizuta).

Ume juice

A producers’ co-operative brochure provided this recipe for ume juice: Freeze 1kg ripe mume fruit for 24 hours. While defrosting, layer in a jar with 0.75kg sugar. When fully thawed tilt the jar to mix the sugar daily for 10 days. Rebottle in a sterile jar then store in refrigerator. (JA Co-operative brochure, translated by Y. Mizuta)

Ume vinegar

The same brochure gave this recipe for ume vinegar: Rinse 1kg green mume, layer with 30g combo (thick dry kelp), and add 1.2L rice vinegar. Store in dark place for six months, then remove the fruit. (JA Co-operative brochure, translated by Y. Mizuta)

Appendix D: Japanese laws and regulations for food and liquor

Table D.1. Japanese laws and regulations for food and liquor

Legalisation	Government department	Applies to
Food hygiene		
Food Sanitation Law	Ministry for Health Labour and Welfare (MHLW) & local governments.	Importation, sale and labelling of food and liquor; food additives and pesticide residues; review of food safety problems; establishment of food standards, chemical analysis of food, biological and toxicological studies re food safety; microbiological analysis; approval and inspection of food manufacturers, processors, retailers, food service
Additives		
Enforcement Regulations, Food Sanitation Law (Supplemental Table 2)	MHLW, local governments.	Foods and food additives packaged for sale - cleanliness and sanitation in manufacture, storage and sale of food; prohibition of sale of unsafe food or food additives; establishing standards and criteria for food and additives
Food safety		
Basic Law on Food Safety	Ministry of Agriculture, Forestry and Fisheries (MAFF); Food Safety & Consumer Affairs Bureau, Regional Agricultural Administration Offices	Food safety (chemicals and micro-organisms)
Labelling Program for Foods Containing Allergens (based on Food Sanitation Law)		Ingredients and additives likely to cause allergic reactions.
Nutritional Improvement Law	Ministry of Health, Labour and Welfare	Processed foods with nutritional labelling. Not mandatory otherwise.
Packaging		
Food Sanitation Law	MHLW, local governments.	Hygiene, safety, standards.
Law for Promotion of Effective Utilisation Resources	Ministry of Economy, Trade and Industry; Ministry of the Environment; MAFF	Identified labelling provisions for food and liquor
The Containers and Packaging Recycling Law		Recycling of packaging for food and liquor
Measurement Law	Ministry of Economy, Trade and Industry	Accurate measurement of net contents for food and liquor
Labelling		
Food Sanitation Law	MHLW, local governments; responsibility of retailer	Labelling standards for processed foods in containers, packaging, additives
Law for JAS Law – The Law Concerning Standardization and Proper Labelling of Agricultural and Forestry Products	MAFF, JAS registered grading organisations	Standards for all fresh and processed foods sold for consumer use. Requires foods sold as organic to have JAS grading.
Quality Labelling Standard for Processed Foods	MAFF	Details of contents, place of origin of main ingredient, country of origin of imports
Organic foods		
Specific JAS standards		Production, manufacturing methods and unique ingredients.
Fair competition, benefit to consumers		
Act Against Unjustifiable	Fair Trade Commission of Japan	Prevents false, exaggerated or vague claims

Premiums and Misleading Representations (Fair Competition Code)		on label or packaging, including country of origin, for food and liquor.
Voluntary codes based on Act Against Unjustifiable Premiums and Misleading Representations	Fair Trade Commission of Japan, Fair Competition Councils, regulated by industry	
Various consumer protection ordinances	Local government	
Intellectual property		
Trademark Law	Japanese Patent Office	
Patent Law		
Unfair Competition Prevention Law		
Liquor tax		
Liquor Tax Law	Ministry of Finance, administered by National Tax Agency	Manufacture, retail and importation of liquor, permissible additives
Liquor Business Association Law		Labelling of liquor, including labelling

Source: Food Law Internet Project, 2000 Japan (FLIP website); MAFF 2003,; JETRO Guide for Exporting Foods to Japan; MAFFh

Appendix E: Harmonised Tariff Items statistical codes for mume imports to Japan

Table E.1: Harmonised Tariff Items statistical codes for mume imports to Japan

Tariff heading	Harmonised system code	Description	General tariff	WTO tariff
0809		Fresh apricots, cherries, peaches (including nectarines), plums and sloes, fresh (No specific tariff listed for mume)	10%	6%
0182		Fruit and nuts, provisionally preserved (for example by sulphur dioxide gas, in brine, sulphur water or other preservative solutions), but unsuitable in that state for immediate consumption		12%
	081290 490 1*	Other		12%
2008		Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified		
	200899 100 3	Ume (fruit of mume plum)	20%	12%
2208		Undenatured ethyl alcohol of an alcoholic strength by volume of less than 80% vol; spirits, liqueurs and other spirituous beverages		
	220870 000 1	Liqueurs and cordials, includes umeshu	JP¥141.1 /litre	JP¥126/litre

*for example Tariff Rate no. 0812.90, Statistical Code No. 490

Source: *Japan Economy Information – Tariff viewing options*, 2006, Asia-Pacific Economic Corporation

Appendix F: SWOT (Strengths, weaknesses, opportunities and threats) analysis of factors affecting the potential for an Australian mume industry

Table F.1. SWOT analysis of factors affecting the potential for an Australian mume industry

Strengths	Weaknesses	Opportunities	Threats
Advanced agronomic knowledge and knowhow	Higher production and transport costs than most Asian producers	Post harvest treatments to export fresh fruit to Japan	Japanese manufacturers supporting mume production in other Asian countries
Experienced stone fruit producers	Lacks experience with mume or products	Dwindling mume production in Japan	Growing imports of low priced Chinese product to Australia and Japan
Counterseasonal production to Asia	Investment needed to mechanise production and meet Japanese standards	Reduce production costs through scale and efficiencies	Improving quality of Chinese umeboshi imports to Japan
Can manage fruit size and consistency	Prevalence of fruit fly	Replace domestic imports prohibited because of additives	Chinese processors introducing HACCP based quality assurance
Regulated use of agricultural chemicals	No counterseasonal opportunity once processed	Japanese resistance to chemical residues in Chinese foods	Japanese manufacturers introducing premium cultivars to China
Ample resources for production and processing	No consumer market for fresh fruit	Develop cold storage treatments to ship fresh fruit to Japan	Strong Japanese brands with established distribution
Can mechanically harvest fruit at hard green stage	Lack of quarantine access for fresh fruit to Japan	Supply semi-processed fruit as ingredients to Japan	Growing acceptance of low-priced Chinese product in Japan
Can reduce chemical inputs by picking immature	Little awareness of mume in Australia	Extend supply season for Japanese manufacturers	Westernising of Japanese diet
Reduced costs and consistent product through mechanisation	Low understanding of Japanese processes and consumer requirements	Make products that require fresh mume (umeshu, umeboshi)	Japanese distributor resistance to Australian brands
World's best practice fruit production, quality management, processing	Longer shipping times to Japan than most suppliers	Price premiums through Nankou cultivar	Japanese consumers' growing price-sensitivity
Extended season through climatic range and high and low chill cultivars	Language barriers in Japan	Shortages of fresh mume in Japan	Japan moving to import fresh mume from China
Quarantine ban on imports of fresh mume to Australia		Supply Japanese manufacturers seeking ingredients off-shore	
Preferred Japanese cultivars		Growing demand for umeshu in Australia	
Competitive prices of key ingredients (salt, sugar)		Japanese visitors and residents seeking traditional foods	
No access for stonefruit imports		Aging Japanese seeking beneficial foods	
Can produce organic fruit		New products to avoid direct competition	
Cost advantage over imported umeshu		Neutraceuticals and pharmaceuticals	
World standard food processing, manufacture, processing practices		Partner with Japanese manufacturers to guide production	
Freight advantage over imports in domestic market		Reduce risk with a range of products	

Strengths	Weaknesses	Opportunities	Threats
Australia's image in Japan as a safe, quality and reliable supplier		Demand for Japanese foods and drinks outside Japan	
Business, cultural and tourism links with Japan		Undeveloped Japanese liquor market	
Can trial Japanese products on local Japanese market		Emerging Japanese market for organics	
Pharmaceutical research capability			
Can communicate with Japan in same time zone			
Organic production where no fruit fly			

The analysis indicates a considerable number of opportunities for an Australian industry to access the Japanese and Australian markets, mainly for umeshu, and technical expertise and production systems and access to mume cultivars that would provide an competitive advantage in the Japanese market. It also highlights the main competitive threat, from China, in these markets.

Appendix G: Industry case studies in Australia

These summaries describe four Australian industries which have developed products for the Japanese market.

Japanese ginger

Queensland company Buderim Ginger developed a Japanese style pickled ginger, primarily for the domestic food service industry. It found the product was uncompetitive in the Japanese market which had for many years imported large volumes of low priced pickled ginger from China with no apparent shortage in supply. It also found the market uses ginger only as a garnish, leaving little opportunity for a differentiated and higher priced Australian product. Although Chinese imports were stopped because of unacceptable colorants, this was quickly remedied, closing any supply window for Australian product. Attempts to supply Japanese importers in Australia were also unviable due to higher production costs. However, the company has been able to successfully export crystallised ginger to Japan, being a western style food (O'Brien G. 2005)

Wasabi

This traditional Japanese root vegetable is mainly used fresh or in a paste with Japanese dishes such as raw seafood and buckwheat noodle, while the leaves and picles are pickled or powdered. In recent years wasabi has been added to many non-traditional foods including ice cream, wine, cheese, salad dressings and crackers in Japan and in cheese, dips and other foods in Australia's and other western cuisines. Consequently demand has growing rapidly, outstripping supply.

In Japan around 5,000 tonnes of premium grade wasabi is cultivated annually in streams, but declining production due to urbanisation of land, water pollution, and labour shortages and cost has led to imports of stream-cultivated product from the USA and field-cultivated wasabi (considered inferior in Japan) from Indonesia and China.

Small wasabi industries have developed in Tasmania and Victoria with the support of RIRDC, mainly supplying restaurants and cheese-makers. Victoria's Rubicon Mountain Pty Ltd grows stream-cultivated wasabi in the run-off from its aquaculture operation, assisted with seed and advice by Ito En (Australia) Ltd, a wholly owned subsidiary of Ito En (Japan) Ltd, a large Japanese food and beverage company (Dundas, P., 2005; Sparrow, A., 2004; Bhaskaran, S. 2002).

Udon noodles

Western Australia company Ball Noodle Manufacturing Pty Ltd produces Japanese-style udon noodles for the Australian and Japanese markets. Japan Food Corporation manages distribution in Australia. Most product carries the brands of the buyers - Japanese noodle manufacturers and institutional markets own brands and American distributors' house brands. Ball Noodle also markets its own brand through a Japanese supermarket chain.

The company recommends using top quality raw materials, state of the art machinery, expert management and superior quality control. It employs a Japanese noodle technician to maintain strict quality control, and a HAACP systems manual developed for the manufacturing facility has provided a strong marketing advantage. The company's Japanese importers have acknowledged the high quality of the wheat varieties and salt used, and the company's clean safe manufacturing environment ('The Right Noodles' 2003).

Sun Masamune Sake Brewery, NSW

Sun Masamune at Penrith, NSW was established in 1996 as Australia's first sake brewery, and is now a subsidiary of leading sake manufacturer Konishi Shuzo of Itami in Japan. In 2000 Sun Masamune

produced 750,000L of premium-grade sake, exporting 80 per cent in bulk to Japan for rebottling and distribution, and bottling the rest for the Australian market and other countries including the USA.

Production is overseen by a Japanese master brewer, using premium quality large grain Australian Japonica rice and high quality water from the neighbouring Blue Mountains. The rice is milled, washed, soaked and steamed, and Koji mould, sake yeast and filtered water added for fermentation. No preservatives are used. The sake products vary in alcohol content (around 15–16 per cent), fruitiness, sweetness/dryness, smoothness of texture, packaging, taste, and recommended temperature for consumption, to satisfy Japanese standards for Junmai-style sake and the Japanese taste. The sake is marketed under the Go-Shu brand, with ‘Australian made’ and a map of Australia on the label.

New products include Go-Rin, made on champagne yeast, fruitier and sweeter than traditional sake, and developed to appeal to the Australian consumer. It is distributed through Japanese restaurants in Melbourne and Sydney, and to Japanese tourists shopping in duty free shops as an Australian souvenir. Tsunami Sparkling Sake Cocktail, a blend of sake with lychee and muscat, with 4.5 per cent alcohol, is distributed through the parent company into Japanese retail stores, and also distributed in Australian cities. ‘Australian-made’ appears on the front label.

Sun Masamune has used lower priced high quality Australian rice and its innovative products to compete in the Japanese and Australian markets (Brammal, L. 2003; Gregor, S. 2000)

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